Final Integrated Natural Resources Management Plan
Naval Weapons Station Seal Beach, California

January 17, 2014

Prepared for:

U.S. Department of the Navy
Naval Weapons Station Seal Beach
Environmental Department
800 Seal Beach Blvd.
Seal Beach, CA 90740

Under Contract With:

Naval Facilities (NAVFAC) Southwest
Contract No.: N62470-08-D1008
Task Order No.: FZND

Integrated Natural Resources Management Plan

Naval Weapons Station Seal Beach

Final
January 2014

Prepared for:

U.S. Department of the Navy
Naval Weapons Station Seal Beach
Environmental Department
800 Seal Beach Blvd.
Seal Beach, CA 90740

Under Contract With:
Naval Facilities (NAVFAC) Southwest
Contract No. N62470-08-D-1008/FZND

Prepared by: Tierra Data Inc., 10110 W. Lilac Rd., Escondido, CA 92026. www.tierradata.com. Minor changes and updates by Tetra Tech, Inc., 5383 Hollister Avenue Suite 130, Santa Barbara, CA 93111. www.tetratech.com.

Station Contact: Robert Schallmann, Ecologist, Naval Weapons Station Seal Beach, Environmental Department, 800 Seal Beach Blvd., Seal Beach, CA 90740-5000.

Photos taken by Tierra Data Inc. staff for use in this document unless otherwise noted in photo caption.

Integrated Natural Resources Management Plan

Naval Weapons Station Seal Beach

Final
January 2014

Prepared for:

U.S. Department of the Navy
Naval Weapons Station Seal Beach
Environmental Department
800 Seal Beach Blvd.
Seal Beach, CA 90740

Under Contract With:
Naval Facilities (NAVFAC) Southwest
Contract No. N62470-08-D-1008/FZND

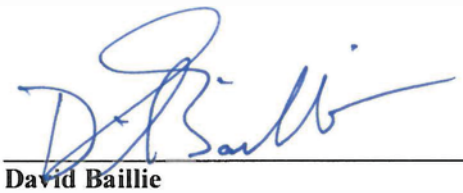
Naval Weapons Station Seal Beach
Integrated Natural Resources Management Plan
Seal Beach, California

Approving Officials:

13 JUN 2014

Commanding Officer,
Martin Hardy III
Captain, U.S. Navy
Naval Weapons Station Seal Beach

Date



13 JUN 2014

David Baillie
Environmental Director
Naval Weapons Station Seal Beach

Date

13 JUNE 2014

Robert Schallmann
Conservation Program Manager
Naval Weapons Station Seal Beach

Date

Naval Weapons Station Seal Beach
Integrated Natural Resources Management Plan
Seal Beach, California

FEB 13 2014

Concurring Agency

Scott A. Sobiech

Jim Bartel
Field Supervisor
U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California

Date

Naval Weapons Station Seal Beach
Integrated Natural Resource Management Plan
Seal Beach, California

The National Marine Fisheries Service has reviewed the Naval Weapons Station Seal Beach Integrated Natural Resource Management Plan (INRMP), and provided comments to the Navy concerning the NMFS trust resources that are described in the plan. NMFS agrees that, if revised in accordance with the comments provided by NMFS, the plan, Chapters 3-5 in particular, endeavors to promote the conservation, protection, and management of fish and wildlife resources, as further elucidated in 16 U.S.C. § 670a(b).

Our agreement discussed above should not be taken to signify consultation or compliance with any applicable federal law (e.g., ESA, MMPA, FWCA, MSA) or regulations regarding NOAA trust resources, nor is it a substitute for compliance with any such laws or regulations. If the Navy determines that the projects implemented under this INRMP or management strategies identified in this INRMP 1) constitute federal actions which may affect listed species under NMFS jurisdiction or their critical habitat, 2) may adversely affect any essential fish habitat, or 3) otherwise require consultation under the FWCA, such projects or management strategies would require consultation.

Furthermore, the agreement discussed above shall also not be interpreted as an automatic preclusion of Naval Weapons Station Seal Beach lands or marine habitats from consideration for designation as critical habitat under the ESA. Any such preclusion would be considered during the regulatory processes associated with the designation of critical habitat.

William W. Stelle, Jr.
Regional Administrator
West Coast Region
National Marine Fisheries Service

June 12, 2014
Date

Naval Weapons Station Seal Beach
Integrated Natural Resources Management Plan
Seal Beach, California

APPROVAL

The San Diego National Wildlife Refuge Complex has participated in the preparation of this INRMP, in accordance with the Sikes Act (16 U.S.C. 670a *et seq.*) as amended.

Concurring Agency Andrew Yuen — 3/21/14

Andy Yuen
Project Leader
San Diego National Wildlife Refuge Complex
U.S. Fish and Wildlife Service
Carlsbad, California

Date

Naval Weapons Station Seal Beach
Integrated Natural Resources Management Plan
Seal Beach, California

APPROVAL

The California Department of Fish and Wildlife has participated in the preparation of this INRMP, in accordance with the Sikes Act (16 U.S.C. 670a *et seq.*) as amended.

Concurring Agency _____ 4-14-14

Edmund Pert
~~Larry Eng~~

Date

Regional Manager
South Coast Region
California Department of Fish and Wildlife
San Diego, California

Naval Weapons Station Seal Beach
Integrated Natural Resources Management Plan
Seal Beach, California

Approving Official – U.S. Navy Naval Facilities Engineering Command Southwest/CNRSW:

04/17/2014

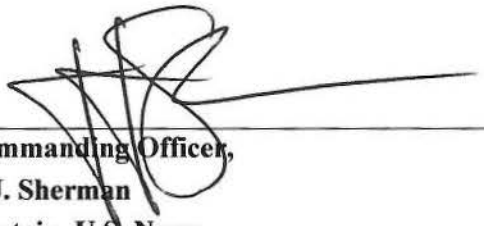
Doug Powers
Natural Resources Program Manager
NAVFAC Southwest/CNRSW
San Diego, California

Date

This Page Intentionally Blank

Naval Weapons Station Seal Beach
Integrated Natural Resources Management Plan
Seal Beach, California

Approving Officials:



12 Sep 19

Commanding Officer,
J. J. Sherman
Captain, U.S. Navy
Naval Weapons Station Seal Beach

Date

12 Sep 2019

David Baillie
Environmental Director
Naval Weapons Station Seal Beach

Date

12 SEPT 2019

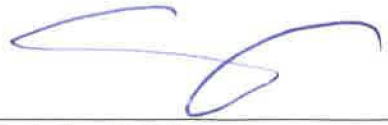
Robert Schallmann
Conservation Program Manager
Naval Weapons Station Seal Beach

Date

APPROVAL

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (as amended), DoDINST 4715.03, and OPNAVINST 5090.lD. This document was prepared and reviewed in coordination with U.S. Fish and Wildlife Service and California Department of Fish and Wildlife South Coast Region in accordance with the 2013 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

Concurring Agency-U.S. Fish and Wildlife Service



6/6/19

Scott Sobiech, Acting Field Supervisor
U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
2177 Salk Ave, Suite 250
Carlsbad, California 92008

Date

APPROVAL

This Integrated Natural Resources Management Plan (INRMP) fulfills the requirements for the INRMP in accordance with the Sikes Act (as amended), DoDINST 4715.03, and OPNAVINST 5090.lD. This document was prepared and reviewed in coordination with U.S. Fish and Wildlife Service and California Department of Fish and Wildlife South Coast Region in accordance with the 2013 Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations.

Concurring Agency - California Department of Fish and Wildlife

Edmund Pert
South Coast Regional Manager
California Department of Fish and Wildlife
3883 Ruffin Road
San Diego, CA 92123

6-6-19
Date

Table of Contents

This Page Intentionally Blank

Naval Weapons Station Seal Beach

1.0 Introduction

1.1 Purpose of Plan

The purpose of this Integrated Natural Resources Management Plan (INRMP or Plan) is to provide Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach or Station) with a viable framework for future management of natural resources on lands it owns or controls. Required by the Sikes Act Improvement Act as amended in 1997 (SAIA) for the U.S. Department of Defense (DoD), the INRMP is the primary means by which natural resources compliance and stewardship priorities are set and funding requirements are determined. A commitment to implement priority projects, as funding permits, comes with the signatures in the front of this Plan.

The SAIA stipulates that this INRMP provide for:

- Conservation and rehabilitation of the natural resources,
- Sustainable, multipurpose use of the resources,
- Public access that is necessary and appropriate for the use described above, subject to safety and military security requirements,
- Specific natural resource goals and objectives, and time frames for acting on them,
- Fish and wildlife management, and land management,
- Wetlands protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants
- Integration of and consistency among various activities conducted under the Plan,
- Enforcement of natural resource laws and regulations, and
- No net loss in the capability of the military installation lands to support the military mission of the installation
- Such other activities as the Secretary of the Navy (SECNAV) determines appropriate.

An INRMP is an ecosystem-based plan to be developed in cooperation with, and with mutual agreement of, the U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) – National Marine

Fisheries Service (NMFS), and the state fish and wildlife agency, in this case, the California Department of Fish and Wildlife (CDFW). These are the signatories and concurring agencies for the NAVWPNSTA Seal Beach INRMP. Other resource agencies that participated in the planning process to develop this INRMP included the U.S. Army Corps of Engineers (USACE) and the Regional Water Quality Control Board (RWQCB).

This INRMP integrates the military mission and natural resource components of existing NAVWPNSTA Seal Beach plans, and meets the requirements of SAIA and all applicable DoD, U.S. Navy, and installation regulations. It fulfills the requirements of DoD Instruction (DoDINST) 4715.03 (18 March 2011) and Naval Operations Instruction (OPNAVINST) 5090.1C CH-1, *Environmental and Natural Resources Program Manual 18 July 2011*. This INRMP is covered under the National Environmental Policy Act (NEPA) by the Environmental Assessment (EA) appended to this document (Appendix A).

The Navy intends to implement this INRMP within the framework of regulatory compliance, mission obligations, anti-terrorism and force protection limitations, and funding constraints. Any requirement for the obligation of funds for projects in this INRMP shall be subject to availability of funds appropriated by Congress, and none of the proposed projects shall be interpreted to require obligation or payment of funds in violation of any applicable law, most notably the Anti-Deficiency Act (31 U.S. Code [U.S.C.] 1341 *et seq*).

1.2 Location and Property Description

Naval Weapons Station Seal Beach is located in northern Orange County between Huntington Beach and Long Beach, California (Map 1-1), approximately 25 miles south of the Los Angeles urban center. Naval Weapons Station Seal Beach property is surrounded by developments associated with the city of Seal Beach, bordering the Station on the west, southwest, and north. The city of Westminster borders NAVWPNSTA Seal Beach on the northeast, the city of Huntington Beach is south/southeast, and unincorporated county land is located at the end of Edinger Avenue, also to the south.

The station is bounded by Interstate 405/CA22 on the north, Seal Beach Boulevard on the west, Bolsa Chica Road on the east and the Pacific Ocean on the south. The station is bisected by Pacific Coast Highway and Westminster Boulevard. Entrances to the station are located on Seal Beach and Westminster Boulevards.

In the Seal Beach vicinity, land use is medium-density residential, primarily consisting of single-family units on individual lots with apartments and condominiums in the Westminster-Garden Grove area. Leisure World retirement community is nearby on Seal Beach Boulevard. Industry and oil extraction sites are scattered throughout this area. Aeronautical and space research facilities are long-time members of the local community that sometimes use NAVWPNSTA Seal Beach property. The Boeing facility borders NAVWPNSTA Seal Beach to the west. Sunset Aquatic Park, immediately south of the Station includes boat slips, a marine repair yard, a boat launch ramp, public picnic areas, and a Harbor Patrol office. The Los Alamitos Armed Forces Reserve Center is located across Interstate 405 north of NAVWPNSTA Seal Beach; the U.S. Navy operates a golf course on U.S. Army land there under permit number DACA09-4-81-87, issued in 1981.

Map 1-1 Naval Weapons Station Seal Beach regional location.

1.3 Military Mission and Strategic Vision

1.3.1 Naval Weapons Station Seal Beach Mission

Naval Weapons Station Seal Beach and its detachments will be the CNIC model for shore-based infrastructure support, seamlessly enabling tenant commands to excel in serving the Fleet while embracing a culture of continuous improvement, transparency, and execution (NAVWPNSTA Seal Beach 2011).

The mission of NAVWPNSTA Seal Beach and its detachments is to provide shore-based infrastructure support to the Navy's ordnance mission and other fleet and fleet support activities. The Station achieves its mission through mastery of ordnance management, maintenance and technical support.

The primary responsibility for oversight and management of NAVWPNSTA Seal Beach is Commander Navy Installations Command (CNIC) exercised through Commander, Navy Region Southwest (CNRSW). Regional command is provided by San Diego-based CNRSW, one of six Regional Commanders.

The Seal Beach National Wildlife Refuge (SBNWR or Refuge) contains a significant portion of the natural resources of NAVWPNSTA Seal Beach. The principle objective of SBNWR, as stated in the SBNWR Management Plan, Endangered Species Management and Protection Plan, and the Comprehensive Conservation Plan (CCP), is to preserve and manage the habitat necessary for the perpetuation of two endangered species–the light-footed clapper rail (*Rallus longirostris levipes*) and the California least tern (*Sterna antillarum browni*). Also, to maximize endangered species' opportunities for survival both at the Refuge and throughout their ranges, and to preserve habitat used by migrant waterfowl, shore birds, and other water birds by managing the preserve primarily as a natural estuarine or salt water marsh area.

1.3.2 Vision for this Integrated Natural Resources Management Plan

Participants in the planning process for this INRMP agreed to the following vision:

- *We will improve the condition of a coastal and nearshore ecosystem, which contains land and water dedicated to the support of national security, while achieving long-term certainty and permanence for the Navy mission at NAVWPNSTA Seal Beach. We will seek maximum ecological health, productivity, biodiversity, and recovery of habitats and species at risk.*
- *We will lead the Navy in institutionalizing a Navy Conservation Ethic. We will change NAVWPNSTA Seal Beach's perceived natural resource liabilities (wetlands and sensitive species) into verifiable assets for ecosystem benefit.*
- *We will fully comply with regulatory requirements while taking advantage of opportunities to add an incentive base to a management program that is fundamentally driven by regulation. Funding of natural resource goals and objectives will be attained at least partially in the marketplace through use of public-public and public-private partnerships.*

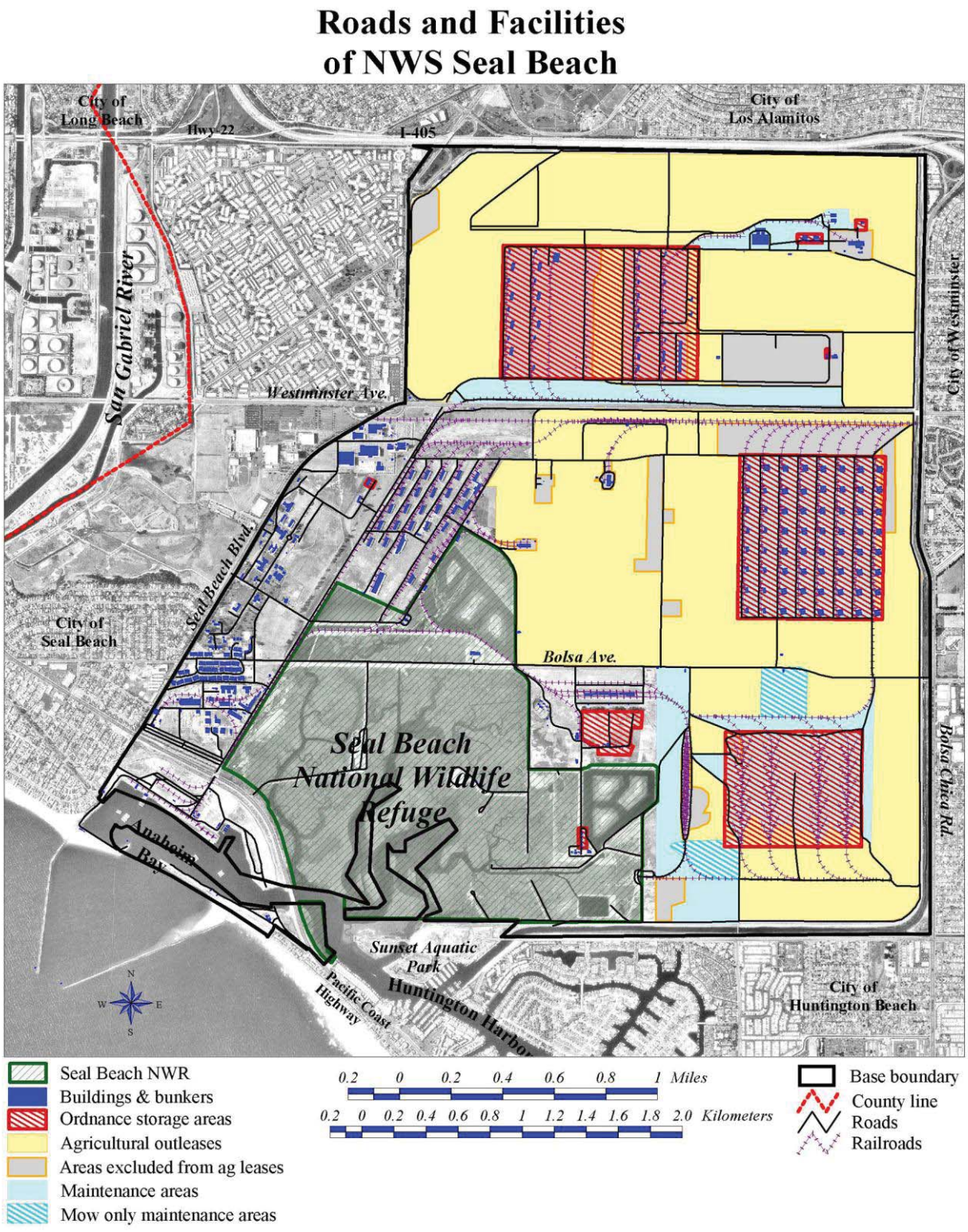
A charter statement for the planning team was also developed (see Section 1.7 Planning Process).

1.4 Land Use Summary

Naval Weapons Station Seal Beach is located within the city of Seal Beach in Orange County. Major landmarks on the Station include Anaheim Bay and associated marshlands, an administrative area, and magazine complexes. Weapons and ammunition are transported via truck, rail, and through the harbor at Anaheim Bay. The inner harbor has docking facilities for U.S. Navy vessels, where loading and unloading of ammunition takes place.

On either side of the harbor lie stretches of sandy beach. On the upcoast side, the beach is used by U.S. Navy personnel and families for recreational purposes. This beach extends approximately 1,000 feet northwest of the entrance channel to a fence that separates NAVWPNSTA Seal Beach from the oceanfront community of Seal Beach. A much larger 20-acre beach lies outside the U.S. Navy fence on the southeast, providing beachfront for the community of Surfside.

With the exception of the Seal Beach National Wildlife Refuge, which is located on 920 acres in the southwest corner, much of NAVWPNSTA Seal Beach has been developed into support facilities for the Station, including magazines for ordnance storage, office buildings, roads, railroad revetments, parking lots, housing, recreation facilities, and open space (Map 1-2). Basic infrastructure includes 220 buildings, 49 miles of railroad track, 68 miles of paved road, and 127 ammunition magazines (NAVWPNSTA Seal Beach 2002) (Map 1-2). More than 2,000 acres are used for agriculture, which is managed through a leasing program. A more detailed description of land use is provided in Chapter 2.



Map 1-2. Naval Weapons Station Seal Beach facilities.

1.5 Tripartite Agreement

The USFWS and CDFW have a statutory obligation to review and coordinate on INRMPs. Recognizing this key, three-way partnership in preparing, reviewing, and implementing INRMPs among the DoD, U.S. Department of Interior (USDI), USFWS, and state fish and wildlife agencies, a Tripartite Agreement was signed in July 2013. The CDFW and other state fish and wildlife agencies were represented by the International Association of Fish and Wildlife Agencies (IAFWA). The desire is for "synchronization of INRMPs with existing Fish and Wildlife Service and state natural resource management plans" and "mutually agreed-upon fish and wildlife service conservation objectives to satisfy the goals of the Sikes Act."

A Strategic Action Plan (03 February 2005) was also developed among the three partners to improve the quality and consistency of INRMPs and to ensure compliance with two amendments to DoD responsibilities under the Migratory Bird Treaty Act (MBTA) and Endangered Species Act (ESA). The National Defense Authorization Act (NDAA; 2003 Authorization) for Fiscal Year 2003 exempted the DoD from the MBTA for the incidental take of migratory birds as a result of otherwise authorized military readiness activities until the Secretary of Interior prescribes regulations authorizing such take. The DoD shall give appropriate consideration to the protection of migratory birds when planning and executing military readiness activities. As indicated in the proposed rule, migratory bird conservation will be incorporated into INRMPs, where applicable, to mitigate where needed and to protect migratory birds and their habitats. The NDAA for Fiscal Year 2004 changed the ESA regarding INRMPs, which were justified on the basis of the need to promote military readiness while protecting listed species. Under new Section 4(a)(3)(B)(i) of the ESA, the Secretary of the Interior or the Secretary of Commerce, as appropriate, is precluded from designating critical habitat on any areas owned, controlled, or designated for use by DoD where an INRMP has been developed that, as determined by the Interior or Commerce Secretary, provides a benefit to the species for which critical habitat designation is proposed.

1.6 U.S. Fish and Wildlife Service Refuges

The presence of a National Wildlife Refuge (NWR) within the boundaries of a military reservation presents unique circumstances for natural resources planning and management. A Memorandum of Understanding (MOU) between the U.S. Navy and USFWS Refuges has been under development for several years (U.S. Navy and USFWS, in progress). It is intended to establish procedures for cooperation between the two agencies in the management of the Refuge and natural resource compliance on surrounding, non-refuge lands; the MOU is currently in draft form. The Refuge was established in 1972 under P.L. 92-408, the "Act to Establish SBNWR" which directed the Secretary of the Interior to administer the Refuge in a manner that is mutually acceptable to the Secretary of the Navy. The USFWS manages the Refuge primarily through the Comprehensive Conservation Plan (USFWS SDNWR 2012), completed in May of 2012, and in accordance with NWR System Improvement Act of 1996 (as amended in 1997). Other supporting natural resource documents include: the SAIA of 1997 as amended (Public Law [P.L.] 105-85); Record of Decision (ROD) (1991) on the 1990 Environmental Impact Statement (EIS) on predator management for federally listed species; General Plan for Use of U.S. Navy Lands and Waters for Wildlife Conservation and Management Purposes, NAVWPNSTA Seal Beach, California of 1973; Fish and Wildlife Management Plan, NAVWPNSTA Seal Beach, updated in 1969; and NAVWPNSTASBINST 5700.1 of 1996 (established the SBNWR Nature Center and recognized the Friends of SBNWR as a co-sponsor of the Nature Center).

1.7 Planning Process

Development of this INRMP involved many individuals and regular meetings over the course of several years (Figure 1-1). The Core Group consisted of representatives of the U.S. Navy, Environmental, USFWS, Refuge, and the Contractor, Tierra Data Inc., Tetra Tech, Inc. Working Group meetings consisted of representatives from NAVWPNSTA Seal Beach, USFWS Ecological Services, USFWS-Refuges, CDFW, NOAA, USACE, and RWQCB. Internal stake- holders included the addition of a broader range of U.S. Navy, Refuge, and community local interests with a stake in the outcome. External stakeholders included the public at large who were invited to comment.

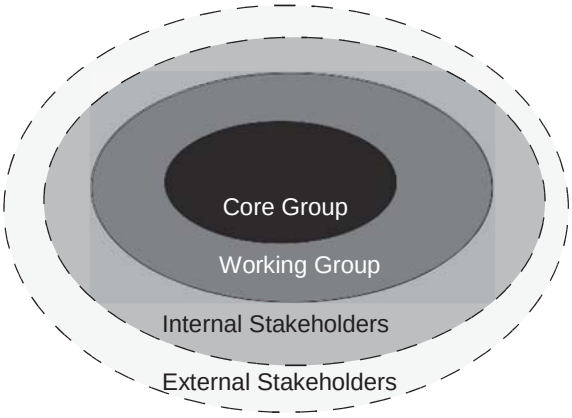


Figure 1-1. Naval Weapons Station Seal Beach Integrated Natural Resources Management Plan planning process groups.

The Core Group developed a charter statement to guide its interactions during the course of this Plan's development (Figure 1-2).

Naval Weapons Station Seal Beach INRMP Charter

Our goal is to develop an Integrated Natural Resource Management Plan to achieve long-term ecosystem health of all natural resources at the Naval Weapons Station Seal Beach which is compatible with Pacific Fleet readiness needs and ensures mission sustainability. We will achieve this goal by exploring all possibilities for ecosystem management and enhancement and identifying all foreseeable mission scenarios and needs.

Department of Defense guidelines will be used to ensure compliance with the Sikes Act as amended and consistency with Department of Defense stewardship programs. In addition, the U.S. Fish and Wildlife Service Refuge management needs will be integrated to the maximum extent feasible. The INRMP will provide resource managers with a plan that can be readily implemented as well as identifying potential future enhancements and mission scenarios.

We will work in a collaborative manner among ourselves and stakeholders. We commit ourselves to supporting the process by attending scheduled meetings and reviewing and commenting on documents. We will openly share information and ideas.

Figure 1-2. Charter Statement to guide Naval Weapons Station Seal Beach Integrated Natural Resources Management Plan development.

INRMP Goal and Objectives Summary

The following section includes the INRMP's Vision Goal as well as three specific goals that discuss ecosystem-based management, sustaining the military mission, and the need for planning and communication to achieve them. This section also contains the objectives and standards of success that will guide natural resource management.

The goals set forth in this INRMP are compatible with the DoD environmental mission to prevent pollution, protect the environment, and protect natural, historic, and cultural resources (DoD 1996), as well as the goals defined in the Department of Defense Natural Resources Conservation Strategic Plan (U.S. Department of the Navy [DoN] 1994).

Goals

Vision Goal: *This INRMP will provide the guidelines, means, and mechanism for assuring long-term sustainability and vitality of both the military mission and ecological health of NAVWPNSTA Seal Beach's natural resources. This will be accomplished such that natural resource protection, restoration, and enhancement can proceed consistent with and unhindered toward internal, National Wildlife Refuge, and regional ecosystem management goals for these lands and waters, without current or future compromise or loss to the military mission. All available Navy and non-Navy resources, the consensus of resource agencies and the public, and effective communication will be employed to secure seamless management across jurisdictions for the benefit of healthy and sustainable land use, habitats, wetlands, and populations of endangered, threatened, and management focus species.*

Goal 1: Protect the high-value, scarce, and at-risk coastal habitats through appropriate ecosystem-based management and enhancement. Emphasis will be placed on at-risk and endangered species, the wetland and upland habitat interface, and sustainable agricultural practices.

Goal 2: Sustain the current and future military mission by providing stewardship of open space and natural resources that include land, water, and wildlife.

Goal 3: Provide the organizational capacity, support, funding, and communication linkages necessary for effective strategic planning and administration of this Plan and NAVWPNSTA Seal Beach's natural resources.

Objectives

To achieve these goals, a total of 48 discrete objectives and associated tasks were developed. They are described in detail in Chapter 5.

Standards of Success

- Mission accomplishment is unimpeded (including security, explosive safety, etc.).
- Contribute to sustainment and long term needs of military land use.
- A net gain in ecological productivity, biodiversity, and sensitive species recovery.
- Work toward a resilient system that is self-recoverable with minimum human intervention.
- Navy projects will not be delayed and will contribute to no net loss.

- Full integration with NAVWPNSTA Seal Beach programs for cost-efficiency and mutual benefit towards EPSO vision and goals.
- A growing internal and external conservation ethic as measured by volunteerism, public interest, and participation.
- Funding strategies that allow progressive implementation of restoration goals and a program that is increasingly self-supporting.
- Actions are aligned with regional ecosystem management.
- Comply with federal, state, and local laws and regulations, executive orders, and DoD policies.
- Facilities management must be consistent with INRMP requirements, objectives, and tasks.

1.8 Key Issues

This INRMP addresses the management of all natural resources on NAVWPNSTA Seal Beach, with a focus on key issues as identified by the Working Group. A key issue is an obstacle to achieving the Plan's goal that has more than one solution or is not easily solved. Many of these issues will require sorting out responsibilities, liability, protection, and coordination requirements for the often conflicting missions and priorities of two primary agencies: U.S. Navy and USFWS. The following key issues were identified and are presented in *no* order of priority, except generally from broad to specific topics.

- "No net loss" to the military mission needs to be defined for this specific property, measured, and monitored so that natural resource activities can avoid contributing to such loss.
- Since 90 percent of the historical coastal marshes in Orange and Los Angeles Counties are gone, it is urgent that the NAVWPNSTA Seal Beach resource's health be maximized. However, the U.S. Navy considers enhancement and restoration activities to contain a risk of encroaching on the military mission due to their ability to encumber other uses of a site by creating permanent, regulated habitats occupied by protected species. Uncertainty about this opportunity cost of decisions, some of which are probably irreversible (such as conversions of uplands to wetlands), has resulted in lost opportunities for habitat restoration work.
- On the other hand, since the long-term, undiminished sustainability of the military mission at NAVWPNSTA Seal Beach requires securing the current boundaries from outside pressures, it is possible that to "encumber" Navy property with high-value natural resources protected by law could protect the mission. Property which functions as a critical security buffer but which sustains natural resource values less than their capability is the most likely to mutually benefit military mission and ecosystem sustainability by enhancement. At present, there is no framework or criteria for achieving a win-win for this work.
- Opportunities to benefit sensitive and scarce natural resources exist as well as appropriate financing, but no criteria have been developed to take advantage of opportunities. The marketplace for compensatory mitigation and for funding of restoration work is not benefiting the Navy as it could be. Requests from outside agencies for conducting wetland projects are denied without criteria (neither mission-related nor ecological) for Navy decision-making. The mission-related risks of doing more conservation work need to be identified and managed, and weighed against the risk of doing nothing.
- Discretionary Navy budgets are generally unavailable or insufficient for wetlands enhancement, such as required under EO 11990, unless driven by major construction projects. In general, the conventional project

mitigation pathway is not triggered sufficiently to get the needed work done, especially that which would result in a net benefit to wetlands over the policy directive of no net loss. Consideration should be given to ways in which the installation might potentially access funding apart from U.S. Navy sources for purposes of marsh enhancement–subject to proper authorization to receive and utilize such funds–since it is an important regional and national resource.

- If no management is undertaken, even in preserved areas protected from development, the habitat may decline due to boundary pressures such as urban encroachment, exotic invasions, predators, or water quality impacts. Long-term changes such as sea level rise and land subsidence.
- The restoration projects currently proposed in concept for NAVWPNSTA Seal Beach wetlands (U.S. Navy 1997) are generally too large to be implemented through conventional Refuge or Navy funding mechanisms. Normal funding mechanisms through Refuge programs and through Navy compensatory mitigation related to development projects do not allow for tackling larger projects or enhancement projects that benefit key limiting factors to marsh health but that are not directly impacted by project proposals. It could be that isolated project work is bringing diminishing returns to the health of the marsh and Anaheim Bay as time goes on.
- Current weapons magazine management strategies result in growth of exotic species, erosion control problems, ground squirrel invasion, and low natural resource values.
- Riparian areas of the Station probably cannot sustain themselves without improved linkages. The marsh, Bay, and uplands have been greatly reduced in size, and fresh- and saltwater inflows have been significantly altered by roads, culverts, and tidal gates in the estuary, and by the deepened channel entrance in the Bay. Impacts to the marsh ecosystem due to historical upstream construction of dams, irrigation and water supply diversions, and groundwater pumping are largely unknown. Reintroducing fresh water may benefit cordgrass growth, which could in turn benefit the light-footed clapper rail.
- Native upland and upland-marsh transition habitats are largely missing from the ecosystem.
- In terms of providing the greatest benefit to the marsh ecosystem function for the least money, it is not known how effort should be directed, whether this might be addressing missing acreage, tidal flow, tidal dampening, subsidence, or water quality.
- It is possible that subsidence due to groundwater and oil pumping (and perhaps tectonic reasons) is occurring and may result in a long-term deficit of tidal salt marsh elevation, including an effect on the viability of cordgrass habitat to support clapper rails. Loss of sediment supply from streams to the marsh may have affected its ability to compensate for subsidence of tidal elevation. However, the relationship between subsidence and marsh productivity depends on many factors and it is not known what the effects might be in this system.
- The U.S. Navy mandated ecosystem approach may conflict with the Congressional mandate for a focus on endangered species recovery in the marsh.
- Anaheim Bay's classification as an impaired water body under Section 303(d) of the federal Clean Water Act (CWA) continues to raise concerns about estuary health.
- There is a need to identify in advance locations where there are enhancement possibilities within and outside Refuge boundaries, and then avoid building in those locations if consistent with the military mission. Expanding the marsh boundaries into existing agricultural lands should be analyzed.

- Evaluating pesticide entry into the marsh where wildlife is abundant has been a long-time concern, and the 1991 ROD (*Record of Decision for Management and Protection of Endangered Species at the Naval Weapons Station Seal Beach and the Seal Beach National Wildlife Refuge, Orange County, California - 1991*) identified and required organic farming methods to be used. A non-point source study showed no such contaminants from the farming operation (Law Crandall Inc. 1997).
- Control over some issues related to habitats is difficult because it requires cooperation among several landowners or agencies. For example, shared use of the Bay makes control of marine debris, often found drifting in the marsh, and noxious aquatic weeds (e.g. *Caulerpa*) futile if limited to Navy property.
- Joint administration of natural resource programs should be "seamless" between the Navy and USFWS Refuge manager, but an MOU has not yet been implemented.
- There is untapped synergy between natural resource and Installation Restoration (IR) (and possibly other) programs. The IR Program objectives should be fully integrated into INRMP planning since planning for marsh restoration is conducted as part of that concurrent process. The IR Program should be considered in the context of broader restoration planning for the marsh.
- There have been changes to the level and type of predator management for endangered species since the EIS (1990) and ROD (1991) on this topic called for restoration of upland habitats that support a natural top predator, the coyote, to create a more "naturally balanced ecosystem" than one dominated by the non-native red fox. The fox was devastating least tern and clapper rail populations. There have been no recent sightings of this predator, but preventative monitoring is still continuing. The INRMP needs to address predator management protocols necessary for endangered species recovery. Current predator management by volunteer monitors occurs in the "hot zone" of the firing range and this is a direct conflict with mission-related land use.
- Naval Weapon Station Seal Beach's conservation framework, currently based on the EIS and ROD, is less than what is possible. The EIS is dated in some areas, focused on older rather than more recent issues.
- Baseline data collection is insufficient to evaluate change due to management versus natural change.
- Dust concerns arising from agricultural activities near residential neighborhoods have resulted in a vegetative barrier planted on the fenceline around the agricultural fields. This may conflict with perimeter security "clear zone" requirements.
- Wildlife- and wetland-focused best practices for agriculture should be identified and implemented. The mountain plover (*Charadrius montanus*), burrowing owls, and geese can benefit. The mountain plover has been identified by the USFWS as a Bird of Conservation Concern (USFWS 2008)
- Oil Island is the site of a commercial oil production facility currently operated by Breitburn Energy Corporation, which holds the mineral rights to the island. Oil production waste-holding impoundments (reservoirs to confine wastes) were in use at Site 22 in 1954. Wastes held there reportedly included drilling muds, drill cuttings, and oily wastes. A remedial investigation report prepared in 1995 recommended a removal action to clean up contaminated soil and groundwater. In 2002, additional investigation activities were undertaken by Breitburn to further define the nature and extent of contamination and potential impacts to ecological receptors. The company subsequently developed and implemented a site management plan to deter wildlife from visiting or inhabiting the site.

A number of broad based key issues, some of which overlap, have been identified to guide the development

and implementation of this INRMP.

- **Partnership Within the National Wildlife Refuge** – Nearly 1000 acres at the station is wetland that is managed in partnership with the SBNWR. Issues to be addressed include restoration/enhancement of marsh habitat, endangered species management, protection of eel grass beds, providing more natural transitions to upland areas, erosion control, protection and improvement of water quality, and predator control.
- **Migratory Bird Management** –Issues to be addressed include enhancement of migratory bird habitat throughout the installation, protecting nesting sites from disturbance during breeding season, and protection of raptors from electrocution and collision.
- **Establish Natural Transition Areas** – Many of the habitat boundaries on the station are abrupt and vulnerable to climate change and subsidence. Provision of more natural transitional areas will enhance habitat diversity and create high quality habitat for special status species now and in the future.
- **Control of Invasive and Exotic Species** – Seal Beach has an ongoing program to control invasive and exotic species. This is crucial to maintaining high quality habitat for native species and for the protection and enhancement of threatened and endangered species.
- **Maintenance of a Sustainable Agriculture Program** – The Seal Beach agriculture program generates a significant revenue stream that can be used to support natural resources projects on a Navy-wide basis. The program provides crucial open-space habitat for a number of migratory birds, including several at-risk species.

1.9 Land Use Planning and Decision Making Context

1.9.1 Federal Legislation and Directives

Table 1-1 summarizes the main federal laws and Executive Orders (EOs) with which NAVWPNSTA Seal Beach must comply. These are described in more detail in Appendix C.

While Table 1-1 provides the overarching legislative guidance by which an INRMP is developed for NAVWPNSTA Seal Beach, certain laws represent "drivers" of environmental compliance and decision-making in that noncompliance could lead to temporary disruption to the mission or a claim against the U.S. Navy. Some of these "driver" laws (ESA, NEPA, CWA, Coastal Zone Management Act [CZMA], NWR System Administration Act) are briefly encapsulated in Section 2.4 Regulatory Context, and others are described in Appendix C.

Table 1-1. Primary federal natural resources management laws and Executive Orders with which Naval Weapons Station Seal Beach must comply.

Act Or Executive Order	Description
Bald Eagle Protection Act (16 U.S.C. 668)	Provides for the protection of bald and golden eagles.
Clean Air Act (42 U.S.C. 7401-7642)	Provides for the protection and enhancement of the quality of the nation's air resources so as to promote public health and welfare. Establishes air quality and emission standards.

Table 1-1. Primary federal natural resources management laws and Executive Orders with which Naval Weapons Station Seal Beach must comply.

Act Or Executive Order	Description
Clean Water Act (33 U.S.C. §§ 1251 *et seq*)	Objective is to restore and maintain the chemical, physical, and biological integrity of the nation's waters (Section 101a).
Coastal Zone Management Act (CZMA) (16 U.S.C. 1451)	Establishes goals and a mechanism for states to control use and development of their coastal zone. Authorizes states, through the California Coastal Commission, to administer coastal nonpoint source pollution pro- grams -
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601)	As amended by the Superfund Amendments and Reauthorization Act (SARA), CERCLA establishes a series of programs for the cleanup of hazardous waste disposal and spill sites nationwide. Work under this legislation is conducted through the U.S. Navy Installation Restoration (IR) Program (chapter 15).
Defense Appropriations Act of 1991 Legacy Program (P.L. 101-511)	Established a program for the stewardship of biological, geophysical, cultural and historic resources on Department of Defense (DoD) lands.
Endangered Species Act (16 U.S.C. 35)	Provides for the identification and protection of federally listed threatened and endangered species of animals, plants and their critical habitats.
Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136)	Governs the use and application of pesticides in natural resource management programs.
Federal Noxious Weed Act of 1974 (7 U.S.C. 2801)	Establishes control and eradication of noxious weeds and regulates them in interstate and foreign commerce.
Federal Water Pollution Control Act as amended by the Clean Water Act of 1977 (CWA) (33 U.S.C. 1251	Regulates placement of dredging and filling of waters of the United States (including wetlands) and establishes procedures for identifying and regulating nonpoint sources of polluted discharge into waterways.
Fish and Wildlife Coordination Act (16 U.S.C. 661)	Provides mechanism for wildlife conservation to receive equal consideration and be coordinated with water-resource development programs
Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801) (P.L. 94-265) as amended through 11 October 1996.	Provides for the conservation and management of fisheries. Expanded requirements for the habitat section s of all Fishery Management Plans.
Migratory Bird Treaty Act (MBTA)(16 U.S.C. 703);	Protects migratory birds through various migratory bird conventions with other countries. The U.S. Navy will consult with the USFWS informally to ensure that actions result in minimal loss (or takes) of migratory birds.
Military Construction Authorization Act-Leases; Non-excess property (10 U.S.C. 2667)	Provides for the out-leasing of public lands.
Military Construction Authorization Act-Military Reservations and Facilities-Hunting, Fishing, Trapping (10 U.S.C. 2671)	Establishes requirements for regulating hunting, fishing, and trapping on military lands.
National Defense Authorization Act of 1989-Volunteer and Partnership Cost-Share Programs (P.L. 101-189)	Expands existing authority to use volunteers to include acceptance of voluntary services for natural resources programs at military installations.
National Environmental Policy Act (42 U.S.C. 4321)	Provides a national charter for protection of the environment and requires federal agencies to prepare a statement of environmental impact in advance of each major action that may significantly affect the quality of the human environment. Mandates that alternatives be developed for the proposed action.
Oil Pollution Act of 1990	Provides that the National Contingency Plan (NCP) include planning, rescue and minimization of damage to fish and wildlife in responding to oil pollution.
Outdoor Recreation–Federal/State Programs Act (16 U.S.C. 460 P-3)	Defines a program for managing lands for outdoor recreation.
Sikes Act Improvement Act (SAIA) of 1997 as amended	Provides for INRMPs to be developed and implemented on military installations.
Soil Conservation Act (16 U.S.C. 3B)	Provides for application of soil conservation practices on federal lands.
EO 13112 Invasive Species, 03 February 1999	Requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems. Establishes federal agency responsibilities for the identification and management of invasive species.
EO 11988 Floodplain Management 24 May 1977	Provides direction regarding actions of federal agencies in floodplains.
EO 11644, as amended by EO 11989, Use of Off-road	Establishes policies and provides for procedures to control use of off-road vehicles on public lands.

Table 1-1. Primary federal natural resources management laws and Executive Orders with which Naval Weapons Station Seal Beach must comply.

Act Or Executive Order	Description
Vehicles on Public Lands, 24 May 1977	
EO 11990 Protection of Wetlands, 24 May 1977	Directs the preservation and enhancement of wetlands.
EO 13148 Greening the Government throughout Leadership in Environmental Management, 21 April 2000	Requires federal agencies to demonstrate environmental leadership by integrating environmental accountability into daily decisions and long-term planning, reducing waste and pollution, and informing the public about potential sources of pollution.
EO 13186 Migratory Birds, 10 January 2001	Directs executive departments and agencies to take certain actions to further implement the MBTA.

1.9.2 Naval Weapons Station Seal Beach Guidance for Natural Resources Management

Management of natural resources at NAVWPNSTA Seal Beach is guided by this INRMP, and complies with DoD Instruction 4715.03, *Natural Resources Conservation Program*, as well as OPNAVINST 5090.1C, *Environmental and Natural Resources Program Manual, October 2007*. In addition, management of the SBNWR is currently guided by a ROD on an EIS for an Endangered Species Management and Protection Plan (USFWS–NAVWPNSTA Seal Beach 1991, See Appendix D). The USFWS has completed a CCP for the SBNWR that will provide a 15-year strategy for achieving refuge purposes and contributing toward the mission of the National Wildlife Refuge System (Refuge System). Also supporting the Refuge management process is an MOU (currently in draft) between the USFWS and NAVWPNSTA Seal Beach.

Other guidance is contained in the following documents:

- Public Law 92-408 to Establish the SBNWR (29 August 1972).
- National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997.
- Naval Facilities Instruction (NAVFACINST) 11010.45 Comprehensive Regional Planning Instruction (CRPI), the primary planning manual for Facilities.
- Naval Sea Systems (NAVSEA) OP 5 regarding management, site approval procedures, and standard operating procedures within explosive safety quantity distance (ESQD) arcs.
- Naval Weapons Station Seal Beach Instruction 5700.1, 19 April 1996 (established SBNWR Nature Center and recognized the Friends of SBNWR as a co-sponsor of the Nature Center).
- Soil and Water Conservation Plan for the Agricultural Outlease program.
- Navy/Marine Corps Installation Restoration Manual, February 1997.
- General Plan for Use of U.S. Navy Lands and Waters for Wildlife Conservation and Management Purposes, NAVWPNSTA Seal Beach, November 1973.
- Management Plan for SBNWR, May 1974, as amended.
- Fish and Wildlife Management Plan, NAVWPNSTA Seal Beach, December 1964, updated 1969.
- Naval Weapons Station Seal Beach Master Plan Update 1989.

- Base Exterior Architecture Plan 1985.
- Naval Weapons Station Seal Beach Fishing Policy 2004.

1.9.3 Regional Planning Processes Related to Naval Weapons Station Seal Beach

The following planning processes and proposed projects affect NAVWPNSTA Seal Beach, and this INRMP will address consistency with their content.

- ***Southern California Wetlands Recovery Project.*** Southern California Wetlands Recovery Project (SCWRP) is a partnership of public agencies working cooperatively to acquire, restore, and enhance coastal wetlands and watersheds between Point Conception and the Mexican border. SCWRP has identified two ecological objectives for Anaheim Bay and its watershed: 1) address impacts of watershed inputs, including sediment, nutrients, and contaminants, and 2) pursue additional restoration and enhancement opportunities with the Navy. Using a non-regulatory approach and an ecosystem perspective, the Wetlands Project's goal is to accelerate coastal wetland restoration in Southern California through developing and implementing a regional prioritization plan for the acquisition, restoration, and enhancement of Southern California's coastal wetlands and watersheds.

  Sixteen public agencies with responsibilities for coastal wetlands and watersheds in Southern California participate in the SCWRP:

  Federal Partners

  U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and Natural Resources Conservation Service.

  State Partners

  California Resources Agency; California Environmental Protection Agency, California Coastal Commission, California Department of Fish and Wildlife, State Coastal Conservancy, State Lands Commission, State Water Resources Control Board, and Regional Water Quality Control Boards (San Diego, Santa Ana, Los Angeles, and Central Coast).

  The SCWRP's goals for the region that include NAVWPNSTA Seal Beach are:

  1. Preserve and restore coastal wetland ecosystems through acquisition of wetlands and associated uplands from willing sellers. The Huntington Beach/Santa Ana River mouth complex has been identified as a priority area.

  2. Preserve and restore stream corridors and wetland ecosystems in coastal watersheds. Some strategies that may be relevant to NAVWPNSTA Seal Beach include "replacing concrete and other hardscaping through biotechnical flood control and stabilization mechanisms" and reconnecting

creek and river corridors to their floodplains.

"Opportunities in Southern California to reconnect creeks and rivers to their floodplains are very limited due to encroachment of development. For this reason, preserving…areas where floodplains can be re-established [is a] high priority…"

3. Recover native habitat and species diversity. Primary strategies are to: a) restore a diversity of habitat types within individual wetland ecosystems; b) employ a multi-species approach focusing on habitat rather than species diversity, while recognizing the more imminent threat to listed species; c) preserve and restore habitat linkages and fish and wildlife corridors, including between wetlands along the coast; d) remove exotic species; and e) recover native, extirpated species.

4. Integrate wetlands recovery with other public objectives. Key strategies include: a) promote integrated wetlands planning with stormwater management, transportation and infrastructure projects; water quality improvement; recreation; fire suppression; public safety; and landscaping of public property; b) pro- mote wetlands projects with multiple objectives such as the use of treatment wetlands to meet both clean water and habitat objectives, and promoting near- shore disposal of any sediments excavated for restoration reasons.

5. Promote education and compatible access to coastal wetlands and watersheds.

6. Advance the science of wetlands restoration and management in Southern California.

- ***California Nonpoint Source Pollution Control Plan.*** This plan is the first significant upgrade of California's Nonpoint Source Pollution Control Program (NPS Program) since its inception in 1988. The State Water Resources Control Board and the Coastal Commission developed the plan in partnership with all state agencies within the California Resources Agency and the California Environmental Protection Agency (Cal/ EPA). The Plan provides a single, unified and coordinated approach to deal with NPS pollution structured around 61 management measures. Management measures serve as general goals for the control and prevention of polluted runoff. Site-specific management practices are then used to achieve the goals of each management measure.

  Several of the management measures for the control and prevention of polluted runoff directly relate to the SCWRP efforts previously mentioned. These are: instream and riparian habitat restoration, erosion and sediment control, protection of surface water quality and instream and riparian habitat, protection of wetlands and riparian areas, restoration of wetlands and riparian areas, vegetated treatment systems, promotion of programs to develop and disseminate scientific information on wetlands and riparian areas, and development of greater public and agency staff understanding. The California Non-point Source Pollution Control Plan specifically recommends that agencies coordinate with the SCWRP for management measures related to hydromodification or wetlands.

- ***Regional Water Quality Control Board Policies and Plans.*** Naval Weapons Station Seal Beach falls

under the jurisdiction of the Santa Ana RWQCB for many state and federal water quality regulations. Both a Basin Plan and a Watershed Management Initiative chapter for the region encompassing the Seal Beach area have been pre- pared. The Basin Plan designates Anaheim Bay-Huntington Harbor as a medium priority impaired water body under Section 303(d) of the federal CWA, a designation based on beneficial uses and water quality objectives as defined in section three of the Basin Plan. The Basin Plan designates beneficial uses for surface and ground waters; sets narrative and numerical objectives that must be attained or maintained to protect beneficial uses and conform to the state's anti-degradation policy; and describes implementation programs to protect waters in the region. The RWQCB's Watershed Management Initiative (WMI) outlines an expected schedule for development of Total Maximum Daily Load (TMDL) regulations for impaired water bodies.

- ***Beach Nourishment and Shoreline Erosion Programs.*** Examples are the USACE Beach Nourishment program, the City of Seal Beach Nourishment Program and the Anaheim Harbor Dredging Program. The California Resources Agency is spearheading an effort to develop a comprehensive coastal sediment management program for the state. As part of this, the Agency's Draft Policy on Coastal Erosion advocates the need to restore sediment transport functions to coastal watersheds, including the use of sediment removed from coastal wetlands as part of restoration activities that can be used as a source of sand for Southern California beaches.

- ***Orange County Sanitation District planning***. This group has plans to construct and expand its road maintenance site, including the use of bright lighting, which could affect plants and animals in the Refuge.

- ***Bolsa Chica restoration planning.*** An EIS and ROD were approved to cut an inlet channel to provide tidal flushing to the Bolsa Chica marsh. Bolsa Chica wet- lands emptied into Anaheim Bay under Warner Avenue in Huntington Beach. The wetlands, supplied by Anaheim Bay alone, historically extended through Huntington Beach and Fountain Valley, draining by way of the Wintersburg Channel. The tidal inlet, which passes underneath a bridge on Pacific Coast Highway 1, officially opened on 24 August 2006.

- ***Natural Communities Conservation Program (NCCP) (State of California Resources Agency).*** This regional habitat conservation planning program, initiated in 1991 and administered by CDFW, has the purpose of protecting enough natural habitat to sustain natural communities of plants and wildlife, while allowing for compatible economic development. By creating an interconnected pathway between rich ecosystems through a network of formal preserves. Landowners can receive permission to incidentally "take" species listed under the state and federal endangered species acts, by having these plans qualify as Habitat Conservation Plans under section 10(a) of the federal ESA. The Orange County NCCP efforts have primarily focused on coastal sage scrub habitat, of which NAVWPNSTA Seal Beach contains only minor components. Few grassland, riparian, or wetland species are identified. There is currently no Special Area Management Plan (SAMP) to integrate wetlands and endangered species planning for coastal Orange County. While the Navy is not signatory to any NCCP agreement, this INRMP provides management strategies for species covered in neighboring NCCP programs that may occur at NAVWPNSTA Seal Beach.

- ***California Aquatic Invasive Species Management Plan.*** The goal of the California Aquatic Species

Management Plan is to provide a statewide framework for responding to aquatic invasive species, and for protecting the biological integrity of the state's waters and native plant and animal communities. Funded in part by the Ocean Protection Council, State Coastal Conservancy and USFWS, the plan was approved by the Aquatic Species Nuisance Task Force and signed by the Governor on 18 January 2008. This should allow the state to apply for federal funding to implement the plan.

This plan may provide guidance and possibly funding avenues for addressing aquatic invasive species issues on NAVWPNSTA Seal Beach.

- ***Clean Water Planning Efforts.*** Significant microbial pollution problems affects public health and results in local beach closures throughout Orange County. Such pollution problems are mostly due to sewage spills and leaks (RWQCB 2002 Order No. R8-2002-0014, Waste Discharge Requirements for Sewage Collection Agencies in Orange County within the Santa Ana Region). Since 1999, there have been a total of 146.8 beach mile day closures and postings in Orange County. Between 01 January 2000 and 31 August 2001, the Orange County Health Officer closed portions of Seal Beach, Sunset Beach, Bolsa Chica State Beach, Huntington Harbor, Huntington City Beach, Huntington State Beach, Newport Beach, Newport Slough, and Newport Coast to body contact recreation on 31 occasions. Also, Anaheim Bay is currently on the medium-priority 303(d) list for metals from watershed-related stormwater runoff, and pesticides from unknown sources. Huntington Harbor is currently on the 303(d) list of impaired water bodies for pathogens, metals, and pesticides. Each is on a schedule for cleanup, and the RWQCB is on a schedule for developing TMDL regulations for these water bodies. An example of a local effort to support cleanup is the Huntington Harbor Waterways and Beaches Committee. This committee is coordinated by the city of Huntington Beach and is a public agency task force engaged in tracking activities in the area. Staff from NAVWPNSTA Seal Beach participate in committee meetings. A major concern has been water quality, and the Committee is actively involved in public education and efforts to ensure compliance with holding tank requirements.

- ***California Ocean Resources Management Program.*** The goal of this program is to ensure comprehensive management, conservation, and enhancement of California's ocean resources. The program focuses on four areas: stewardship; economic sustainability; research, education and technology; and jurisdiction and ownership. *California's Ocean Resources: An Agenda for the Future* outlines an implementation strategy for the Ocean Resources Management Program. Some program recommendations relevant to the regional Wetlands Recovery Project are: 1) complete resource inventories within bays, estuaries and coastal lagoons along the coast, as well as offshore waters , 2) establish comprehensive long-term approaches for managing California's ocean and coastal fishery stocks, and 3) support state, national, and international efforts to reduce the introduction of non-native species and study the current effects of these species on California and other west coast states.

- ***Endangered Species Recovery Plans.*** These plans define federal recovery targets for down-listing or de-listing species. Specific plans exist for the light-footed clapper rail, salt marsh's birds beak, western snowy plover and a draft plan exists for the California least tern.

- ***Commercial Fishery Management Plans.*** The NMFS is responsible for conserving and enhancing fisheries and determining whether projects or activities adversely impact Essential Fish Habitat (EFH) zones. All eelgrass and estuary habitats are considered EFH according to the Pacific Fishery Management Plans.

- ***Orange County General Plan.*** The General Plan proposes open space, natural resource, and recreational opportunities adjacent to NAVWPNSTA Seal Beach that could affect the flexibility of the Navy in using its property.

1.9.4 Relevant National and State Wildlife Planning Processes

The following planning processes can lend guidance to the management of wildlife found on NAVWPNSTA Seal Beach, and this INRMP will address consistency with their goals.

- The National Wildlife Refuge System Improvement Act of 1997 provides guidance on how refuges should be managed. A requirement of this Act is the preparation of a CCP for each refuge that provides refuge managers with a 15-year strategy for achieving refuge purposes. The goals and objectives of a CCP include wildlife and habitat management, refuge operations, protection of cultural resources, and the provision of compatible public uses. The CCP for the SBNWR has been completed.

- The State of California's Wildlife Action Plan (California Department of Fish and Wildlife 2007) presents statewide and regional conservation actions needed to restore and conserve ecosystems and wildlife populations.

- The North American Bird Conservation Initiative (NABCI) provides guidelines for managing birds, and seeks to integrate the United States Shorebird Conservation Plan, North American Waterfowl Conservation Plan, and Partners in Flight.

1.9.5 Ecosystem Management Framework

This INRMP reflects the ecosystem-based approach described by federal policy. The status and condition of natural and cultural resources, the continuing need for military readiness, and the public values, budgets and technology which affect the land and its management all play a role in ecosystem-based decisions (Figure 1-3).

DoD Manual (DoDM) 4715.03-M Enclosure 8-INRMP Implementation requires that Navy installations incorporate ecosystem management's "ten guiding principles" as the basis for land use planning and management. The ten principles of ecosystem management had first appeared in a 1994 DoD memorandum and were subsequently published as principles and guidelines in an enclosure to DoDM 4715.03. DoD principles and guidelines address key components of ecosystem management that are generally acceptable to academicians and practitioners alike, and they provide guidance pertinent to installation managers. DoDM 4715.03 also provides a DoD definition of ecosystem management as:

"A goal-driven approach to managing natural and cultural resources that supports present and future mission

requirements; preserves ecosystem integrity; is at a scale compatible with natural process; is cognizant of nature's time frames; recognizes social and economic viability within functioning ecosystems; is adaptable to complex changing requirements; and is realized through effective partnerships among private, local, state, tribal, and federal interests."

Figure 1-3. Charter Statement to guide Naval Weapons Station Seal Beach Integrated Natural Resources Management Plan development.

The ecosystem management mandate on NAVWPNSTA Seal Beach is accomplished, in part, by applying principles of sustainability and proper, compatible use at various scales of analysis:

- Regional,
- Station-wide,
- By administrative unit (Refuge and Navy management),
- By management of focus species and their habitat requirements.

Finally, it is also reflected in this INRMP's emphasis on partnerships with other agencies and the public, and its emphasis on long-term monitoring to support an adaptive management approach.

The 10 guiding principles of ecosystem management are as follows:

1. *Maintain and Improve the Sustainability and Native Biodiversity of Ecosystems.* Ecosystem management involves conducting installation programs and activities in a manner that identifies, maintains, and restores the "composition, structure, and function of natural communities that comprise ecosystems," to ensure their sustainability and conservation of biodiversity at landscape and other relevant ecological scales to the maximum extent that mission needs allow.
2. *Administer with Consideration of Ecological Units and Timeframes.* Ecosystem management requires consideration of the effects of installation programs and actions at spatial and temporal ecological scales that are relevant to natural processes. A larger geographic view and more appropriate ecological time frames assist in the analysis of cumulative effects on ecosystems that may not be apparent with smaller and

shorter scales. Regional ecosystem management efforts are generally more appropriate than either national or installation-specific efforts. Consideration of sustainability under long-term environmental threats, such as climate change, is also important.

3. *Support Sustainable Human Activities.* People and their social, economic, and national security needs are an integral part of ecological systems, and management of ecosystems depends on sensitivity to those issues. Consistent with mission requirements, actions should support multiple use (e.g., outdoor recreation, hunting, fishing, forest timber products, and agricultural out-leasing) and sustainable development by meeting the needs of the present without compromising the ability of future generations to meet their own needs.

4. *Develop a Vision of Ecosystem Health.* All interested parties (federal, state, tribal, and local governments, nongovernmental organizations, private organizations, and the public) should collaborate in developing a shared vision of what constitutes desirable future ecosystem conditions for the region of concern. Existing social and economic conditions should be factored into the vision, as well as methods by which all parties may contribute to the achievement of desirable ecosystem goals.

5. *Develop Priorities and Reconcile Conflicts.* Successful approaches should include mechanisms for establishing priorities among the objectives and for conflict resolution during both the selection of the ecosystem management objectives and the methods for meeting those objectives. Identifying "local installation objectives" and "urban development trends" are especially important to determine compatibility with ecosystem objectives. Regional workshops should be convened periodically to ensure that efforts are focused and coordinated.

6. *Develop Coordinated Approaches to Work Toward Ecosystem Health.* Ecosystems rarely coincide with ownership and political boundaries so cooperation across ownerships is an important component of ecosystem management. To develop the collaborative approach necessary for successful ecosystem management, installations should:

    - *Involve the military operational community early in the planning process.* Work with military trainers and others to find ways to accomplish the military mission in a manner consistent with ecosystem management;
    - *Develop a detailed ecosystem management implementation strategy for installation lands* and other programs based on the vision developed above, and those principles and guidelines;
    - *Meet regularly with regional stakeholders* (e.g., State, tribal, and local governments; nongovernmental entities; private landowners; and the public) to discuss issues and to work towards common goals;
    - *Incorporate ecosystem management goals into strategic, financial, and program planning and design budgets* to meet the goals and objectives of the ecosystem management implementation strategy;
    - *Seek to prevent undesirable duplication of effort,* minimize inconsistencies, and create efficiencies in programs affecting ecosystems.

7. *Rely on the Best Science and Data Available.* Ecosystem management is based on scientific understanding of ecosystem composition, structure, and function. It requires more and better research and data collection,

as well as better coordination and use of existing data and technologies. Information should be accessible, consistent, and commensurable. Standards should be established for the collection, taxonomy, distribution, exchange, update, and format of ecological, socioeconomic, cartographic, and managerial data.

8. *Use Benchmarks to Monitor and Evaluate Outcomes.* Accountability measurements are vital to effective ecosystem management. Implementation strategies should include specific and measurable objectives and criteria with which to evaluate activities in the ecosystem. Efficiencies gained through cooperation and streamlining should be included in those objectives.
9. *Use Adaptive Management.* Ecosystems are recognized as open, changing, and complex. Management practices should be flexible to accommodate the evolution of scientific understanding of ecosystems. Based on periodic reviews of implementation, adjustments to the standards and guidelines applicable to management activities affecting the ecosystem should be made.
10. *Implement Through Installation Plans and Programs.* An ecosystem's desirable range of future conditions should be achieved through linkages with other stakeholders. "Specific DoD activities" should be identified, as appropriate, in installation INRMPs and ICRMPs and in other planning and budgeting documents.

Finally, the Navy directed (OPNAVINST 5090.1C CH-1) that ecosystem-based management shall include:

- A shift from single species to multiple species conservation.
- Formation of partnerships necessary to consider and manage ecosystems that cross boundaries.
- Use of the best available scientific information and adaptive management techniques.

1.10 Strategic Design of the Plan

1.10.1 Implementation

Signature approval by the U.S. Navy provides an authority for implementation, while signature by the partners including USFWS, CDFW and NOAA/NMFS signifies the concurrence of the management document. Some strategies suggest changes that do not necessarily require direct funding to implement (e.g. adopting methods or criteria for habitat restoration). However, others will need to be programmed for funding. Implementation of the strategies and projects described in this Plan are guided by how budget priorities are assessed for environmental work on DoD installations.

The budget programming hierarchy for this INRMP is based on both DoD and Navy funding level classifications. The four programming and budgeting priority levels detailed in DoDI 4715.03 (18 March 2011) Natural Resources Conservation Program, implement policy, assign responsibilities, and prescribe procedures for the integrated management of natural and cultural resources on property under DoD control. Budget priorities are also described in 5090.1C CH-1, Environmental and Natural Resources Program Manual. Navy guidance further defines how funding priorities are assigned using DoD guidance and Environmental Readiness Levels (ERL) (See Chapter 6).

1.10.1.1 Stewardship and Compliance Responsibilities

For the purposes of this INRMP, the terms stewardship and compliance have specific meanings as criteria for implementing project lists. Project rankings are assigned based on whether an activity is mandatory to comply with a legal requirement such as under the ESA, CWA, or MBTA. Alternatively, a project may be considered good land stewardship but is not considered an obligation for NAVWPNSTA Seal Beach to be found in compliance with environmental laws. Projects considered necessary to comply with the law are generally funded within budget constraints, whereas stewardship projects are ranked lower for funding consideration when projects are competed among multiple installations. For a discussion of funding classications and priorities, see Chapter 6.

1.10.1.2 Partners and Cooperators

Some proposed strategies involve specific actions that may need cooperative funding, and cooperative efforts are essential to ensure complete implementation of this Plan. NAVWPNSTA Seal Beach currently works with agency partners and uses contracted cooperators. These include the following:

- USFWS for Refuge management, federally listed species management and INRMP development,
- NMFS for CWA compliance, Rivers and Harbors Act Section 10 permit applications, marine mammal protection, EFH zones and INRMP planning,
- USACE for Clean Water Act compliance,
- CDFW for INRMP development, non-federally listed, sensitive species management, fishing policy establishment, and management of submerged lands whose ownership is retained by the state,
- Bloom Biological for raptor and burrowing owl (*Athene cunicularia*) monitoring,
- Government Service Administration (GSA) for contract management,
- NAVFAC SW IPT for contract management,
- State of California Resources Agency Department of Fish and Wildlife Habitat Conservation Planning Branch (USFWS) for California Least Tern breeding surveys,
- Huntington Beach Wetlands Conservancy conducts light-footed clapper rail and California least tern work.

1.10.1.3 Review and Revision Process

The DoD and DoN use an Environmental Management System (EMS) to integrate environmental considerations into day-to-day activities across all levels and functions of Navy enterprise. It is a formal management framework that provides a systematic way to review and improve operations, create awareness, and improve environmental performance. Systematic environmental management as an integral part of day-to-day decision making and long-term planning processes is an important step in supporting mission readiness and effective use of resources. The most significant resource for every organization is their senior leadership's commitment and visibility in EMS implementation and sustainability. A robust EMS is essential to sustaining compliance, reducing pollution and minimizing risk to mission. The Navy EMS conforms to the International Organization for Standardization (ISO) 14001:2004 *Environmental Management System* standard.

Section 101(b)(2) of the Sikes Act [16 USC 670a(b)(2)] specifically directs that the INRMPs be reviewed "as to operation and effect" by the primary parties "on a regular basis, but not less often than every five years", emphasizing that the review is intended to determine whether existing INRMPs are being implemented to meet the requirements of the Sikes Act (as amended) and contribute to the conservation and rehabilitation of natural resources on military installations. The Office of the Secretary of Defense (OSD) guidance (17 May 2005) states that joint review should be reflected in a memorandum or letters between "the parties" at least every five years. Informal annual reviews are mandatory to facilitate adaptive management, during which INRMP goals, objectives, and "must fund" projects are reviewed, and a realistic schedule established to undertake proposed actions. This written documentation should be jointly executed or in some other way reflect the parties' mutual agreement and summarize the rationale for the conclusions the parties have reached.

DoD and DoN policy requires installations to review INRMPs annually in cooperation with the two primary parties to the INRMP (USFWS and the state fish and wildlife agency). Annual reviews facilitate adaptive management by providing an opportunity for the parties to review the goals and objectives of the plan, as well as establish a realistic schedule for undertaking proposed actions. As a guide for addressing annual INRMP review, the Navy developed the Navy Natural Resources (NR) Metrics. These NR Metrics can be used to gather and report essential information required by Congress, EOs, existing U.S. laws, and the DoD. There are seven Focus Areas that comprise the NR Metrics to be evaluated during the annual review of the Navy Natural Resources Program/INRMP:

1. Ecosystem Integrity
2. Listed Species and Critical Habitat
3. Fish and Wildlife Management for Public Use
4. Partnership Effectiveness
5. Team Adequacy
6. INRMP Project Implementation
7. INRMP Impact on the Installation Mission

A description of the most recent Navy Natural Resource Metrics questions are presented in Appendix E. Natural Resource Metrics are found on the Navy Conservation website.

Section 101(b)(2) of the Sikes Act (as amended) specifically directs that the INRMPs be reviewed "as to operation and effect" by the primary parties "on a regular basis, but not less often than every five years", emphasizing that the review is intended to determine whether existing INRMPs are being implemented to meet the requirements of the Sikes Act (as amended) and contribute to the conservation and rehabilitation of natural resources on military installations. The OSD (17 May 2005) guidance states that joint review should be reflected in a memo or letters.

Recent guidance on INRMP implementation interpreted that the five-year review would not necessarily constitute a revision; this would occur only if deemed necessary. The Annual Review process is broadly guided by the NAVFAC Environmental Conservation Program Directive (DoDI 4715.03) and by OPNAVINST 5090.1C CH 1. The following policy memoranda clarified procedures for INRMP reviews and revisions:

- DUSD (I&E) Policy Memorandum October 10, 2002, which replaced a 1998 policy memorandum.
- Assistant Deputy Undersecretary of Defense (ADUSD) for Environment, Safety and Occupational Health (ESOH) Policy (01 November 2004 Memorandum).

- ADUSD for ESOH Policy (September 2005 Memorandum).

The most recent guidance on INRMP reviews is found in DoD 4715.03. The Annual Review reports on the status of INRMP implementation toward meeting natural resources conservation program measures of merit to DUSD (I&E) at each Environmental Management Review and to Congress in the Defense Environmental Programs ARC. The report summarizes:

- Each installation's compliance with Sikes Act.
- Annual feedback received from the USFWS or NOAA Fisheries Service.
- Annual feedback received from the state fish and wildlife agency.
- Funding requirements per Fiscal Year needed to implement the INRMP: the amount required for recurring projects, and the amount required for non-recurring projects.

According to OPNAVINST 5090.1C CH-1, Annual Reviews must verify that:

- Current information on all conservation metrics is available.
- All *must fund* projects and activities have been budgeted for and implementation is on schedule.
- All required trained natural resources positions are filled or are in the process of being filled.
- Projects and activities for the upcoming year have been identified and included in the INRMP. An updated project list does not necessitate revising the INRMP.
- All required coordination has occurred.
- All significant changes to the installation's mission requirements or its natural resources have been identified.
- The INRMP goals and objectives remain valid.

1.11 Roles and Responsibilities

The Commanding Officer of NAVWPNSTA Seal Beach has primary responsibility for this INRMP, although various entities are involved in the development and implementation. The concept of integrated management of natural resources both justifies and requires that internal and external stakeholders contribute to the management of natural resources at the Installation.

1.11.1 Installation Stakeholders

The NAVWPNSTA Seal Beach Commanding Officer, with support from the Installation Environmental Program Director, is responsible for the implementation of this INRMP while ensuring successful accomplishment of the military mission. The Installation Commander is responsible for ensuring that installation personnel comply with the laws and requirements associated with the management of natural resources, and that funding and staffing are sufficient to accomplish the projects and programmatic objectives outlined in this INRMP. The Installation Environmental Program Director reports to the Public Works Officer and the Commanding Officer ensuring both are informed about natural resource issues and recommends actions to ensure the military mission is carried out while complying with laws, regulations and policies that govern natural resources. Additional requirements of the Installation stakeholders include performing annual reviews and revisions of the INRMP. The Naval Chain of Command is summarized in Figure 1-4.

1.11.2 External Stakeholders

In accordance with EO 13352 (August 26, 2004), Facilitation of Cooperative Conservation, NAVWPNSTA Seal Beach natural resources staff will promote cooperative conservation with an emphasis on collaborative activities among federal, state, local, and tribal governments, non-governmental entities, and private citizens. The SAIA requires that this INRMP be prepared in cooperation with, and reflect mutual agreement of, NOAA, NMFS, USFWS, and CDFW. This requirement affords them signatory authority as external stakeholders and approving officials of this INRMP. Cooperation and coordination with these agencies is an integral part of the Navy's Natural Resource Program.

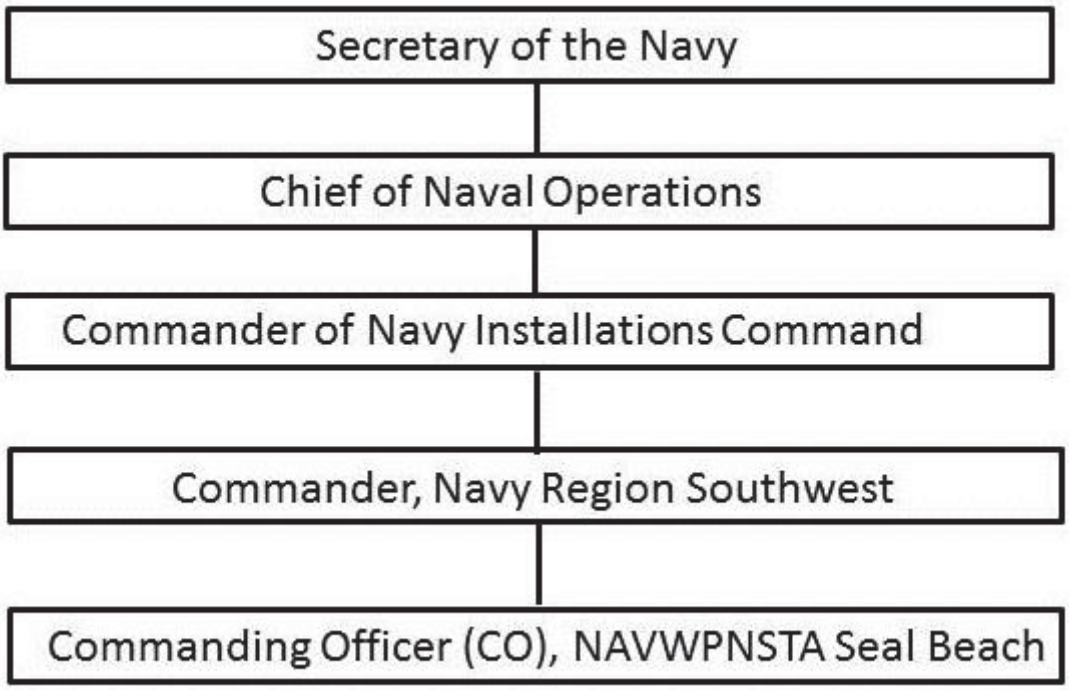


Figure 1-4 Internal Stakeholders that include the Naval Chain of Command.

This Page Intentionally Blank

Naval Weapons Station Seal Beach

2.0 Historic and Current Land Use

2.1 Historical Land Use Overview

2.1.1 Pre-European Period

Although it is unknown when human occupation of the Orange County coast began, archaeological evidence indicates people were present in the area by the end of the Pleistocene epoch, over 11,000 years ago. These people represent the Early Man cultural period, which persisted until about 9,500 years before present. Artifacts recovered from this period depict hunting was the primary activity of subsistence. It is likely that the people of the Early Man period migrated frequently when game in a given area became exhausted. The population of the area probably remained quite small due to the nomadic hunting and gathering lifestyle (DoN 1988). Because only lithic tools have survived from this early period, little is known of the culture.

During the Milling Stone period, which began around 9,500 years before present, tools for the processing of hard seeds appeared in large numbers for the first time. These tools, known as manos (a hand-held stone) and metates (a larger stone against which seeds were ground), permitted exploitation of a wide range of vegetation. Hunting continued to play a role, but the gathering of seeds apparently played the major role in subsistence. The people of the Milling Stone period were also wanderers (USFWS and DoN 1990), covering a wide geographic area.

Around 3,000 years before present, the Milling Stone culture began to differentiate into smaller units, each with its own characteristics. This period, which persisted until around 1,250 years before present, is known as the Intermediate period. A time of rather rapid cultural change, this period is not well understood. Introduction of the mortar and pestle (grinding tools that use a pounding rather than a sliding action) allowed exploitation of the acorn as a food resource (USFWS and DoN 1990). Although greater emphasis appears to have been placed on the procurement of acorns, hard seed gathering continued, as did exploitation of shellfish and vertebrates (Wlodarski *et al.*1985). Large, relatively permanent encampments were first in evidence during the Intermediate period. The use of steatite, a soapstone used for making stone bowls and pottery also began. Because the only known local sources of steatite are on Catalina Island, it is clear that the Intermediate period people had mastered the techniques for crossing expanses of open ocean for trading purposes (Wlodarski *et al.*1985). Indicated by the reduced size of projectile points from the Intermediate period compared to previous periods, the bow and arrow probably came into use during this time (DoN 1988).

The Late Prehistoric period, which followed the Intermediate period, began around 1,250 years before present and ended with Spanish contact around 1600 A.D. By the time the Spanish arrived, the Native Americans in the area were divided into three groups. The Gabrieliño occupied Los Angeles and northern Orange Counties, the Juaneño occupied the area around San Juan Capistrano, and the Luise–o occupied interior Orange and San Diego Counties.

Pottery appeared near the end of the Late Prehistoric period. The Gabrieliño apparently controlled the trade in steatite and the bulk of that material is found in their area. Because steatite and pottery served much the same purpose, less pottery is found in the Gabrieliño sphere of influence compared to surrounding areas (USFWS and DoN 1990).

Historically, this particular region consisted of a water-logged coast (over 17,300 acres of coastal wetlands in Los Angeles and Orange Counties [USFWS and DoN 1990]) that was marshy and crossed by estuaries, rivulets, and small lakes. These wetlands were flushed by ocean tidewaters and fed by creeks, rivers and springs from the Los Angeles basin (CDFW and USFWS 1976).

In the mild climate rush, reed and thule grew thick and strong. Thule grew to 16 feet and was used by the Indians of present-day Seal Beach to build temporary winter shelters. They also used thule for weaving baskets and foot wear, hats, water-carriers and aprons (Dorr 1976). Food was abundant and easily obtained. Indians ate fish, sea mammals, and mollusks, as well as tender new seeds in summer. In winter they trapped small animals, made acorn flour, and ate berries, reptiles and grasshoppers. The only crop these southern California Indians planted was wild tobacco around their huts (Dorr 1976). The "thule" referred to could be three-square (*Scirpus americanus*), California bulrush (*Scirpus californicus*), or prairie bulrush (*Scirpus robustus*), what is called "tule" today.

Possibly the earliest mining in Orange County was by Indians who excavated brea (a tar saturated sand) from Brea Canyon for use in weatherproofing their dwellings. Early Mexican and American settlers also found brea to be useful for roofing tar and domestic fuel (Morton 1984).

2.1.2 Western Settlement

Spanish settlers arrived in the Orange County coastal area around 1600 and began to ranch cattle. Most of the Alamitos, Anaheim-Sunset, and Bolsa wetlands were granted by a Spanish concession (an area of 300,000 acres) to an early Spanish settler in 1795. In 1833, this land grant was partitioned in a Mexican government grant called the Los Alamitos Rancho that encompassed 28,027 acres including the Alamitos Bay wetlands and part of the Anaheim Bay (USFWS and DoN 1990).

From 1833 to 1868 this wetlands and bay area, which included present-day NAVWPNSTA Seal Beach and SBNWR, was part of an extensive marsh system (ranging from Los Alamitos Bay on the west to Bolsa Chica Bay on the east) that remained relatively undisturbed. However, there may have been slight water diversions for use in rancheros. "In 1837 Juan Pacifico Ontiveros maintained a small garden by diverting water from the Santa Ana River through a small ditch to his rancho in the area" (Santa Ana River Watershed Profile 2001).

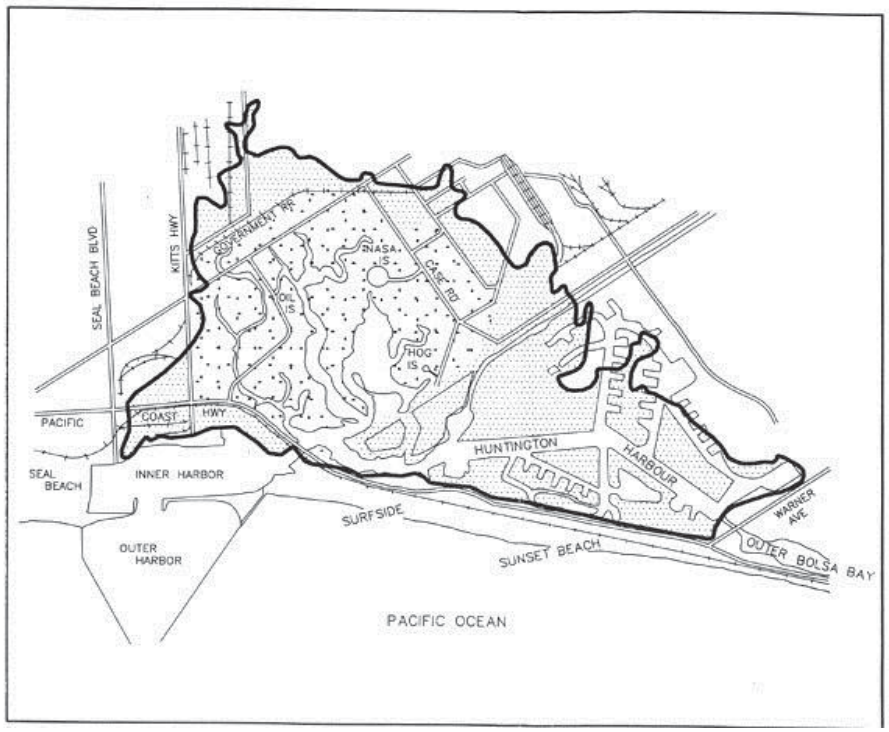
In 1851, after Los Angeles was divided into six townships, towns and small farming establishments slowly replaced cattle ranches (rancheros). Farming practices led to the reclamation of much of the wetlands (CDFW and USFWS 1976). German Burghers were arriving from San Francisco looking for agricultural land to grow grapes and produce wine. They gathered into the Anaheim area and became farmers. The city of Anaheim was founded on 1,165 acres of Rancho San Juan Cajon de Santa Ana purchased in 1856 from landowner Juan Pacifico Oliveras for $2.00 an acre. Water was diverted for domestic use from the Santa Ana River near the present location of Prado Dam.

Until the flood of 1862, winemaking had been unsuccessful as the major industry and cattle continued to dominate the area. Neither small channels nor storm drains set up for flood control could prevent the four feet of water from rushing over the banks of the Santa Ana River, causing 200,000 cattle to drown and much of the soil to wash away (Santa Ana River Watershed Profile 2001). For three years following the flood, there was a drought that claimed the lives of most cattle. When conditions improved, cattle were replaced by sheep.

In the late 1800s, salt marshes of two estuaries, where Anaheim and Bolsa bays now exist, spread relatively intact for miles along the north coast of Orange County. The two wetlands covered 4,600 acres and were separated only by Bolsa Chica Mesa. Map 2-1 shows the historical placement of wetlands and channels in the Seal Beach area. Then began the transformation to what they are now, joined into one man-made waterway, surrounded by urban and recreational development, dredged, filled and criss-crossed by roadways and bridges (CDFW and USFWS 1976). See Photo 2-1 and Map 2-2

Changes began around 1863, when the people of the village of Anaheim began to search for a way to ship their produce and wool and for a harbor where large ships could bring them supplies, such as wood for building homes. They chose to develop a port east of Long Beach; however, the flood washed silt down the San Gabriel River, changing its course and blocking the entrance to the harbor. The Burghers moved east and formed the port of Anaheim Landing in 1868. This was the first major disturbance of Anaheim Bay and the adjoining marshlands. From here they used lighter boats to shuttle cargo to steamships farther out in the ocean, and to bring in lumber and supplies from bigger ships. By 1870, wagon trains were used by farmers to haul wine and wool to Anaheim Landing, and families that came along contributed to establishing the Landing as a vacation place (Dorr 1976).

Additional development began with the coming of the railroad. In 1875 the Southern Pacific Railroad began serving Orange County, arriving at the first station in west Anaheim. A three hour commute between Los Angeles and Anaheim became possible. In 1887, the Santa Fe Railroad arrived, offering competition to Southern Pacific and resulting in “wage” wars (Orange County Government Online 2004).



Map 2-1. Outline of the 1873 Seal Beach marshlands is shown as the stippled area surrounded by the dark boundary.

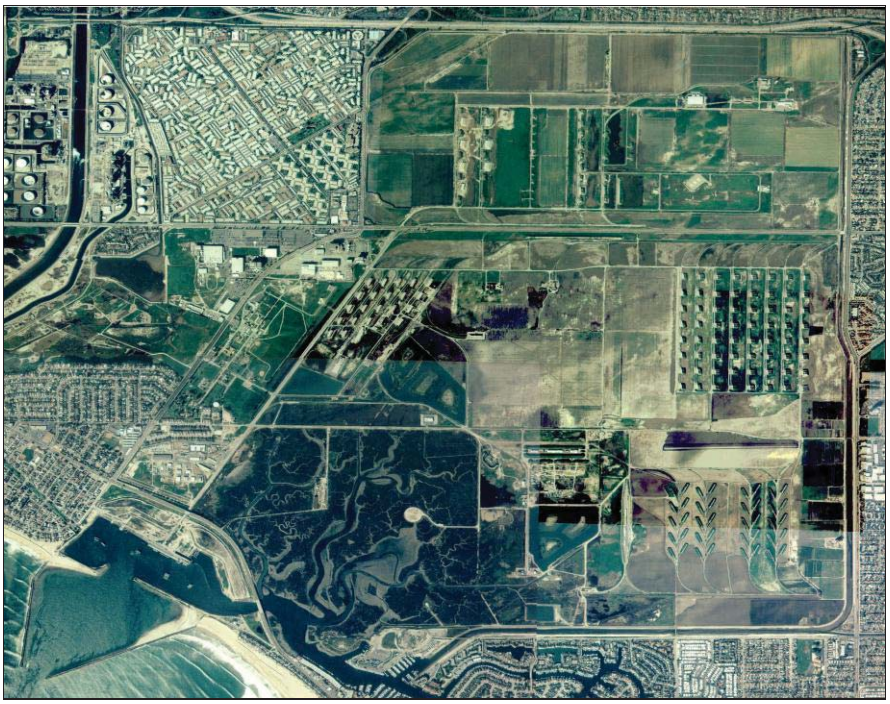
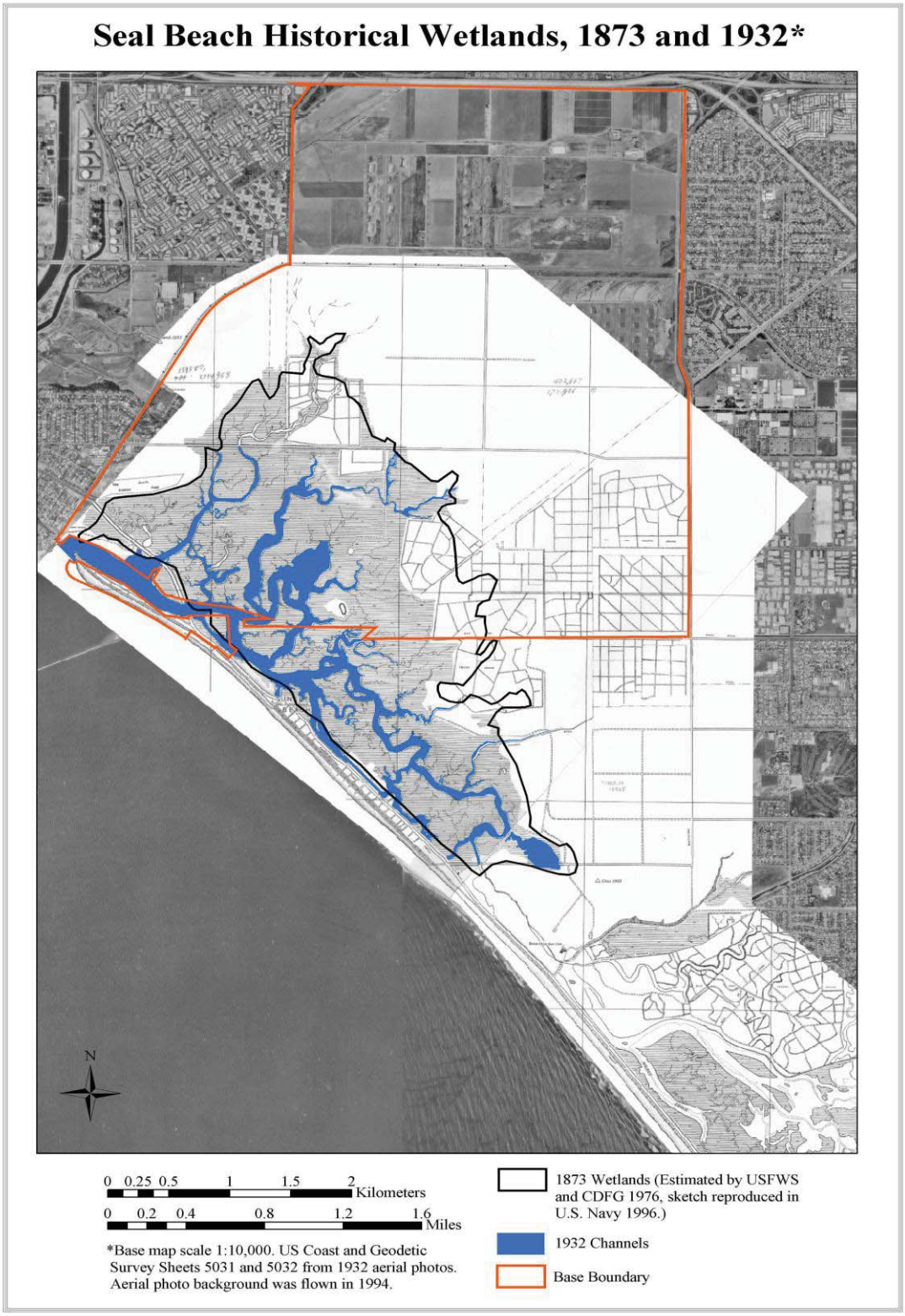


Photo 2-1. Aerial photograph of marshlands, bay area, and surrounding development (1990s).



Map 2-2. Wetland boundary and channels of Seal Beach in 1932.

In the 1890s, the Bolsa Chica gun club, a large landowner at the south end of historical Anaheim-Bolsa wetlands, engineered an important change in the marsh system. A dam with tide gates was built across a narrow part of the main channel through which the ocean water flowed into and out of the Bolsa Bay marsh lands. Once the dam and tide gates were in place the interior swamp lands were reclaimed for agricultural use. As a result, tidal flow was restricted and the natural opening to the sea closed. The Santa Ana River channel was then dug to drain the Bolsa system into Anaheim Bay. Today this system continues to function as it has since 1898, with only one opening to the sea. "[U]rbanization of the coastal plain caused the River to be confined within the artificial levees and discharge at its present location in Huntington Beach" (Santa Ana River Watershed Profile 2001).

Further development of Anaheim Bay began in 1904 when the Pacific Electric Railway laid tracks on landfill. The Red Car Service running from Los Angeles to Newport Beach played a key role in the growth of Seal Beach. Because of the railroad, the prosperity of shipping at Anaheim Landing diminished, but not its popularity. The increase in population led to an increasing need for farming and orchards to produce food.

The weather generally supported farming year round, but dry summers made irrigation a necessity. Increased irrigation efforts followed, including the use of crude brush, sand dams, and hand-dug ditches to divert water from the Santa Ana River to the fields and orchards (Santa Ana River Watershed Profile 2001). Naval orange trees, originally introduced in 1873, were found to be extremely well-suited for the climate. This, along with accessibility of the railroad to eastern markets, spurred citrus groves to rapidly replace most other forms of agriculture.

The city of Seal Beach was incorporated in 1915, named for the number of seals (California sea lions) frequenting the ocean and beach there. At the time of incorporation, there was a celebration of about 500 people, who ate a "banquet from the sea" with albacore, barracuda, clam chowder, and oysters (Dorr 1976).

A roller coaster and cyclone ride were brought from the 1915 San Francisco World Expo to Seal Beach to attract visitors to the pier and beach area. Despite Prohibition, saloons and bars soon dotted Main Street and gambling was popular at two halls in Seal Beach. These attractions combined to make the city a tourist destination and Red Cars transported people from Huntington Beach, Seal Beach and Los Angeles within a few hours. "As lively as Seal Beach was, the city remained free of the deep-seated corruption, violence and lawlessness that gripped other cities during Prohibition" (Barbara Roundtree, Seal Beach historian, *in* Grad 1993). See Photo 2-2 of Anaheim Landing in 1915.

In the 1920s and 1930s gambling boats were anchored off shore from Seal Beach (Dorr 1976). The ships lay beyond the three mile territorial limit of the United States and business flourished. However, inevitable with the Great Depression, tourism dropped and many businesses closed.

Photo 2-2. Old Anaheim Landing, 1915. Courtesy of the First American Corporation, Historical Collection.

Fishing and hunting were very popular. Gun clubs were established in 1899 and 1900, and it was observed that the "section of the coast between Long Beach and Newport Beach was one of the greatest habitats for wildlife and gamebirds in the world, and birds (ducks, geese, jacknipe, coots, plovers, doves, kildeer, egrets, herons, pelicans, gulls and land birds) were seen by the thousands, so thick in flight as to almost eclipse the sun" (Talbert 1952 *in* CDFW and USFWS 1976). Wildlife diminished during the 1920s for various reasons including oil drilling, the influx of people to the coastal zone, and the development of beach cities (USFWS and DoN 1990).

The Bolsa Chica Gun Club remained active until 1945, leasing portions of their land for oil drilling (Photo 2-3). The Seal Beach oil field was discovered in September 1924 when the discovery well was drilled by Shell Oil Company. This area is a tidal flat (Alamitos and Marine Areas) where elevations range from slightly above sea level to a maximum of 25 feet above sea level (Hesson and Olilang 1990). It is located one-half mile inland from the Pacific Ocean between the oil fields of Long Beach and Huntington Beach. In 1926 State Highway 1 opened, running along the coast next to the railroad tracks, forming a connection between Huntington Beach and Seal Beach. Oil was struck in both areas and oil fields provided the economic stimulus for resort development in both communities, which spurred development of Sunset Beach on the coast between them. The wetlands continued to decrease (CDFW and USFWS 1976).

During the 1938 "Great Flood", the Santa Ana River flooded the entire northern half of Orange County killing 50 people, destroying almost all bridges, and damaging agricultural land. The 1938 flood was a catalyst that changed the watershed's future (Photo 2-4). Following the flood, the USACE developed a 100-year flood control protection plan for the Santa Ana River with the principal component being construction of the Prado Dam in 1941.

Photo 2-3. Gun Club in Huntington Beach vicinity, 1949. Photo courtesy of The First American Corporation, Historical Collection.

Photo 2-4. Aerial of the flood of March 3, 1938, Huntington Beach area. Photo courtesy of The First American Corporation, Historical Collection.

Prado Dam was constructed (566' high and stored 200,000 acre-feet of water) approximately 30.5 miles upstream from the Pacific Ocean where the Santa Ana River flows through a narrow pass in the Santa Ana Mountains. It was built to provide flood control and water conservation storage for Orange County, but the dam also changed the hydrology of the Santa Ana River. The reservoir above the dam destroyed the previously existing riparian habitat in the area and created an artificial sediment trap. The channelized flow and sediment trapping by the reservoir

prevented the Santa Ana River's waters and its sediments from entering the floodplain, diminishing the flood-dependent habitat. This severely limited the amount of sediment delivered to the Pacific Ocean as beach sand replenishment. Prado Dam also blocked fish passage from the lower to the upper watershed (CDFW and USFWS 1976).

The construction of Prado Dam as an additional flood control measure opened the existing floodplain to new development. Increased development created further need for more flood control. The continued urbanization along Santa Ana River has been accompanied by modification of essentially all of the Santa Ana River tributary channels and construction of many flood control structures such as levees, weirs, culverts, flood walls, and the Seven Oaks Dam. Currently, only portions of the upper river channel remain natural. Based on William Graf's geomorphic "naturalness" classification for river channels, the Santa Ana River channel is essentially artificial due to human activities and changes in sediment supply. The engineered bed and banks of the largely artificial channel vary from soft bottom streambeds with revetted sides, to soft bottom rectangular streambeds with concrete rip rap, to complete concrete lining with rectangular walls.

The completion of the Prado Dam created enough flood protection in the lower Santa Ana River watershed to accommodate the building boom in Orange County during the 1950s and 1960s. The boom dramatically increased the area of impervious ground surfaces and associated urban runoff and consequently increased the chances of serious flooding. The result of these cascading actions has created the need for further flood control within the watershed (Santa Ana River Watershed Profile 2001).

2.1.3 Historic Military Period

World War II had a great impact on Seal Beach. The Navy bought the land around Anaheim Bay, relocating the Anaheim Bay Settlement homes to other areas of town to provide the U.S. Navy a base of operations for the war effort. These historic homes can still be seen from Central Avenue to Pacific Coast Highway. At that time Seal Beach had about 1,500 residents (Speer 1994).

The Naval Station, then called the Naval Ammunition and Net Depot, was established in 1944 less than a year before the war ended (a bathhouse was converted into its main administrative building). Naval Weapons Station Seal Beach's start as a net depot meant it was repairing steel nets designed to keep Japanese submarines out of U.S. harbors (Speer 1994). After the war, the Station was placed on a reduced work load, supporting the peacetime Fleet until about 1950, when hostilities with Korea resulted in a return to full operation. Since a variety of operations were performed at the Station, in 1962 it was redesignated the U.S. Naval Weapons Station Seal Beach.

The community of Seal Beach changed slowly during and after WWII as a new generation moved in. Soldiers who had been stationed and trained in Orange County returned and brought their families (Catalano 1999). Now considered a problem, gambling establishments were gone by the late 1940s, and the citizens of Seal Beach voted to outlaw gambling in their city. The Red Car stopped running the late 1950s and the tracks were removed in the 1960s, but the landfill remains.

As the boom continued into the 1950s and 1960s, so did inflation and foreign competition, driving much of the local industry into a sharp decline (Morton 1984). "Urbanization has taken its toll on the sand and gravel industry, even though ironically the very process of urban development demands that new deposits be made available to supply construction needs. This dilemma continues as valuable resources are rendered unusable by land-use conflicts,

premature development, and failure to recognize that mined-land reclamation can mitigate environmental constraints" (Morton 1984).

During the housing boom in 1955 and 1956 in Seal Beach, orange groves were bulldozed to accommodate homes. There was an increased demand for building materials as well as entertainment.

Disneyland was started in 1955 in Anaheim. Fast food and supermarkets arrived. Large industrial firms such as Rockwell, McDonnell-Douglas, Hughes and Northrup arrived in Anaheim, Seal Beach and Fullerton. The second stage of Saturn's S-II lunar exploration launch vehicle was assembled in Seal Beach by North American Aviation, which became the largest industrial element in the city for employment (CDFW and USFWS 1976).

2.1.4 Summary of Historic Changes Affecting Anaheim Bay and the Tidal Marsh

When the Navy acquired the property in 1944, it created a harbor, construction wharves, magazines, roads, dikes, islands and other fills for the general development of the ammunition depot, reclaiming approximately 600 acres of the original Anaheim wetlands.

In 1960, 868 acres adjoining NAVWPNSTA Seal Beach (primarily marsh land of Anaheim Bay in the central portion of the historic wetland area), were acquired by the Huntington Harbour Corporation to build a marine-oriented residential development. Dredging and filling began in 1961 and in the next 14 years that portion of the Anaheim Bay salt marsh behind Sunset Beach was completely reclaimed (CDFW and USFWS 1976).

In 1962 a strip of marsh land at the south end of NAVWPNSTA Seal Beach was declared surplus by the U.S. Navy and offered to Orange County at half market value. The 63-acre parcel was bought by the county for a marina and park. Filling began in early 1963 and took several years. The southeastern portion of the roughly triangular-filled area was then developed as a marina. In 1968 the marina and boat launching ramp were completed and opened to the public (CDFW and USFWS 1976).

By 1969, surface diversions and groundwater pumping had eliminated most of the dry weather surface flows in the river system between the mountains and Prado Dam (CRWQCB 1995). As the inland cities grew, the Santa Ana River became effluent-dominated as a result of increased urban runoff and wastewater flows. Between 1970 and 1990, the total average volume rose from less than 50,000 to over 130,000 acre-feet per year (CRWQCB 1995).

Table 2-1 summarizes the recent ecological history of Anaheim Bay leading to its size reduction, dampening of tidal flows, and loss of sediment and freshwater flushing from upstream. When comparing the 1875 U.S. Coast and Geodetic Survey topographic map to marsh boundaries present in 1981, Peter Warden, Chief Surveyor, estimated that less than 60 percent of the Anaheim Bay salt marsh remained. Based on a size estimate derived by the CDFW (1976) for 1894 of 2,300 acres this would suggest that less than 1,380 acres remained in 1981. The Refuge currently encompasses approximately 956 acres of this remaining habitat.

Table 2-1. Recent ecological history of Anaheim Bay leading to size reduction and restriction of tidal flows, and loss of freshwater input and sediment from the upper watershed. Current approximate acreage of the Seal Beach National Wildlife Refuge is 956.

Year	Event	Result
1868	Small boat port developed at Anaheim Landing.	First major disturbance of Anaheim Bay by man.
1875	Pacific Railroad reached Anaheim (Reardon 1981).	Anaheim Landing became unnecessary and use changed to primarily fishing and hunting (Reardon 1981).

Table 2-1. Recent ecological history of Anaheim Bay leading to size reduction and restriction of tidal flows, and loss of freshwater input and sediment from the upper watershed. Current approximate acreage of the Seal Beach National Wildlife Refuge is 956.

Year	Event	Result
1890	Dam built across narrow portion of main channel to Bolsa Bay marshlands.	Tidal flow restricted and natural opening to the sea was closed. Interior "swamp" lands claimed for agricultural use.
1898	Channel dug to drain Bolsa system into Anaheim Bay.	System continues to function with one opening to the sea.
1904	Pacific Electric Railway established.	Railroad tracks were laid on landfill, beginning development of the area.
1900-1920s	Twenty-three hunting clubs established in Bolsa-Los Alamitos marsh complex by 1900, attracting hunters from all over California (Talbert 1963). Leveed duck ponds established within marsh and in adjacent uplands to support hunting clubs. This section of the coast between Long Beach and Newport Beach was one of the greatest habitats for wildlife and gamebirds in the world, and birds (ducks, geese, jacknipe, coots, plovers, doves, kildeer, egrets, herons, pelicans, gulls and land birds) were seen by the thousands, so thick in flight as to almost eclipse the sun" (Talbert 1952 in CDFW and USFWS 1976). The gun clubs protected all birds during the breeding season. Duck clubs were generally used for pasture or farmed between hunting seasons, while some land remained inundated all year.	Wildlife diminished, especially bird population. Wildlife diminished during the 1920s for various reasons including oil drilling, the influx of people to the coastal zone, and the development of beach cities (USFWS and DoN 1990).
	Before 1928 at least two channels were plumbed as straight lines in the marsh (visible on 1928 aerial photos), perhaps to sustain duck ponds.	
1924	Oil was discovered in Seal Beach.	Economic stimulus provided for resort and then residential development. Wetlands decreased with oil pad development. Oil Island established.
1926	Construction of Pacific Coast Highway, 160 km of roads, 96 km of railways and 32 ammunition magazines.	A connection between Huntington Beach and Seal Beach was formed with the highway running along the coast next to the railroad tracks. The original channel in this area of the marsh was terminated significantly altering drainage and circulation patterns.
1938	The Great Flood –Santa Ana River flooded the entire northern half of Orange County.	Agricultural land was damaged, bridges were destroyed, many deaths.
1941	Prado Dam was constructed. Channelization of San Gabriel River, diversion of Anaheim, Bolsa and Carbon Canyon Creeks into the storm drain system.	Eliminated most of the fresh water influx to the marsh. The amount of sediment delivered to the Pacific Ocean as beach sand replenishment was severely limited.
1944	Navy port facilities construction begins.	Begin hard armoring of bay margins.
1950s	Building boom began.	Chances of serious flooding increased, creating a need for further flood control within the watershed.
1954	Construction of Oil Island.	Hancock Oil Company builds a 6.5 acre island from the slough along with access roads, and starts pumping oil.
1962	Orange County bought 63-acre parcel of marshland from U.S. Navy.	Marina and park planned for marshland at south end of the Naval Weapon Station.
1968	Sunset Aquatic Regional Park (marina and boat launching ramp) completed.	Southeastern one-third of parcel developed.
1969	Surface diversions and groundwater pumping.	This channelization eliminated most fresh water influx from the San Gabriel River (Reardon 1981). Most dry weather surface flows in the river system between the mountains and Prado Dam were eliminated resulting in further alteration to the salt marsh environment.
1970	Increase in urban runoff and wastewater flows from continued building development.	Santa Ana River became effluent-dominated.
1972	Establishment of National Wildlife Refuge per P.L. 92-408 Act to Establish Seal Beach National Wildlife Refuge.	Provided permanent protection for rare, threatened, and endangered species.
1974	40-acre U.S. Navy site granted to National Aeronautics and Space Administration (NASA).	Design and manufacture of second stage Saturn V rocket for Apollo program. Multi-story structures are still standing and in use.
1975	Development of Huntington Harbor small boat marina and residential complex.	Resulted in the blockage of the southern tributary channel into the eastern arm tidal flats, as well as causing most of the southeastern portion of the salt marsh.
1990	Mitigation for 147-acre Pier J landfill in Long Beach Harbor.	116 acres of wetland habitat (four tidally influenced basins-two with islands) created within the Refuge by the Port of Long Beach.

2.2 Current Land Uses and Their Management

Presently, about 60 percent of the city of Seal Beach's land area is NAVWPNSTA Seal Beach, consisting of agricultural fields, the coastal marshland, and rows of ammunition magazines.

Because much of the U.S. Naval fleet is forward deployed, or stationed far from U.S. shores, the positioning of vessels at appropriate points at sea allows quick and advantageous responses to an emergency. Naval Weapons Station Seal Beach's ordnance handling responsibilities are designed around the supply of the Pacific Fleet Aircraft Carrier Battle Group, consisting of 10 to 12 ships, planes, 3,000 U.S. Marines, amphibious units, and necessary underwater components. Three out of four Battle Groups are continuously preparing for deployment, and local infrastructure is enormous. To support this, the NAVWPNSTA Seal Beach facility receives, segregates, stores, and issues conventional ammunition, surface-launched missiles and air-launched missiles. It is a loading station for missiles, torpedoes, guns, ammunition (nine mm-five inch), and decoys. The average monetary value of stored weapons is $1.8 billion. Eighty ships are served per year, with each in port from two to three days.

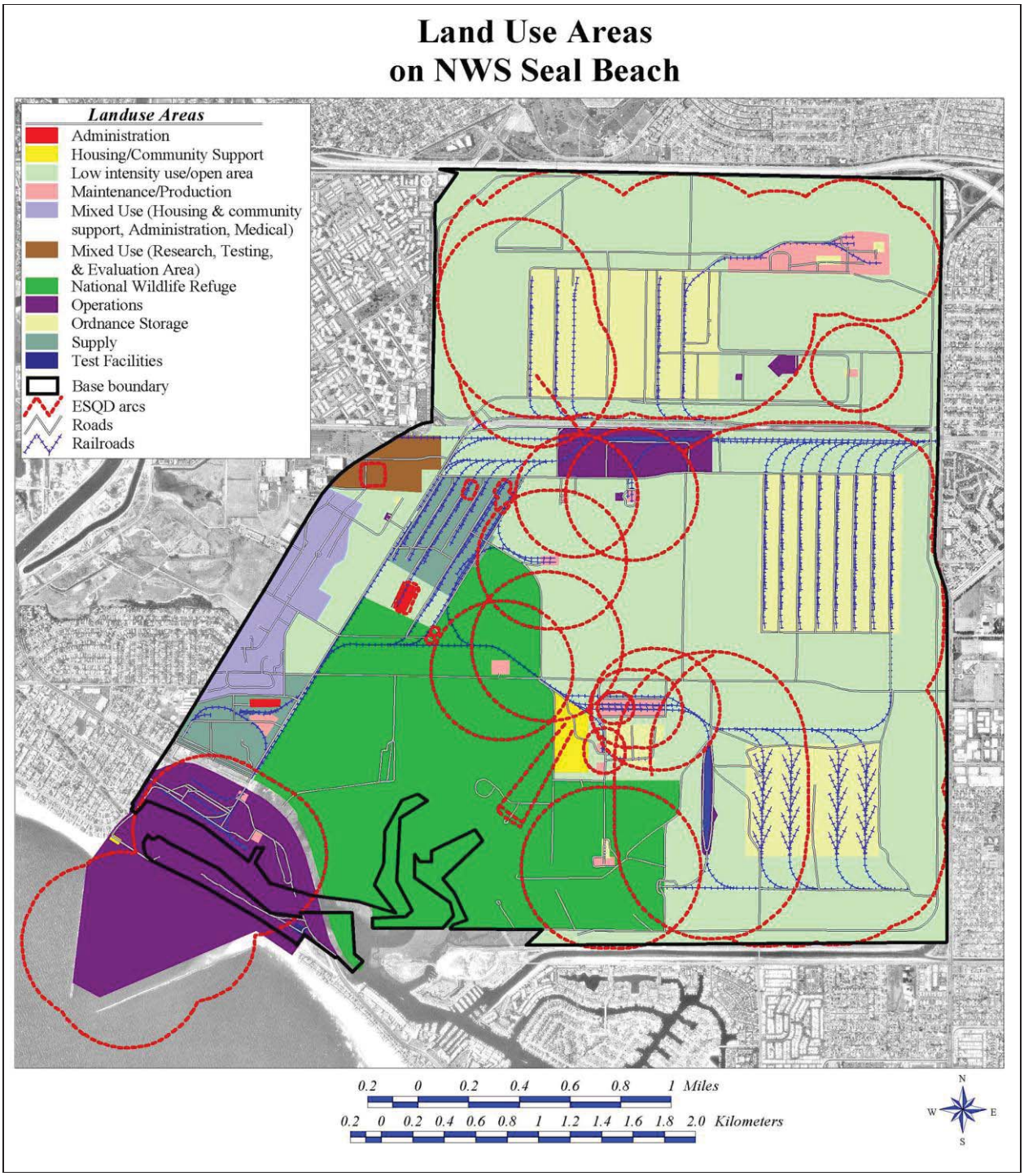
2.2.1 Land Use Areas and Constraints

NAVWPNSTA Seal Beach currently has 17 tenants, the largest being Navy Munitions Command, CONUS West Division (CONUS West). CONUS West provides storage of Navy ordnance, conducts inspections, and performs wharf-side munitions loading and unloading of surface combatants and medium-deck amphibious assault ships. CONUS West also maintains and repairs certain weapons systems, including standard tomahawk missiles, lightweight torpedoes, and fire control radars. While CONUS West is the largest, NAVWPNSTA Seal Beach tenants include:

- 5th Battalion, 14th Marine Regiment
- Branch Medical Clinic, Port Hueneme
- Fleet Logistics Center San Diego (FLCSD)
- Hewlett Packard
- Maritime Security Squadron (MSRON) 11
- Naval Criminal Investigative Service (NCIS)
- Naval Exchange (NEX) Port Hueneme
- Naval Facilities Engineering Command Southwest
- Naval Recruiting Command, Los Angeles
- Naval Recruiting Command, San Diego
- Naval Reserve Recruiting Command, Detachment One
- Naval Surface Warfare Center, Corona Division, Detachment Seal Beach
- Naval Surface Warfare Center, Port Hueneme Division
- Navy Munitions Command CONUS West Division
- Navy Munitions Command CONUS West Division Unit Seal Beach
- Sea-Air Federal Credit Union
- U.S. Fish and Wildlife Service (USFWS)

The main other land use areas are the Refuge, agricultural leases, other leases, easements, and right-of-ways. In addition, certain areas are designated for recreational use. Landscaping is managed through the Base Exterior Architecture Plan (BEAP) (2004). Map 2-3 depicts the current land use areas on NAVWPNSTA Seal Beach, and, where known, land use constraints.

Naval Weapons Station Seal Beach is the West Coast site for America's World War Two Submarine Memorial (Photo 2-5). Dedicated in 1977, the memorial pays tribute to over 3,000 submariners who never returned from WWII, and includes plaques for each of the 52 U.S. submarines lost in that conflict (Naval Weapons Station Seal Beach 2002).



Map 2-3. Current land use areas and ESQD safety arcs on Naval Weapons Station Seal Beach. Anaheim Bay is owned in fee by the U.S. Navy to the Mean High Water Mark. Submerged lands below that are owned by the State of California.

Photo 2-5. America's WWI Submarine Memorial located at Naval Weapons Station Seal Beach.

2.2.1.1 Ordnance Facility Management Areas and ESQD Arcs

Supporting the Pacific Fleet's combat readiness and sustainability by safely storing, inspecting, maintaining, and distributing ordnance (the military mission at NAVWPNSTA Seal Beach) allows for compatible natural resource management. Explosive Safety Quantity Distance arcs originating from most of the activity's 127 magazines encumber over 3,448 acres of land. General development and other uses of this safety arc-encumbered land for non-ordnance related functions is severely constrained. This results in *de facto* protection of large contiguous areas of native habitat. These areas provide an excellent environment for the sustainment of wildlife and plant communities.

Safety requirements for ordnance facilities are described in the manual "Naval Sea Systems Command Operational Procedures 5, Volume 1 (Ammunition and Explosives Ashore–Safety Regulations for Handling, Production, Renovation and Shipping)," known as OP-5. The ESQD arcs are shown on Map 2-3. Within these arcs, only essential personnel are allowed. There is a limit to the number of people allowed within those arcs within a given time period, and to the placement of buildings that may be inhabited in those arcs. For example, farmer lessees are not allowed a trailer for administrative purposes for their on-site operation. A secondary radius within the larger ESQD arc is measured from the corner of each building, and the permissible location of a neighboring building is determined by the amount of explosive weight within that building. This intraline explosive distance is how far one building has to be from another source so that if the one building were to detonate it would not detonate another building outside of that zone (so as not to start a chain reaction). Buffers zones are built into the arcs. The hazard is greater from actual handling of ordnance than from its storage, and safety zones are designed to accommodate this increased hazard.

Some ESQD arcs meet the perimeter property line. The calculation of the arc radius can be explained by using the maximum explosive distance and then making the determination that you cannot exceed that amount of explosive weight, or alternatively by determining where there is a safety issue and limiting the amount of explosive contained in a building. If these distances were to change to allow for a particular project, the procedures for handling and storing ordnance may be affected because the process for the movement of ordnance is altered.

The Explosive Safety Officer reviews all ordnance activity to ensure that ordnance handling and any other activity within ESQD arcs is in compliance with OP-5. For example, this INRMP cannot recommend that biological monitoring be conducted within ESQD arcs that would require a persistent presence of personnel. All new activities are required to have an Explosive Safety Hazard brief. A waiver is needed for exceptions to explosive safety arc rules. Permissible activities are examined through a site approval process (completely separate from project processing under NEPA), and if limits are expected to be exceeded, the weight of ordnance stored inside magazines must be adjusted to limit the exposure of personnel to potential explosion.

Mission requirements determine who is "essential" and who is not. It is possible to get construction waivers to exceed the time and personnel limits within the arcs. It is also likely that occasional biologists doing restoration work would be approved. The northern side of the property where farming occurs is almost entirely encumbered with ESQD arcs. Agricultural workers have been approved to work in the arcs due to the limited time period they spend there. Also, Westminster Boulevard and the Pacific Coast Highway as public transportation routes have waivers in effect and are considered safe due to the short time exposure of people transiting the area, or ammunition loads are kept below capacity in the magazines involved in the safety arc. Visitors to all explosive operating areas are briefed, and must sign an acknowledgement of the safety risk.

The Navy will not compromise on preserving the integrity of the safety distances or fencelines. Proposed projects cannot encumber the amount of ordnance that can be handled or the hours of possible operation. Considerations for the future include the fact that new weapons systems do not fit in 1945-design magazines, so new magazines have been built for them. The Navy may decide to remove a row of magazines because they are out of date.

Magazine Area Maintenance

Naval Weapons Station Seal Beach has 210 ordnance magazines of various types, 124 of which are earth-covered (DoN CNRSW 2002). The majority of these magazines were constructed during the latter part of World War II (1944 and 1945); eight missile magazines on the Station were constructed in the last decade (DoN CNRSW 2002). The magazines are located in two primary areas. The area north of Westminster Boulevard is referred to as 'North Side,' and the area south of Westminster Boulevard is referred to as 'South Side.' The magazines north of Westminster Boulevard include flat-top missile magazines and various relatively small parabolic types. The northeast corner of the South Side includes flat-top tripartite embankment magazines and three-unit parabolic magazines (DoN CNRSW 2002). The magazines are visible from some vantage points outside the Station, including some surrounding residential and commercial areas and adjacent public streets.

Land use possibilities are limited within the safety arcs associated with magazines by NAVSEA OP-5 regulations regarding fire hazard and security near the magazines. On the magazines themselves, which are steel-reinforced concrete covered by earth and vegetation, the height of vegetation is restricted to 18 inches overall, including a 50-foot clear zone from embankment toe to embankment toe. Once any vegetation reaches 18 inches, the entire magazine area is mowed. Mowing may occur twice a year or four times a year, depending on rainfall and vegetation growth. Mowing generally occurs from the middle of March to beginning of June, and sometime after November. Besides mowing vegetation in the area within 50 feet of the magazine toe and atop the magazines themselves,

mowing also takes place along roads and along railways. Public Works contracts the mowing around magazine perimeters and on top of the magazines.

The guidance in NAVSEA OP-5 Rev. 7 is as follows:

> **Section 4-1.10 Firebreaks.** Vegetation, trees, grass, leaves, undergrowth, and weeds can become a serious fire hazard to structures and facilities. Vegetation may be ignited by sparks from locomotives or exhaust of motor vehicles; by personnel who are smoking; by careless and unauthorized use of matches, cigarette lighters, and similar flame-producing devices; by lightning; and by sun reflecting on broken glass. Therefore, vegetation within 50 feet of any Potential Explosive Structure shall be maintained at a height of no more than 18 inches to create a firebreak, except where topography or other physical characteristics make this impossible. A 25-foot firebreak shall be maintained along both sides of on-Station rail tracks carrying ammunition and explosives. Vegetation should be controlled by chemical weed killer, cutting, plowing, or controlled burning, as necessary or appropriate. Firebreak requirements for open storage areas are provided in paragraph 4-1.27, and open burn/detonation sites in paragraphs 13-2 and 13-3.
>
> **Section 4-1.10.1 Trees.** All trees shall be removed from firebreaks. Trees outside firebreaks need only be removed if they present an immediate hazard to the Potential Explosive Structure, such as a dead or damaged tree. Trees alongside revetments or ground barriers need not be removed unless there is a danger of the tree falling over the barrier and affecting operations inside the enclosed area. All trees within lightning protection zones of protection (mast and catenary) must be removed.
>
> **Section 4-1.10.4 Plowing.** Plowing or blading of the earth cover to control vegetation is not recommended unless exceptional fire hazards exist.
>
> **Section 4-1.10.5 Burning.** During calm weather, when adequate precautions are taken to prevent spread of fire, closely supervised burning may be employed to control vegetation. The fire department, and when appropriate, a natural resource representative shall supervise burning within 200 feet of any aboveground magazine, explosives operating facility, or outdoor storage pad that contains ammunition or explosives, or within 50 feet of any earth-covered magazine that contains ammunition or explosives. During burning operations, all windows, doors, and ventilators of nearby magazines should be closed. All railcars and vehicles that contain hazardous materials shall be removed from the area.

Current operations and maintenance costs for the magazines were calculated in a recent study (DoN CNRSW 2002). Weed abatement activity covers about 110 acres and is conducted about five times a year at a total cost of $50 - $75/acre, or $5,500 - $8,250 per year. Facility sustainment costs for Category Code 4221 (Ammunition Storage, Installation) are identified by the DoD Facilities Cost Factor Handbook at $1.32 per square foot. Annual sustainment costs for the 124 earth-covered magazines at NAVWPNSTA Seal Beach were estimated as part of this study. Total earth covered magazine square footage was estimated to be approximately 500,000 square feet, yielding an annual sustainment cost figure of $660,000. Square footage was estimated only for the actual concrete magazine structure, and did not include the earth berming surrounding the structure. Use of the total magazine footprint, including berm, would have yielded a much larger number.

Magazines require 24 inches of dirt cover on top of them and some vegetation is needed to stabilize the soil. Managed as open space in this way, the habitat can be compatible with short-grass species and shrublands that are not continuous with magazine perimeter zones (50 feet from toe). However, this condition, in conjunction with the gradual slope of the magazine, attracts weeds, ground squirrels, and other early successional species. The dominant species of vegetation present on and adjacent to the ordnance magazines are wild oat (*Avena barbata*), ripgut grass (*Bromus diandrus*), small flowered iceplant (*Mesembryanthemum nodiflorum*), sour clover (*Melilotus indica*), cheeseweed (*Malva parviflora*), Russian thistle (*Salsola tragus*), black mustard (*Brassica nigra*), and Italian ryegrass (*Lolium multiflorum*). Burrowing owls occupy some of the drain pipes in the revetments of the magazines. Red-tailed hawks (*Buteo jamaicensis*) use the area for wintering. Red-winged blackbirds (*Agelaius phoeniceus*) nest in the growth on top of the magazines (DoN CNRSW 2002). In the past, this has limited activities related to

maintaining the height of the growth (because of terms of the MBTA), but recent rulings have allowed the maintenance activity to continue without restriction.

Finally, some magazines are supporting more weeds (versus natives) than others due to unknown and perhaps multiple reasons, but which could be related to the mowing schedule. Erosion control is an ongoing concern (Photo 2-6).

Photo 2-6. Magazine slope, showing planted iceplant, which has been considered for all magazines as a means to control erosion.

Summary of Erosion Condition on Magazines

Some of the magazines at NAVWPNSTA Seal Beach have eroded, reducing the thickness of earth cover to less than the required 24 inches. Because erosion exposes the cement cover of the structure, soil is periodically imported to re-cover the magazines. Soil placement on magazines is timed to avoid the migratory bird breeding season. Soil importation is expensive and alternative approaches have been tested. New magazines have been covered with gravel to control vegetation in order to reduce maintenance required to keep vegetation in a fire-safe condition (by mowing). However, vegetation eventually becomes established on the surface despite the gravel placement. Some magazines were refurbished in 1994, and this removed burrowing owl nesting and raptor foraging habitat (Bloom 1996). A recent proposal was to "spraycrete" the magazines to manage problems with soil erosion. However, this too has been found to require periodic maintenance because the soil cement cracks and seeds can become established in the cracks.

Erosion repairs have been implemented on up to ten magazines a year (DoN CNRSW 2002). The repair procedure involved compaction, scarification, and the addition of new soil. Sometimes dredge material from Anaheim Bay is used for repairs; however, this material is highly erodible and does not support much plant material. Severe erosion was noted where dredge material has been employed (DoN CNRSW 2002). There has been erosion repair implementation on some magazines within the past three years (R. Schallmann, *pers.comm*. 2006).

In general, the magazine embankment erosion appears to be caused by the long-term effects of precipitation on unstabilized slopes (i.e. those lacking vegetative or other cover). Some of this erosion has been attributed to the burrowing of ground squirrels. Where it is established, the existing grass vegetation provides a relatively dense coverage and fibrous root system to bind the upper layer of the soil. The primary impact of the erosion is the reduction in earth cover at the upper edges of the side embankments of the magazines. Significant secondary impacts, such as increased sedimentation at the magazines doors or effects from runoff or sedimentation to adjacent areas, have not been observed (DoN CNRSW 2002).

The following summary of erosion condition on the magazines (from DoN CNRSW 2002) may be helpful in evaluating natural resource opportunities to benefit erosion control as well as native species work.

Missile magazines: Vegetation (primarily bunchgrass) has grown over the tops and sides of many of the missile magazines to completely cover the crushed rock surface. This growth appears to provide some stability to the rock cover and may account for the relatively small amount of slippage of the rock on these magazines.

Parabolic magazines: The magazines have an earth cover only, with no crushed rock or other material layer over top. At the time of the field survey, vegetation provided cover on most of the magazine surfaces. This cover consists primarily of bunch grasses and herbaceous plants such as black mustard. However, large areas of the earth cover on some magazines, generally on west and south facing embankments, were unvegetated. Moderate erosion is most evident in these exposed areas. Soils have washed over the tops and around the edges of the front retaining walls of some of the magazines. Some rodent burrows were also present in the exposed areas and may contribute to erosion.

Flat-top magazines: These magazines have an earth cover only, with no crushed rock or other material layer over top. At the time of the field survey, vegetation provided cover on most of the magazine surfaces. The vegetative cover consists primarily of bunch grasses and herbaceous plants such as black mustard, but other types of vegetation were present on some magazines. However, large areas of the earth cover on some magazines, generally on south facing embankments, were unvegetated. Erosion is most evident in these exposed areas. The greatest loss of soil appears to be at the upper edge of the side embankments where they meet the top cover. This loss of soil is often most apparent at the revetment walls, where the top of the embankment is sometimes as much as one foot below the top of the wall.

Three-Unit Parabolic Magazines: These magazines have an earth cover only, with no crushed rock or other material layer over top. At the time of the field survey, vegetation provided cover on most of the magazine surfaces. The vegetative cover consists primarily of bunch grasses and herbaceous plants, although other types of vegetation were present on some magazines. Many of these magazines have suffered from extensive erosion that has reduced the amount of earth cover. The loss of soil has been the greatest at the rear portion of the magazines, where the waterproof seal below the flashing on the rear roof vents is often exposed. In some instances, the roof and/or rear wall of the magazines has also been exposed. Soil has also deposited in the depressions between the parabolic units and has sometimes washed over the revetment wall between the units.

Seven alternatives to improving the erosion condition of the magazines were considered in the Navy's study (DoN CNRSW 2002), plus the status quo (current practice). One of the alternatives was to re-establish vegetative cover to

function as an effective barrier to erosion. Costing assumed that a vegetation cover could be achieved through soil scarification and application of a hydroseed mixture and appropriate soil amendments. This alternative assumes that appropriate native vegetation seed mixture could result in a lower growing vegetation palette that requires less mowing. A second alternative was to re-establish vegetative cover with the addition of six inches of soil cover prior to revegetation. This ensures that OP-5 criteria regarding magazine soil coverage are met.

2.2.1.2 Security and Perimeter Buffer Requirements

Land use possibilities are also limited by regulations regarding the physical security requirements of any installation that stores and handles ordnance, including restrictions on groundskeeping practices. The CO, Security Officer/Provost Marshall, CNO, DoN Echelon 2 and subordinate commands are responsible for ensuring the physical security of NAVWPNSTA Seal Beach as instructed in OPNAVINST 5530.14C *Navy Physical Security* (01 May 2001), and OPNAVINST 5530.13B *Physical Security Instruction for Conventional Arms, Ammunition, and Explosives* (05 July 1994 incl. CH-1 of 02 June 1999). These Instructions provide guidance on how to safeguard warfighting assets and material from loss or theft.

OPNAVINST 5530.14C, Chapter 6 requires:

- 0602a: Physical barriers will be established along the designated perimeter of all restricted areas.
- 0603a: Federal standards and specifications for chain link fencing are outlined in references (u) through (y).
- 0606a: Where fences are used as restricted area perimeter barriers, an unobstructed area or clear zone should be maintained on both sides of the restricted area fence. The purpose of such areas is defeated if vegetation is high enough to provide concealment of a person lying prone on the ground.
- 0606b: An inside clear zone should be at least 30 feet. Where possible, a larger clear zone should be provided to preclude or minimize damage from incendiaries or bombs.
- 0606c: The outside clear zone should be 20 feet or greater between the perimeter barrier and any exterior structures, vegetation or any obstruction to visibility.
- 0606e: All fencing should be kept clear of visual obstructions such as vines, shrubs, tree limbs, etc., which could provide concealment for an intruder.

The perimeter road is an integral part of the security program for NAVWPNSTA Seal Beach. It provides an easily accessible location for security personnel to view the installation boundary and for maintaining the perimeter clear zone. Much of the perimeter road is located outside of ESQD arcs and, consequently, is often coveted by outside parties for projects such as road expansions. However, the perimeter road must remain unencumbered for security reasons.

In the perimeter clear zone, the height of vegetation is restricted so that intruders can be detected and a clear line of sight is available to Security personnel. Height restrictions call for eight-inch vegetation along fence lines for 30 feet inside the fence and 20 feet outside. Plantings along the Station perimeter must conform to these height restrictions. For example, trees planted along the Station perimeter must be removed and new ones set back from the fence line. In addition, even if a tree is planted outside the 30-foot buffer, its branches cannot span the fence line enabling persons to climb across.

The agricultural lessees maintain vegetation height restrictions up to the toe of a magazine. Plants may not exceed the height of a crouching person in the agricultural fields. Crops over a certain height are restricted, and in the past,

growers have been known to seek out special, short crop varieties. The lessee also controls weeds within the 50 foot (ft.) buffer around the toe of the bunkers located within the agricultural outlease area.

Supporting NAVWPNSTA Seal Beach security personnel's role is the Orange County Sheriff's Department's Sunset Harbor Patrol, which enforces access restrictions into the marsh and Sunset Aquatic Park. The Sheriff patrols the channel area, but gives authority to NAVWPNSTA Seal Beach security personnel on certain matters.

2.2.1.3 Transportation, Circulation, and Utilities

Specific access and circulation system components, configurations and relationships permit the efficient and safe organization of ordnance operations. This system must be capable of responding to significantly changing or increasing demands that might be placed upon it during times of military mobilization. The transportation systems on NAVWPNSTA Seal Beach primarily function to move ordnance to and from its storage facility and people from the main gate to their places of employment. These systems encompass a network of 68 miles of roads and 49 miles of railways and waterways. Public Works is responsible for the construction and maintenance of the roads on NAVWPNSTA Seal Beach.

Most of the information in this section comes from the Station's 1989 Master Plan Update (DoN WESTDIV 1989). The Utilities Privatization Initiative may, in the long term, result in a change in service provider for some functions.

Railroad Lines

Historically, access to ordnance magazines was largely via rail. As a result of a study that was done that showed it is more efficient to move ordnance on base by truck rather than rail, the tracks are now abandoned and no longer utilized.

Electricity

Southern California Edison Company supplies electricity to NAVWPNSTA Seal Beach. Southern California Edison maintains two 12 kilovolt (kV) feeder lines: one from the northeast side; and a second line that traverses from west to east along Bolsa Avenue.

Natural Gas

Natural gas is purchased from Southern California Gas Company and used to provide space heat to offices, operations and residential buildings on site.

Potable Water

Under normal conditions, water is supplied by the city of Seal Beach. NAVWPNSTA Seal Beach wells have been abandoned. Extensive portions of the water delivery system are devoted to fire protection service for the widespread ordnance handling and production activities. Approximately 7.5 miles or 21 percent of the total 35.4 miles of water lines are devoted to non-potable uses. Daily water use is 196,000 gallons. An automatic back-up water system for the Seal Beach site consists of one additional on-site well available when pressure drops below a prescribed pressure. On NAVWPNSTA Seal Beach property, the city of Seal Beach maintains a three-million gallon surface level storage tank with booster pump facility that serves an independent city of Seal Beach water distribution system, but is tied to NAVWPNSTA Seal Beach system and can be activated in emergency situations.

The bulk of NAVWPNSTA Seal Beach water lines were replaced under "Special Project" funding through Commander Project Fleet (G. Stathos, *pers. comm*. 2002).

Sanitary Sewer

The sanitary sewer system is provided by Orange County Sanitation District via the city of Seal Beach, predominantly served by a gravity branching configuration sewer line system supplemented in remote site areas with several small independent leach fields. NAVWPNSTA Seal Beach complex maintains limited discharge leaching field systems for some remote facilities. Ten on-site lift stations overcome local grade obstacles, the most significant of which is a lift station force main subsystem which connects the Research, Test and Evaluation (RT&E) Complex area with the main gravity system. Approximately 140,000 gallons per day of sewer effluent are generated by NAVWPNSTA Seal Beach.

Local Telephone Service

Telephone service is provided by an extensive on-site telephone system that serves all major facilities at NAVWPNSTA Seal Beach. The system consists largely of overhead lines with underground facilities serving Anaheim Bay, the 5th Street-6th Street/Case Road, RT&E and steamout transfer depot areas. The current antiquated switching facility is located in building 204. On-site telephone lines are owned by the Navy and are in need of replacement.

Fire Alarm System

On the NAVWPNSTA Seal Beach complex most telephone poles and underground conduits also carry fire alarm circuits, which have periodic alarm boxes serving all major facilities at appropriate access spacing.

2.2.1.4 Waterfront Operations

When the Navy acquired the Seal Beach lands it only obtained unencumbered title to those lands above the mean high water mark (CDFW and USFWS 1976). The state retained the tidal and submerged lands, which are under the jurisdiction of the State Lands Commission. See Photo 2-7 for an example of operations.

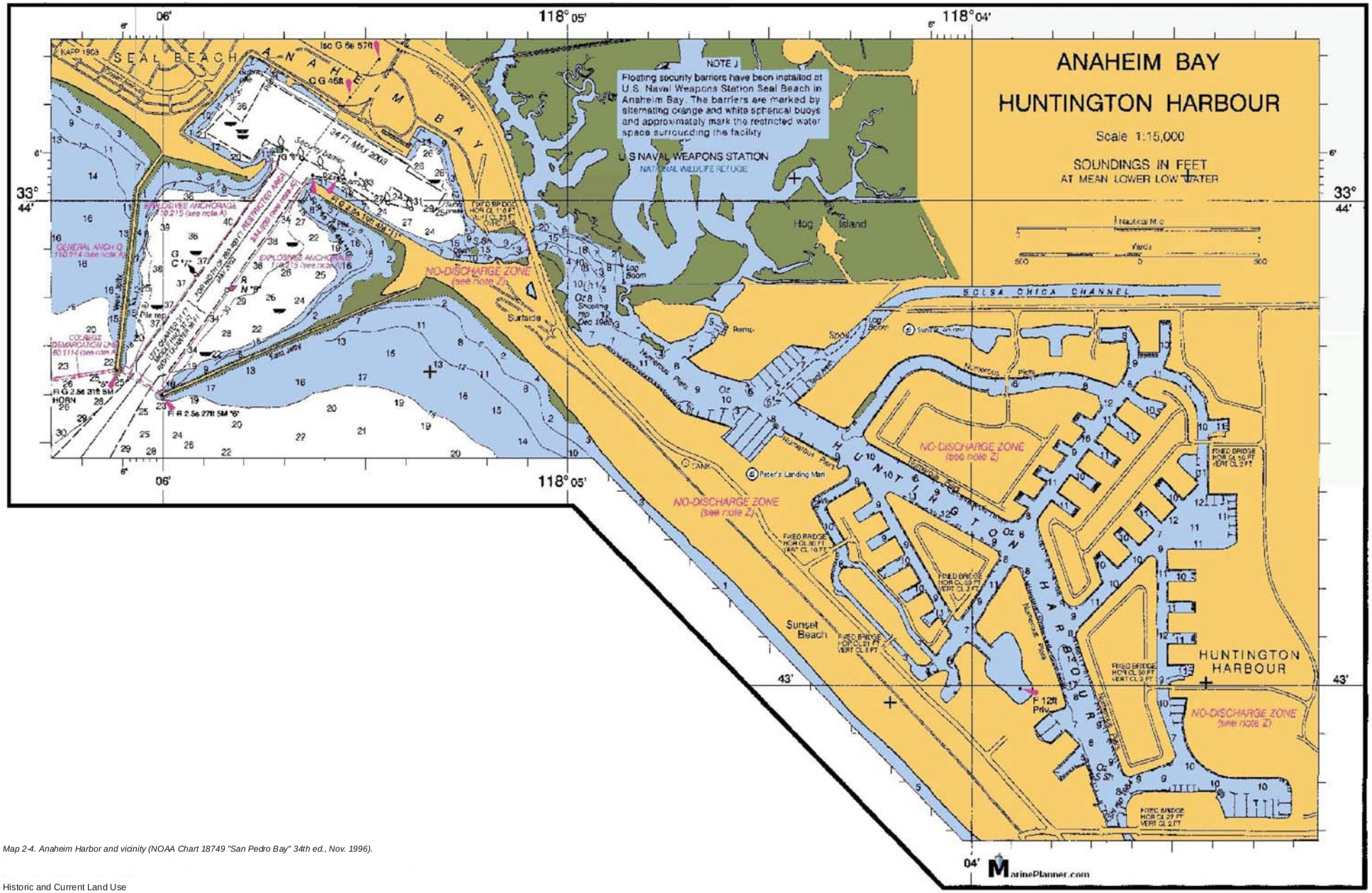
Photo 2-7. Waterfront operations. Photograph shows USS Okinawa LP4-3.

Anaheim Bay is comprised of:

- Inner Anaheim Harbor (where U.S. Navy vessels dock) (See Map 2-4)
- Outer Anaheim Harbor
- The main channel to Huntington Harbor
- The marsh

The marsh is separated from Inner Anaheim Harbor by the Pacific Coast Highway and a railroad. The Anaheim Bay inner harbor serves both the Navy's need for ordnance loading and the needs of civilian recreational boats. Both groups share a single entrance to the Bay. Large Navy ships that cannot enter the harbor dock to the north offshore from Long Beach, and are stocked by barges loaded in Anaheim Bay. The Bay is heavily used by the public, especially during the summer months. This has created security concerns heightened in the post-11 September 2001 atmosphere.

The inner harbor is a 75-acre, rectangular body of water, dredged to allow ocean going Naval vessels to dock at its wharf (Photo 2-8). The 1,000 ft. wharf and its maintenance buildings are situated on the northeast embankment. The harbor sides are armored with rock. A barrier beach separates inner from outer harbor and makes the former a still-water harbor. The outer harbor is created and protected from wave action by two rock jetties that extend 2,800 ft. out into the ocean and angle toward each other, leaving a 600 ft. wide opening for boat passage. The rock is granite and the jetties are 100 ft. wide at their base and 15 ft. wide above water.



Map 2-4. Anaheim Harbor and vicinity (NOAA Chart 18749 "San Pedro Bay" 34th ed., Nov. 1996).

Historic and Current Land Use

The entire tidal system is comprised of the Anaheim Bay Harbor and marsh, Huntington Harbor and outer Bolsa Bay. The latter area was originally part of another tidal system, the Bolsa system, but in the late 1800s was connected by a man-made channel to the Anaheim tidal system. The central portion of the system, at one time part of Anaheim Bay, is the man-made waterway of Huntington Harbor. It is completely dredged, channelized, 95 percent bulkheaded and devoted exclusively to marine-oriented living and recreation (CDFW and USFWS 1976).

Photo 2-8. Navy ship docked at the wharf, with marine onlooker. Photo courtesy of Naval Weapons Station Seal Beach.

Waters within the jetties are restricted, and explosive anchorages are established on the east and west side of the channel, as established in 33 CFR "Navigation and Navigable Waters" Part 334 (Danger Zone and Restricted Area Regulations), and Part 110 (Anchorage Restrictions):

> *Section 110.215* "The waters of Anaheim Bay Harbor between the east side of the Entrance Channel and the East Jetty, and the West side of the Entrance Channel and the West Jetty..... is reserved for use of Naval vessels carrying or transferring ammunition or explosives under standard military restrictions as established by the Safety Manual, Armed Services Explosives Board...No pleasure or commercial craft shall navigate or anchor within this area at any time without first obtaining the permission of the CO, Naval Weapons Station, Seal Beach, California. This officer will extend full cooperation relating to public use of the area and will fully consider every reasonable request for the passage of small craft in light of requirements for the national security and safety of persons and property."
>
> *Section 334.930* The restricted area is the water of Anaheim Bay Harbor between the east and west jetties, and the contiguous tidal channel and basin as far east as the Anaheim Bay Bridge. "The authority of the Naval Weapons Station CO in this area extends to restricting and disallowing the navigating or anchorage of craft during such times as the CO determines that considerations of national security or safety warrant such action(s). All craft authorized transit of this area shall stay within the limits of the entrance channel in the Outer Harbor, and confine their movement to within the limits of the marked small craft channel at the southern portion of the Inner Harbor. Recreational craft, such as water skis, jet skis, (personal water craft), row boats, canoes, kayaks, wind surfers, sail boards, surf boards, etc., and any activity involving persons in the water, are specifically prohibited within the restricted area. Boats unable to throttle down or maintain steerage ways at 5 miles per hour speed shall proceed at the minimum speed consistent with seamanship in an area subject to waterborne explosive handling operations. In case of doubt, boat operators of inbound boats will remain in the west end of the basin and outbound boats will remain in the east end of the basin until informed by a member of the Naval Weapons Station or U.S. Coast Guard of the completion of the waterborne explosive handling hazard. Smoking, open flames and barbecues in boats are prohibited during transit of this area..."

A Notice to Mariners is sent out by the Public Affairs Officer if there are any changes in the status of security measures at the Harbor. For instance, Huntington Harbor was shut down after the terrorist attacks of 11 September 2001 for obvious security reasons. There have been discussions within the Navy to install lights on the wharf for

nighttime operations during a military step-up, although no formal proposal has been developed. Installation of lights at the wharf would require public notification.

The waters of Anaheim Harbor are protected under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. There is also submerged eelgrass in Anaheim Bay. This is a special aquatic habitat that is protected under the CWA and as EFH under the Magnuson-Stevens Fisheries Conservation Act. California least terns forage over the Harbor and this activity is protected under the ESA. For these reasons, any project work in the Harbor must be determined compliant with these laws. All of these laws come into play when project work and a permit from the USACE are necessary, such as the gradual replacement of creosote pilings in the waterfront area. The USACE coordinates with USFWS, NOAA, and CDFW on conditions of the permit to allow project work to ensue. For example, USFWS will request avoidance of California least tern nesting season for project work, and NOAA will require that any impacts to eelgrass be mitigated.

2.2.2 Seal Beach National Wildlife Refuge

In 1964 the threat of a freeway, designed to run through the heart of the Anaheim Bay marsh, resulted in the establishment in the estuary portion of NAVWPNSTA Seal Beach a Navy Wildlife Refuge. The story of the freeway controversy is illustrative of the dramatic turn-about in public attitudes toward coastal wetlands that took place in the late 1960s in California (CDFW and USFWS 1976). The U.S. Navy took a stand against the freeway both for safety and security problems as well as abusive impact on natural resources, and CDFW also did not want encroachment in the marsh. In 1970, in compliance with the Sikes Act (P.L. 99-561), the U.S. Navy adopted a three-party cooperative agreement with the primary responsible agencies–the USFWS and the CDFW–for the preservation and protection of the fish and wildlife resources. However, the agreement did not have the authority to prevent a freeway. As a result, local citizens who also opposed the destruction of the marsh sought and received Congressional sponsorship of a bill to establish a NWR (See Figure 2-1). This provided more permanent protection than could be provided by a DoD refuge designation alone. The Friends of Anaheim Bay, Sierra Club local chapters, and the National Audubon Society, sponsored the bill. See Map 2-5 for the boundaries of the SBNWR.

The SBNWR was established in 1972, under P.L. 92-408 (86 Stat. 633), to be administered by the USDI and guided by the National Wildlife Refuge System Administrative Act of 1966 (as amended in 1997), “to provide for the conservation, protection, and propagation of native species of fish and wildlife, including migratory birds which are threatened with extinction...” (U.S. Congress 1972) and is implemented “pursuant to plans which are mutually acceptable to the Secretary of the Interior and SECNAV (P.L. 92-408).” Land title was retained by the U.S. Navy. Shortly thereafter, in 1973, a General Plan for administering the Refuge was signed by SECNAV and the Secretary of the Interior, broadly establishing responsibilities and that a cooperative agreement covering “necessary details on the management of the refuge” is developed.

92D CONGRESS
2D SESSION

H. R. 10310

IN THE SENATE OF THE UNITED STATES

JUNE 6, 1972

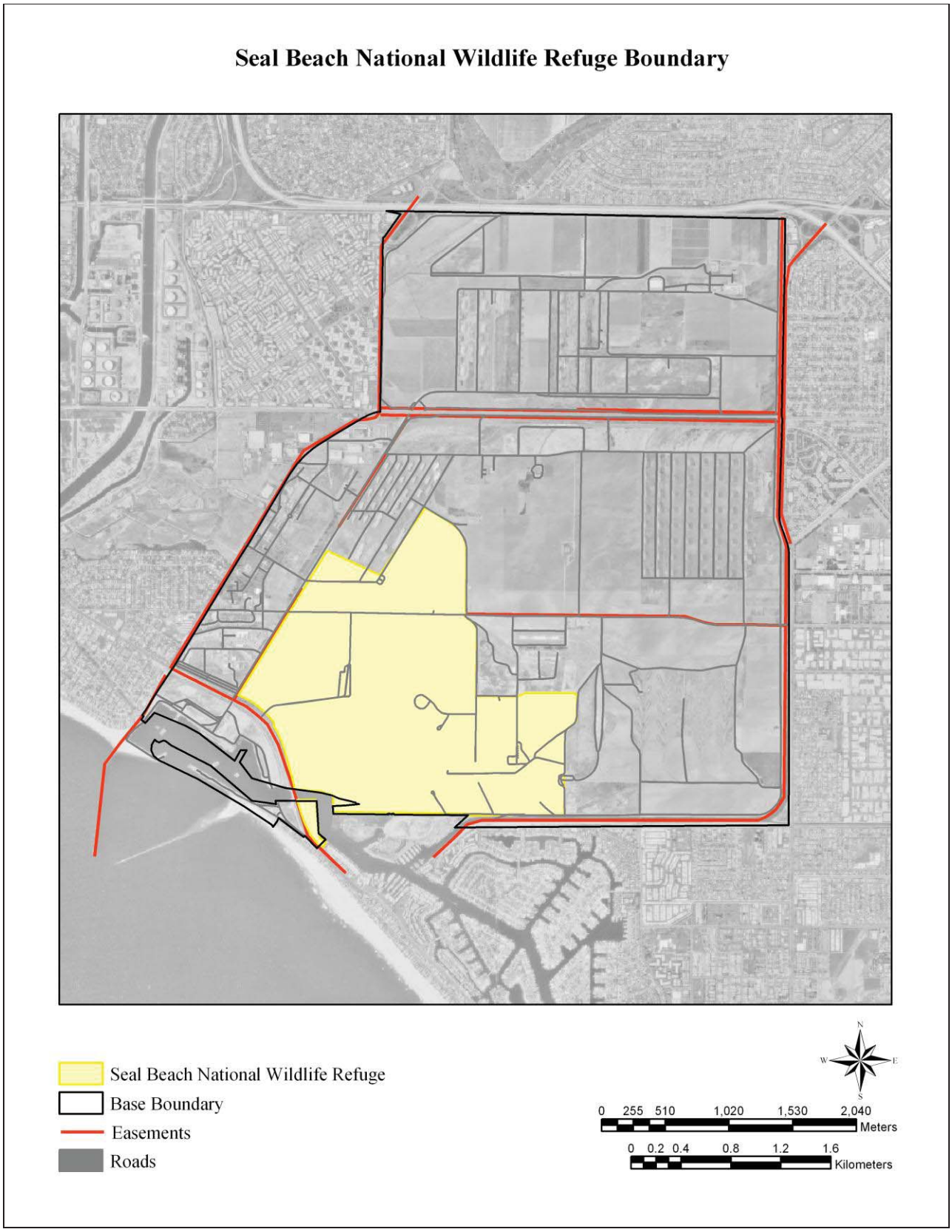
Read twice and referred to the Committee on Commerce

AN ACT

To establish the Seal Beach National Wildlife Refuge.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is authorized to establish the Seal Beach National Wildlife Refuge (hereafter referred to in this Act as the "refuge") as part of the national wildlife refuge system.

Figure 2-1. The Act of Congress that established the National Wildlife Refuge.



Map 2-5. Seal Beach National Wildlife Refuge boundaries.

In 1974 a SBNWR Management Plan was signed by the CO of NAVWPNSTA Seal Beach and the Regional Director of the Pacific Region, Bureau of Sport Fisheries and Wildlife (the former USFWS). For the Refuge portion of NAVWPNSTA Seal Beach lands, this plan amended the 1969 Fish and Wildlife Cooperative Plan (which was an update of a 1964 Plan) prepared under the Sikes Act of 1953 in cooperation with CDFW. This plan identified that "the principal objective of this refuge is to preserve and manage the habitat necessary for the perpetuation of two endangered species–the light-footed clapper rail and the California least tern. It is also the aim to preserve habitat used by migrant waterfowl, shore birds, and other water birds." The refuge would be managed "primarily as a natural estuarine or salt water marsh area." Among other details of Navy-Service coordination and management, this plan:

- Settled the final perimeter of the 1,000-acre refuge and posting of the boundary. The boundary was described using physical features such as roads, but it remained unclear whether the road boundaries included or excluded the roads themselves within the Refuge. (Roads are primary Navy mission needs.) Specific exclusions were made for Oil Island and all buildings and other structures;
- Prohibited construction of any facility in the Refuge without approval of the Navy CO;
- Provided that the Navy would contact the Refuge whenever it undertook activities that could have effects on the Refuge lands or wildlife;
- Provided that Navy personnel would only enter the Refuge as necessary, and would coordinate with the USFWS if entry were required during nesting season;
- Prohibited hunting;
- At least temporarily prohibited wildlife viewing by the public, but allowed it for Station personnel;
- Any habitat manipulation proposed by the USFWS must be approved by the Navy, coordinated with CDFW, and all permits would be obtained as appropriate;
- Directed that the need for additional water control structures in the eastern portion of the Refuge would be investigated;
- Prohibited fishing in the Refuge, but allowed fishing for Station personnel on the ocean side of Pacific Coast Highway;
- Established an advisory committee for screening proposed research projects, consisting of California State University Long Beach (CSULB) personnel, and subject to approval by Navy and Refuge personnel.

The 1974 Management Plan was amended in 1991 to add approximately eight acres to the area included within the Refuge boundary.

From 1972 to 1991, the Refuge was managed as an unstaffed satellite of the Kern National Wildlife Refuge, 200 miles away. Refuge personnel were rarely at Seal Beach except for high-priority endangered species recovery work, and financial resources for backing management were scarce. During the 1980s and early 1990s, two controversial issues challenged the existing coordination and management procedures, and overall cooperative relationship between the USFWS and U.S. Navy. One was the lawsuit regarding predator management already mentioned, and the other was a major wetland mitigation project conducted by the Port of Long Beach on Navy/Refuge lands.

The first USFWS on-site manager was assigned in November 1996, after the site was re-designated a part of the San Diego National Wildlife Refuge Complex. By 1998, a renewed effort at formalizing guidance for coordination and cooperative management was begun. Currently, a draft MOU has been drawn between the U.S. Navy and the

USFWS Refuge. This MOU details responsibilities on a range of management topics, requires monthly and quarterly coordination meetings with written documentation, and details a dispute and arbitration process. Program responsibilities also come from the Carlsbad Fish and Wildlife Office for regulatory matters, and the Torrance Law Enforcement Office for matters of law enforcement.

In accordance with the Improvement Act, which establishes the fundamental mission of the NWRs as wildlife conservation, the SBNWR is managed for "wildlife first." Today, the Refuge Manager's primary focus is on the management of threatened and endangered species, including the endangered light-footed clapper rail and California least tern, and their habitats within the Refuge. Management on the Refuge is further defined with completion of the CCP (completed in 2012), which is required by the Improvement Act for each refuge within the NWRs. The purpose of a CCP is to provide guidance for how the Refuge should be managed for a period of at least 15 years. The CCP is intended to ensure that wildlife comes first on the Refuge; to provide the direction necessary to achieve the purposes for which the Refuge was established; and to present a clear and comprehensive statement of desired future conditions for the Refuge. The current MOU requires that the Refuge boundary be reviewed during each five-year update of the INRMP (and during the CCP process) to jointly determine if any lands should be added to the Refuge.

Another document that currently provides guidance for the management of the SBNWR is the ROD for the Final EIS for the Endangered Species Management and Protection Plan Naval Weapons Station Seal Beach and Seal Beach National Wildlife Refuge (1990). This ROD contains fairly specific guidance for managing and protecting the listed species supported within the Refuge and adjacent Navy lands. This Plan was created after a 1986 EA on management and control of the non-native red fox (*Vulpes vulpes*), which had previously preyed upon the California least tern at Seal Beach, was challenged in a law suit brought by Animal Lover's Volunteer Association, Inc. against the U.S. Navy and USFWS. After the adequacy of the EA was sustained before the U.S. District Court, the case was appealed to the Ninth Circuit Court of Appeals which found the EA inadequate (Animal Lover's Volunteer Association vs. Carlucci, 849 F.2d 1475 [9th Cir. 1988]: 867 F. 2d 1224 [9th Cir. 1989]). However, this did not cause the cessation of the red fox control program, which has since been successful at eliminating the red fox from the Stations premises. Meanwhile the Court ordered that an EIS be prepared.

The Preferred Alternative "E" from the EIS involved expanded endangered species management along with restoration of supporting upland habitats. Additional high quality wetlands and a restored ecosystem that maximizes production of native fish and wildlife would be provided by establishing, as closely as possible, a self-perpetuating collection of natural habitats. Research would be conducted to explore the possibilities and feasibility of restoring native shrubland habitat and reintroducing coyotes to the Station in order to create a more naturally balanced ecosystem with minimal need for human intervention to support and protect endangered species. This would proceed based on availability of funding and staff. The following summarizes details of the ROD on the Endangered Species Management and Protection Plan, which applies to both NAVWPNSTA Seal Beach as a whole and the Refuge administrative overlay. The ROD was approved in 1991 by the USFWS Regional Director and the U.S. Navy Deputy Director for Environment, Office of Assistant Secretary of the Navy (Installations & Environment), and documents the decision to expand the endangered species management program with ecosystem restoration at the Refuge and the Station for "at least the next 10 years." The Plan's implementation was contingent on staffing and funding:

- *Species population monitoring.* Determine abundance and trend of populations to guide management decisions, to include night surveys for nocturnal, predatory species; California least tern surveys; and light-footed clapper rail call counts and high tide surveys.

- *Endangered species studies.* Study the population dynamics and habitat use of the California least tern and light-footed clapper rail.
- *Endangered species protection.* All predator control activities will be conducted based on the mutual concurrence of the USFWS, U.S. Navy, and U.S. Department of Agriculture (USDA) Animal Damage Control, and coordinated with CDFW. The barrier fence around NASA Island would be maintained and enhanced. The Navy perimeter fence would be maintained and improved as the fence is repaired or replaced, perhaps by adding a horizontal, ground-level extension to discourage predators from burrowing under the fence.
- *Predator control.* Predatory mammals would be actively trapped and relocated, trapped and euthanized, or otherwise controlled as appropriate. Red foxes would be captured primarily by padded leghold traps, whereas other effective and appropriate techniques would be used for feral cats, opossums, or striped skunks such as cage traps or other methods. If captured animals are to be relocated, this will be accomplished using stringent criteria in the EIS. In the absence of suitable relocation sites, captured predatory mammals will be euthanized at the trap site by lethal injection. Other effective, safe, and humane means may also be used, as identified in the EIS.

  Animals trapped that are not considered to pose a significant threat to endangered species because of the time of year trapped, total estimated numbers on the Station, or other factors, may be released at the trap site or to an area away from the marsh based on criteria and guidelines described in Appendix E of the EIS.

  Techniques for controlling avian predators include live-capture and release off-site, live capture and euthanization, shooting, and toxicant application. Live capture of predatory birds will be by baited foot noose harnesses or modified pole traps. In the event that common ravens or American crows become problem predators of endangered species on the Refuge, a toxicant, Starlicide (DRC-1339), may be used for their control. Shooting may be used in rare cases when a problem bird cannot be trapped or returned after release off-site and continues to prey on endangered species.

  An index was to be established to aid management of predator populations on NAVWPNSTA Seal Beach and SBNWR, and to avoid the need for enacting emergency control measures for protecting endangered species. Predators would be controlled based on location, seasonality, and numbers of predator sign or sightings on the Station and Refuge. The type, extent, timing, and duration of control activities for targeted species would be based on this index and the population status and trends evident for endangered species at the time. Indices would be periodically revised based on new knowledge. If significant or repeated predation of endangered species occurs, immediate emergency control measures would be implemented.

  The long-term solution to continued, active predator trapping is considered to be habitat restoration to support reintroduction of the top carnivore, the native coyote (*Canis latrans*).
- *Habitat management.* This includes management and maintenance of nesting sites for terns and rails, including the addition of new nesting areas.
- *Habitat restoration and enhancement.* Some identified projects included examining the feasibility of cleanup and restoration of Oil Island; an eight-acre wetland parcel would be considered for addition to SBNWR; the upland restoration already mentioned to support coyote reintroduction; upland restoration adjacent to the Refuge; providing agricultural tailwater and local runoff to enhance marsh productivity; and continued monitoring of the Port of Long Beach mitigation ponds.

- *Monitoring and researching environmental quality.* This section advocated continuation of the U.S. Navy's IR program, and expansion of a cooperative USFWS-U.S. Navy contaminant study to determine the extent of bioaccumulation on wildlife.
- *Public use and education.* Public involvement, an annual tour, a symposium, and development of public viewing and interpretive facilities would be explored.
- *Staff and funding.* Staffing and funding would be increased in three phases from 1.5 staff years and $67,500/year (1989 dollars) to 5.5 staff years (Navy and Refuge) and annual funding of $225,000 (1989 dollars). Initial cost of shrubland development and coyote introduction was about $250,000.

NWR Partnerships with Community Groups

The Refuge has provided a much more public face to NAVWPNSTA Seal Beach than it had in the past. An interpretive Nature Center was established on Earth Day (21 April 1996) in an existing 1,600 square foot building that was originally used as a mail room by NAVWPNSTA Seal Beach (WPNSTASB INSTR 5700.1). Shared by volunteers and one Refuge staff member, the Nature Center was established to enhance awareness and educate people on the importance of the coastal salt marsh habitat and the significance of the Refuge for a number of sensitive species (Photo 2-9).

Although public use is restricted, monthly public tours, pre-arranged scout group and school tours of the Refuge and Nature Center, annual marsh clean-up, and National Wildlife Refuge Week events are offered. These were temporarily halted after 11 September 2001, but are gradually coming back on line. Meetings of the Friends of SBNWR, a non-profit (501[c]3) organization established by local community members to support the Refuge, are held on site and they are a co-sponsor of the Nature Center. Through use of educational tours and co-sponsoring arrangements with other joint federal stakeholders and environmental service organizations, the U.S. Navy accomplishes a good community relations policy. The Refuge office has a native plant garden (Photo 2-10), and there is also an interpretive observation platform that overlooks the marsh.

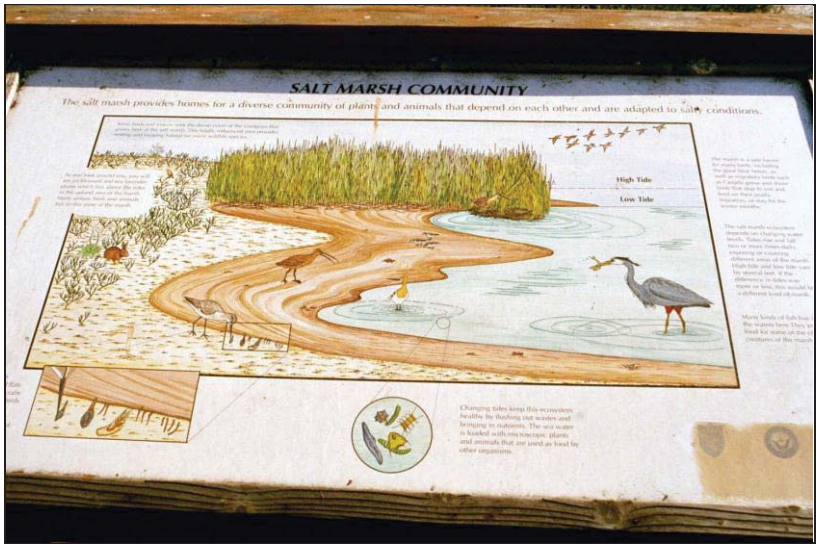


Photo 2-9. Salt marsh educational sign at the National Wildlife Refuge Viewing Point.

Photo 2-10. Native plant garden at the National Wildlife Refuge Nature Center.

The Refuge is a source of community pride for the neighborhood surrounding NAVWPNSTA Seal Beach. Many volunteer their time in support of its natural resource values. About 120 people come annually to clear weeds. Community members are also heavily involved in the non-lethal predator control of the federally endangered California least tern population that nests on the Station.

A sampling of those involved in the recommence of community visitation and tours through the SBNWR are shown below:

- Friends of Seal Beach National Wildlife Refuge.
- The Sierra Club (has conducted an annual marsh cleanup since the 1970s).
- Surfrider Foundation.
- El Dorado Audubon Club (based at El Dorado Nature Center in the city of Long Beach) has adopted the Refuge since the 1990s as part of its "Refugekeepers" program.
- Laguna Hills Audubon Club, a nearby retirement community, has also adopted SBNWR as part of their Refugekeepers program.
- Youth Conservation Corps.
- Los Alamitos High School Ecology Club.
- The Aquarium of the Pacific in Long Beach is interested in restoration work at the marsh, since as a member of the National Organization of Zoos and accredited by the American Zoological Society, it is supposed to participate in local conservation efforts. The NAVWPNSTA Seal Beach CO has sometimes volunteered as a scuba diving assistant in the "Blue Cavern" kelp exhibit at the Aquarium.
- Business associations and the Chamber of Commerce of Seal Beach. The Chamber includes the Refuge in its fundraising, and in return requests support for its events such as "Sand Castle Days" and a 10-kilometer race. The city of Seal Beach has an ad hoc committee of non-profit organizations for mutual support and to coordinate schedules so that events do not conflict.
- Boy Scouts and Girl Scouts have events at the Refuge.

Refuge management has also benefited from cooperative research relationships with local universities. There has been a long-standing relationship between NAVWPNSTA Seal Beach and CSULB for conducting research on Station lands. Many theses have been done on marine resources of Anaheim Bay, the burrowing owl, and other topics; the Navy has funded some of this research.

There has also been research conducted by California State University (CSU) Fullerton, Azusa Pacific University, Saddleback and Irvine Valley colleges, and Long Beach City College. Since 1985, there has been very little research conducted on the Refuge.

2.2.3 Agricultural Outleases

The U.S. Navy is required to identify lands that are suitable for agricultural outlease purposes when compatible with military needs (OPNAVINST 5090.1C [30 October 2007]). Military lands that meet the following criteria and that are capable of producing agricultural crops or forage for livestock are considered for outleasing when the proposed lease: shall sustain and conserve the property for future military use; shall not interfere with current or planned use of adjacent property; does not represent a hazard to the premises; and a substantial benefit, such as reduced maintenance costs, cash rental for leased property, or improved property management shall accrue to the government.

All new or revised land management plans will incorporate the potential for additional agricultural outleases, and related documentation, in a section of the plans dealing specifically with agricultural outleasing. If the potential exists for additional agricultural outleases (compatible with the mission and in consideration of a balanced natural resources program), Engineering Field Divisions will provide a written report to the installation CO including maps of potential agricultural outlease uses, a summary of benefits the government will derive from outleasing, and a brief economic analysis of current and potential outlease land uses. The economic analysis should consider:

- Cost of required improvements prior to and during outleasing;
- Estimated fair market rental value;
- Annual operating maintenance expenses;
- Dollar value of conservation benefits; and
- Advantages/disadvantages of a contract for more than the normal five-year maximum term.

Portions of NAVWPNSTA Seal Beach are currently outleased to two local growers (see Map 1-2) and are referred to as the “South Ag Lease” (Parcel 4B01) and “North Ag Lease,” separated by Westminster Avenue. These leases have been active here for many years, and currently comprise 2,153 acres, although not all available land is generally cultivated each year, and some acreage is reserved for storage and maintenance activities.

Primary crops include barley, lima beans, garbanzo beans, nopales (cactus fruit), cucumbers, cauliflower, green beans, celery, lettuce, squash, peppers, watermelons, strawberries, and cabbage. Other crops grown have been processing tomatoes, carrots, parsley, radishes, bell and chili peppers, onions, melons, parsnips, rutabagas, peas, pumpkins, collard greens, mustard greens, turnip greens, beets, kale, Swiss chard, kohlrabi, black-eyed peas, basil, leeks, green onions, cilantro, bok choy, dill, oats, and wheat. See Photo 2-11.

In a portion of the South Ag Lease, along the eastern property line, the grower has been required to plant alfalfa for perennial cover in order to control dust emanating from this field, which is comprised of dredge fill. Recently, an opportunity arose to add 35,000 cubic yards of fill with more organic material in the soil mix than previously exists,

and this is expected to improve the soil condition such that it is more conducive to crop growth as well as dust control. The fill became available from a construction project involving a pipeline in the city of Huntington Beach, and was to be provided "free of charge." In small amounts this was not a security issue. The problem arose from mulch that was actually green waste and full of trash. The waste then developed maggots and caused an issue with flies, thus its use was not permitted.

Photo 2-11. Agricultural field at Naval Weapons Station Seal Beach.

Some fields are unirrigated and dry-farmed. Irrigated crops are watered using Station wells and applied by sprinkler or furrow means. Water is also available from the Orange County Water District. To minimize mosquito breeding, there may be no tailwater or other standing water in ditches between water applications. A small amount of agricultural tailwater sometimes enters the marsh north of Bolsa Avenue.

Portions of the leased area, not to exceed two acres total, may be used for apiary (beekeeping) purposes in conjunction with bean production. All apiary sites and the bee owner must be annually registered with the Orange County Agricultural Commissioner and subject to their inspection. Water must be available to the bees at all times. No more than 75 single hives, or their equivalent in multiple hives, shall be placed at any site. The bee owner shall follow the directives of the California Food and Agricultural Codes Section(s) 2900 regarding beekeeping. Every attempt must be made to prevent the introduction of Africanized honey bees to the Station.

The EIS on endangered species and predator management (USFWS and DoN 1990) identified a direction towards organic farming. However, it was added that there is too much residual dichlorodiphenyltrichloroethane (DDT) and dichlorodiphenyldichloroethane (DDE) in the soil for these fields to be certified as organic in the near future (DoN SWDIV 1995). A direction towards organic farming has not been a current goal of the agricultural program.

Conservation Requirements of Agricultural Leases

Each agricultural outlease must include a conservation plan which details the best management practices to protect the natural resources and government interests under the lease. Naval Facilities Engineering Command provides the technical and administrative functions of this program (OPNAVINST 5090.1C [30 October 2007]). The lessees are required to perform reimbursable conservation and maintenance work as approved or directed by the government.

This reimbursement takes place in the form of credit against the lessee's rent; the rent credit is not allowed to exceed the total amount of cash rent received during the term of the lease. This work, mostly grounds maintenance, would have to be done by NAVWPNSTA Seal Beach Public Works if it were not for these leases.

Current conservation and maintenance work requirements, to be accomplished at the lessees' own expense and in accordance with the specifications and guidelines set forth in the Soil and Water Conservation Plan are:

- Agricultural management compatible with a National Wildlife Refuge
- Efficient water conservation irrigation practices
- Minimum or low tillage combined with incorporating crop residues
- Pest management with minimal effects on wildlife
- Fire prevention and control
- Hazardous waste management

Vegetation Management

Due to vegetation height restrictions for NAVWPNSTA Seal Beach security needs for which a distant line-of-sight is needed, crop height is also restricted. For this reason corn, pole beans, pole tomatoes, and vineyard or orchard crops are prohibited. In addition, rice, sod, and stolon or rhizome crops may not be grown for various reasons.

Lessees control weeds to ensure they are kept less than 12 inches year-round either mechanically, by mowing or disking, or with herbicides. All ditches and culverts are kept free of silt, debris, and vegetation to assure continuous, unimpeded flow of water. Vegetation on drainage ditches and shoulders is mowed, chopped or sprayed to maintain a maximum height of 12 inches. All road shoulders are mowed to a minimum width of six feet from the road edge, and may not be disked. All application of herbicides is in accordance with local and federal regulations. No soil sterilants are used. Lessees are prohibited from applying to outleased land any herbicides that will cause illegal residues on crops or in any way adversely affect, damage, or limit crops that may be planted subsequent to the lessee's tenancy. This protects soil productivity, maintains groundwater quality including that of runoff, allows future lessees maximum flexibility and diversity in planting crop rotations.

Minimum Tillage and Soil Management

The lessee shall practice "minimum tillage" wherever practical and feasible. The lessee shall deep rip designated fields to a depth of 36 inches in the first and third year and 48 inches every second year to prevent plow pan from forming in field or in the 50-foot buffer areas around magazines. In some locations, gypsum is added to the soil during this subsoiling, to manage salinity levels. Minimum till practices that incorporate crop debris back into the soil are preferred. To minimize wind erosion and neighborhood dust, no tractor work (disking or ripping for planting, cultivation, harvesting, or maintenance or mowing) shall be conducted in the perimeter fields when the wind speed is greater than five miles per hour (mph) or after 11:00 AM. Certain fields are designated mow only due to dust control concerns.

Pesticide Use

DoD and U.S. Navy policy requires that use of pesticides is minimized on their property (OPNAVINST 5090.1C [30 October 2007]). Pesticide use is restricted on NAVWPNSTA Seal Beach due to the adjacent SBNWR; for instance, methyl bromide is not allowed to be applied on these parcels. Direction to the farmer is provided in the Soil and Water Conservation Plan addendum to the agricultural leases. They are required to abate noxious or

undesirable weeds, rodents, insects and other pests on their parcels. The farmer is also required to submit a pest management plan to their Station Point of Contact at the start of the lease. The Plan includes a list of pesticides proposed for use to be approved by the NAVFAC pest management consultant. Any new pesticides to be used by the farmer after the initial Pest Management Plan has been submitted must also be submitted for approval. Information to be included on the pesticide list is: common name and concentration of pesticide, product formulation, application rate, and approximate time and frequency of application. A pesticide approval form is available from the Station Point of Contact.

The pesticides presented in Appendix F are approved for use on these leases. Also included in Appendix F are pesticides approved for use in industrial areas and SBNWR.

State or county permits required for application of a particular pesticide are the responsibility of the lessee. Lessees are required by DoD to record and report all pesticide use and pest management performed on DoD property. A record keeping/reporting form is available from the Station Point of Contact. Lessees are also required to notify the Station Contact of any modification of their pesticide application plan, and the County Agricultural Inspector at least four days prior to applying any pesticide. Under contract with the State of California, Orange County monitors all pesticides used on the agricultural leases. Inspectors periodically sample and conduct focused tests to determine if the maximum allowable concentration of a specific chemical is exceeded, and general tests to determine every chemical used on the produce and the concentration of each chemical. Tests are also performed to determine if illegal chemicals or excesses are being used on produce for human consumption. The County Inspector observes the mixing and application processes of regulated pesticides to ensure application is in accordance with approved methods.

Mosquito Abatement

The lessees are responsible for the abatement of mosquitoes on their leases. Tail water or runoff water is not permitted to stand in ditches or in fields for longer than three days between irrigation operations. The lessee's plan for controlling mosquitoes must be described and the chemicals planned for use must be listed in the Pest Management Plan. Mosquito control insecticide use must be recorded and reported to the Station Point of Contact.

Rodent Control

The lessees are responsible for performing and funding rodent control to prevent damage to the leased area. The plan for controlling rodents must be described and the rodenticides planned for use must be listed in the Pest Management Plan. Rodenticide use must be recorded and reported to the Station Point of Contact. Chemical toxicants with secondary poisoning effects are not allowed.

Bird Control

No chemical avian pesticides will be allowed to be used on the leased areas. All bird control measures, whether cultural or mechanical, shall be approved by the Station Point of Contact.

2.2.4 Other Real Estate Agreements

Other real estate agreements are listed in Table 1-2 and most involve minor acreages. Outside of the agricultural leases, the next largest is the Orange County Flood Control District easement, close to 125 acres.

The Breitburn Energy Corporation (Photo 2-12) holds rights to about 112 acres. When lands for the Station were condemned by the federal government, mineral rights were retained by the former owner, the Alamitos Land Company. There was oil under the marsh, part of the greater Seal Beach Oil Field, and in 1954 the first well was drilled by Hancock Oil Company from the 6.5 acre 'oil island' built up in the wetlands. The island is connected to both Pacific Coast Highway and Bolsa Avenue (on Navy land) by roads built atop fills through the marsh. Breitburn maintains its own access roads.

The original agreement between the Navy and the oil operator, concerning the ultimate disposition of the oil production facilities, was that the roads, bridge, and drill site (island) including all facilities be removed and the land returned to its original state when oil production ceases. The life expectancy of the oil field was estimated to be about 15 years (CDFW and USFWS 1976), but clearly this was an underestimate. The present oil operator has requested that the agreement be amended to allow the island and roads to remain in the marsh and that beautification and visitor use improvements be substituted (CDFW and USFWS 1976).

Photo 2-12. Breitburn Energy Corporation operation on Oil Island.

2.2.5 Jurisdictional Waters of the U.S. and Other Habitat Designations

Certain areas of Station lands and adjoining waters are further constrained by their protection under Section 404 of the CWA as Waters of the U.S. or jurisdictional wetlands (Table 2-2). Discharges of dredge or fill into these water bodies are regulated under Section 404 of the Act. The USACE's jurisdiction in fresh waters includes the channel itself for Waters (defined by the Higher High Water Mark), to the outer edge of adjacent wetlands. Some water bodies are specifically exempted from regulation, such as irrigation ditches or drainage ditches excavated in uplands only if they do not possess any downstream connectivity to known Waters of the U.S., otherwise all Waters of the U.S. require permits for ground disturbing activities and possible mitigation. Questions about site-specific impacts must be addressed to the USACE.

Jurisdictional delineations should be performed at each installation to show which wetlands or water bodies are subject to regulatory jurisdiction under Section 404 of the CWA or Section 9 and 10 of the Rivers and Harbors Act of 1899. The Environmental Protection Agency (EPA) defines wetlands that may be subject to regulatory jurisdiction as "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Besides meeting the definition of a wetland, to be jurisdictional wetlands the waters must also connect to otherwise jurisdictional Waters of the U.S.

Table 2-2. Definitions of phrases used to describe the jurisdictional status of water bodies.

Term	Definition	Includes	Not Included
Waters of the U.S.	1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide; 2) All interstate waters including interstate wetlands; 3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds), the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters: i) which are or could be used by interstate or foreign travelers for recreational or other purposes; or ii) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or iii) which are used or could be used for industrial purpose by industries in interstate commerce; 4) All impoundments of waters otherwise defined as waters of the U.S. under the definition; 5) Tributaries of waters identified in paragraphs (1) through (4) of this section; 6) The territorial seas; 7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) through (6) of this section (33 Code of Federal Regulations [CFR] 328.3[a]; 40 CFR 230.3[s]).	Oceans, bays, rivers, perennial streams, intermittent streams, ephemeral swales, desert arroyos, lakes, ponds, seasonal ponds, desert playas, vernal pools, wetlands, reservoirs, farm or stock ponds (not with pumps or gates) and farmed wetlands.	Irrigation ditches, drainage ditches excavated in uplands, temporary sediment basins, reflecting pools, wastewater systems, and mining ponds.
Jurisdictional Wetland (a subset of Waters of the U.S.)	Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328.3[b]; 40 CFR 230.3[t].	Swamps, marshes, bogs, and similar wetlands.	Depends upon conditions.
Special Aquatic Sites (a subset of Waters of the U.S.)	Geographic areas that possess unique ecological characteristics of productivity, habitat, wildlife protection, or other important ecological values.	Wetlands, sanctuaries and refuges, mudflats, vegetated shallows, coral reefs, stream riffle and pool complexes.	All other.
Navigable Waters of the U.S. (a subset of Waters of the U.S.)	Those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the water body, and is not extinguished by later actions or events which impede or destroy navigable capacity (33 CFR 329.4).		Nonnavigable, isolated, and intrastate waters. Examples may include vernal pools, lakes, mudflats, sandflats, wetlands, wet meadows, or natural ponds.

Recent Court Decision on Nonnavigable, Isolated, Intrastate Waters

Recently, the United States Court of Appeals for the Ninth Circuit has concluded that under the Supreme Court's decision in Solid Waste Agency of Northern Cook County (SWANCC) v. USACE there has been a change in what

the USACE may cover in its jurisdiction as waters of the U.S. under the CWA. The ruling stated that waters that are nonnavigable, isolated, and intrastate are not jurisdictional unless their use, degradation, or destruction could affect other waters of the U.S., thus establishing a significant nexus between the water in question and other waters of the U.S. In the past, these isolated or intrastate waters were deemed jurisdictional in part based upon their use by migratory birds which crossed state boundaries and thus were said to fall under interstate and international commerce law.

2.2.6 Installation Restoration Sites

The purpose of the Installation Restoration Program (IRP) is to identify, assess, characterize, and clean up or control contamination from past hazardous waste disposal operations and hazardous material spills at Navy installations (WSFSB 1998). Administered by Naval Facilities Engineering Command Southwest (NAVFAC SW), state regulatory oversight for the IRP is provided by the Cal/EPA DTSC and the California RWQCB (CRWQCB), Santa Ana Region. Incorporating federal and state laws and regulations relating to environmental investigation and cleanup, the IR program is accomplished in six steps:

1. Preliminary Assessment (PA). For this first step, a team of engineers and scientists collects and evaluates evidence of contamination produced from past activities that may pose a potential threat to human health or to the environment. The assessment consists of a review of archival and activity records, interviews with present and previous activity personnel, and an on-site survey.

2. Site Inspection (SI). This second step is designed to address whether contaminants are present at the sites recommended for analysis in the PA. In this step, preliminary field sampling and analytical testing are used to determine if specific toxic and hazardous materials are present in hazardous concentrations.

3. Remedial Investigation. This third step provides detailed information on the horizontal and vertical distribution and quantification of specific contaminants of concern, as well as on the physical, hydrologic, climatic, and environmental nature of the sites.

4. Feasibility Study (FS). This fourth step evaluates clean-up or mitigation possibilities. From the FS, a Proposed Plan is developed and a Record of Decision (ROD) is prepared.

5. Remedial Design (RD). This fifth step entails preparation of plans and specifications for the recommended clean-up and/or mitigation measures discussed in the Proposed Plan and the ROD.

II. Remedial Action (RA). This sixth and final step involves funding and installing and/or constructing the clean-up and/or mitigation measures designed in the RD step.

In some cases, the Navy and regulatory agencies may conduct a Removal Action of hazardous substances at a site. A Removal Action can be conducted at any time during the Remedial Action process and is used when an expedited cleanup is determined to be in the best interests of the government and surrounding community.

The IRP at Naval Weapons Station Seal Beach began in 1985 with an Initial Assessment Study in which 25 locations of potential contamination were identified. A further Resource Conservation and Recovery Act Facility Assessment in 1989 and subsequent discoveries brought this total up to 75 locations. During the course of these and later studies, 46 sites were determined to contain no significant contamination, five currently operating, permitted

facilities were removed from the program, and two additional sites were transferred to other environmental programs specializing in underground storage tanks. Fifteen sites have had cleanup actions completed. The remaining seven IRP sites are in various stages of active study or cleanup.

As part of the Fiscal Year (FY) 2002 Defense Authorization Act, Congress mandated that DoD and the military components develop a program to address environmental health and safety hazards from unexploded ordnance (UXO), discarded military munitions, and munitions constituents. The DoD and Navy responded by developing the Military Munitions Response Program (MMRP), which is a unique program element under the Defense Environmental Restoration Program. The processes used in the traditional Installation Restoration cleanup program in most cases apply to the MMRP as well. A Military Munitions Response Program (MMRP) Preliminary Assessment was conducted at NAVWPNSTA Seal Beach in late 2008, with five MMRP sites recommended for further study. With the results of the SI in 2009, two of the MMRP sites, UXO Site 2 and AOC 1, were subsequently granted closure with no further action required.

Table 2-3 shows the current status of all of the IRP and MMRP sites. Map 2-6 shows the locations of the remaining active IRP sites and all of the MMRP sites. Of these sites, IRP Sites 7, 22, and 74 and MMRP Sites UXO 1 and AOC 2 are either partially or entirely located within the SBNWR.

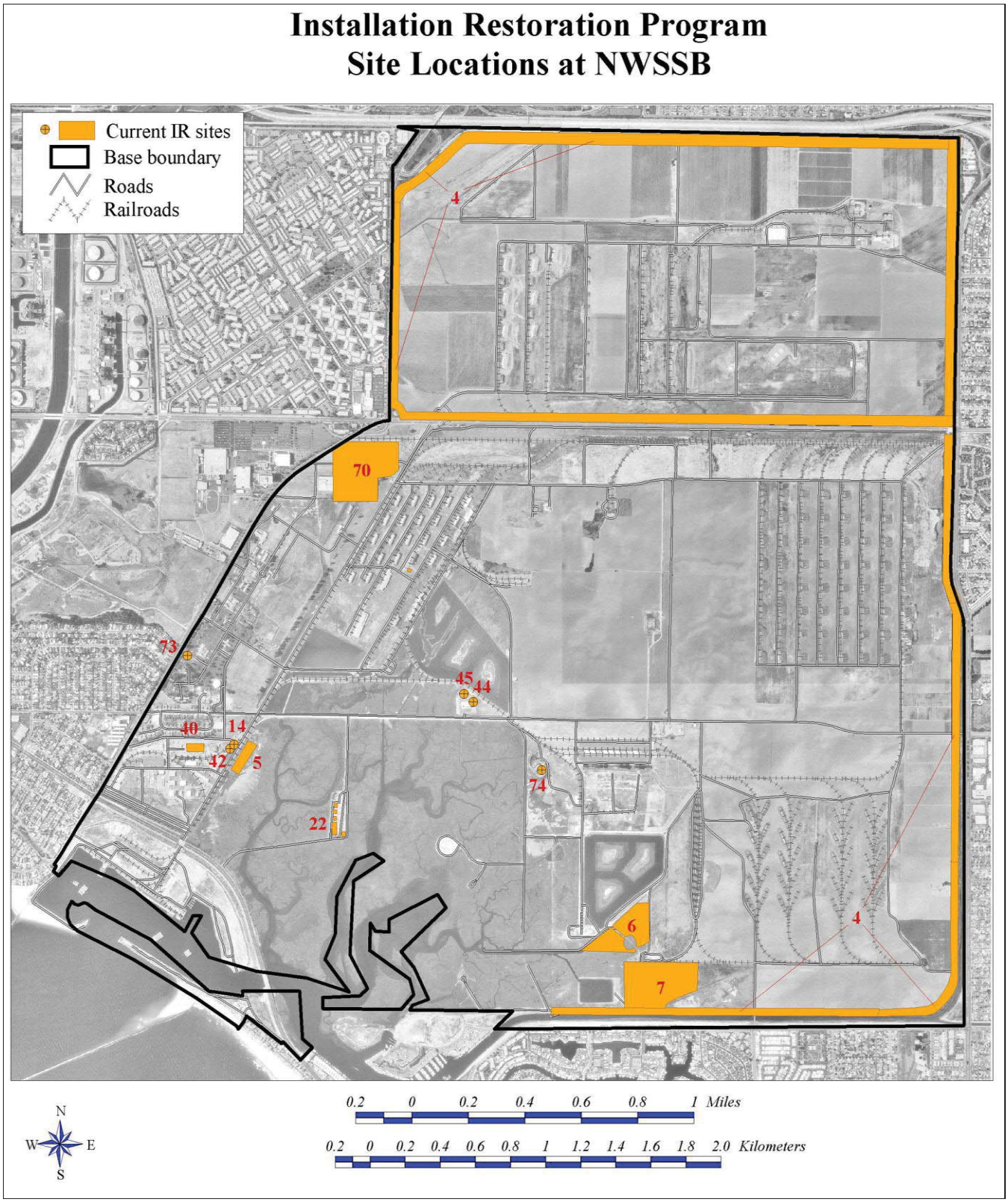
Table 2-3. Installation Restoration Program Sites for Analysis.

Site Name	Site Description	Status
Site 7	Station Landfill	Landfill Cover Maintenance and Inspection
Site 22	Oil Island	Site Maintenance and Monitoring
Site 40	Concrete Pit/Gravel Area	Groundwater Remedial Action
Site 70	R, T & E Area	Groundwater Remedial Action
Site 74	Old Skeet Range	Remedial Investigation/Feasibility Study Planned
Site 75	KAYO-SB Ag Well	Preliminary Assessment/Site Inspection
UST Site 229	Building 229 Fuel Tank	Site Investigation
UXO 1	Primer/Salvage Yard & POLB Mitigation Pond	Remedial Investigation and Removal Action Planned
UXO 6	Westminster POLB Fill Area	Remedial Investigation Planned
AOC 2	Explosives Drop Tower	Remedial Investigation Planned

Limited sediment contaminant data were collected at several locations in the Refuge in 1988 (DoN 1988 [cited in USFWS and DoN 1990]) as part of the IR program. Of the contaminant sought, total petroleum hydrocarbon (TPH) and chromium were found to exceed SWRCB designated levels to protect marine waters, set at 100 mg/kg and 20 mg/kg, respectively. Some of the chromium detected may be the result of oil drilling at Oil Island, since one of the most frequently used drilling muds (to flush out chippings and to lubricate and cool the drill bit) is chrome lignosulphonate. Chromium was found to have been accumulated in horn snails at Oil Island in concentrations up to 6 mg/kg.

In 1995, a study to assess the effects of operations at NAVWPNSTA Seal Beach on the biota of the salt marsh of the SBNWR was completed (DoN SWDIV 1995). The study focused on potential bioaccumulation of chemicals in species that are primary food items of the California least tern and the light-footed clapper rail, since they are high on the food chain and most likely to be affected by bioaccumulation. Major pathways for contaminants include surrounding uplands, aerial deposition, and tidal waters. Wildlife can be exposed through dermal contact, inhalation

or ingestion. Wildlife are most commonly exposed by way of consumption of contaminated food, which is the primary cause of bioaccumulation of toxins up the food chain.



Map 2-6. Currently active Installation Restoration sites on Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach 2011).

Contaminant levels were tested in food fish species that occur in the Port of Long Beach (POLB) ponds and tidal channels. (Four ponds were created on Navy lands by the POLB as mitigation for pier construction at the Port in the early 1990s-see Chapter 3.) The observed levels do not warrant a concern for immediate remediation. The chemicals found in food species in concentrations sufficient to potentially produce sub-lethal effects in the least tern and clapper rail included cadmium, chromium, copper, lead, nickel, zinc, DDE, and polychlorinated biphenyl (PCB). In light of the potential for ongoing erosion and deposition, particularly in the POLB ponds, monitoring to assess possible further bioaccumulation of chemicals in the northwest and southeast areas of the SBNWR was recommended. It was further recommended that responsibility for this monitoring effort be determined based on the conditions of the MOU signed by the U.S. Navy, POLB, CDFW, and NMFS, which provided guidance for the design of the POLB mitigation ponds.

The process for restoring contaminated sites employs a community-based IRP Restoration Advisory Board (RAB). There is overlap between RAB membership and the Working Group overseeing development of this INRMP. The IRP Site Management Plan was last updated in March 2002. Currently there is no plan to provide additional update to the document. The INRMP Working Group will be informed and provide opportunity to submit inputs to the response actions of the remaining IRP and MMRP sites through the participation in RAB functions. The objectives of the response actions at some of the remaining IRP and MMRP sites may coincide with natural resource objectives of the INRMP. There is a much greater need to link these parallel processes on NAVWPNSTA Seal Beach than on most Navy properties, due to the opportunities available for enhancing the future of NAVWPNSTA Seal Beach wetlands available from the IR program (see Section 5.2.1 “Jurisdictional Wetlands and Waters”). In Section 3.3.8, a summary of restoration activities for NAVWPNSTA Seal Beach wetlands that have been proposed in the past is shown; some of these proposals were linked to IR site cleanup requirements.

2.2.7 Military Family Housing

Naval Weapons Station Seal Beach family housing consists of 25 acres near the base. At this location, pets such as dogs, cats, hamsters, gerbils, birds, and fish are permitted. A limit of two pets (dogs or cats) is set for each household.

Authorized dogs and cats are required to be registered with the city of Seal Beach, Animal Control. In addition, residents must register their pets with the Housing Office and provide proof of city registration within ten days of acquiring the pet or moving in. Proof of rabies certificate must be furnished when registering with the city of Seal Beach and Housing. Breeding of these animals for commercial purposes is prohibited. All animals must be confined to the unit, the rear yard, or supervised on a leash. Dogs must not be allowed to run free in the neighborhood. Pet owners must clean up after their pets when they are outside or on a walk. Failure to adhere to these guidelines could result in the removal of the pet from Seal Beach Navy Housing, or termination of occupancy. Loose animals are picked up and taken to the city animal shelter.

Grounds maintenance and renovation contractors are to establish turf by seed, hydro-seed or sod (as determined by the Contracting Office alone) and are only allowed to spray herbicide with no soil residual. Herbicides are to be used in compliance with pesticide requirements for the base and all green waste is to be disposed of at a legal greens recycling disposal site.

2.2.8 Environmental Awareness and Outdoor Recreation

The Morale, Welfare, and Recreation (MWR) department provides recreation and entertainment options for the visiting fleet and sailors stationed in the area (MWR Seal Beach 2010). There is a beach, Beach House, fitness facilities, picnic areas, fields and courts available for the authorized personnel and patrons. A picnic area includes picnic tables, barbecue pits, playground, volleyball court, horseshoe pits, and softball field.

Athletics Center

The Athletics Division (building 16) offers gymnasium, fitness center, outdoor equipment rental, racquetball courts, tennis courts, softball fields, picnic and barbecue area, and running course. The fitness center includes a cardiovascular room, weight room, aerobic/karate room, sauna and locker rooms with showers. Intramural sports, fitness program, facility and equipment rental, aerobic classes, martial arts classes and free exercise video check out are also included in the Fitness Center.

Barney's Beach House

Barney's Beach House (Photo 2-13) has its own shaded patio, barbecue pits and a private beach. Utility hookups, equipment rentals, a restroom facility with showers, a lifeguard and coordinator are available. The beach house can be reserved for weekends and holidays from 10 AM–7 PM. The beach is closed Monday– Friday.

Photo 2-13. Barney's Beach House.

Fishing is allowed for Station personnel and their dependents in portions of the inner harbor (see Section 3.5.3 "Fishes").

There are two stretches of beach on either side of the harbor mouth; the one on the upcoast side (Barney's Beach) is used by Navy personnel and their families as described above. The downcoast beach is not used for recreation.

MWR has also built a recreational vehicle campground near the U.S. Marine lease area in the vicinity of the eucalyptus grove targeting retired or reserve military families as customers. There is still interest in integrating a nature trail into the design of the facility.

The neighboring Sunset Aquatic Park is the main recreational area in the estuary. Adjoining the southern boundary of the Station, this 63-acre County-operated facility has a 286-slip marina, public boat launching ramp, and picnic area. About two-thirds of the land remains undeveloped, but plans call for expansion of the marina and launching ramp, a recreational vehicle camping facility, and a least tern nesting site (USFWS and DoN 1990). The Park was constructed on a strip of marsh land at the south end of the Naval Weapons Station that was declared surplus by the Navy and offered to Orange County at half the market value.

In the past, MWR has requested access to the Refuge for kayaking for families from the Family Housing Area. However, this proposal was withdrawn because of the inability to police such activities, the presence of endangered species, and it was deemed inequitable to businesses that rent kayaks in neighboring communities.

Opportunities for use of the Refuge for wildlife observation, photography, and special events could be expanded for residents of the Housing Area as well as others.

2.2.9 Golf Course at Los Alamitos

The Navy Golf Course, located ten minutes driving time from NAVWPNSTA Seal Beach at Los Alamitos, is a PGA-rated gold course with an 18-hole Destroyer course, nine-hole Cruiser course, driving range, putting green, Pro-Shop, Gateway restaurant and catering facilities. See Map 2-7. The Navy turned the land over to the Army for its use as the Joint Forces Training Base in return for an unlimited lease at no cost for the golf course (MWR department, *pers. comm.*). It is a $2.5 million operation (MWR department, *pers. comm*.)

The golf course covers 294 acres (Permit DACA09-4-81-87). It has 13 lakes and sterile carp are used to eat algae in the lakes. Morale, Welfare and Recreation department periodically seeks a depredation permit to control coots. Boats installed with cutting devices are used for controlling the incursion of aquatic vegetation in the lakes.

Map 2-7. Los Alamitos Golf Course northeast of Naval Weapons Station Seal Beach, permitted to the U.S. Navy by the U.S. Army. Photo taken in 1994. Boundary is estimated based on drawing in Permit DACA09-4-81-87 29 June 1981. While boundary is constructed according to Permit, agricultural fields are not operated by Naval Weapons Station Seal Beach.

Recognized for its use by birds, Orange County bird counts are conducted there every year. White pelicans make the lakes an annual stopover for about two weeks. No fishing is allowed due to liability concerns.

2.2.10 Public Uses

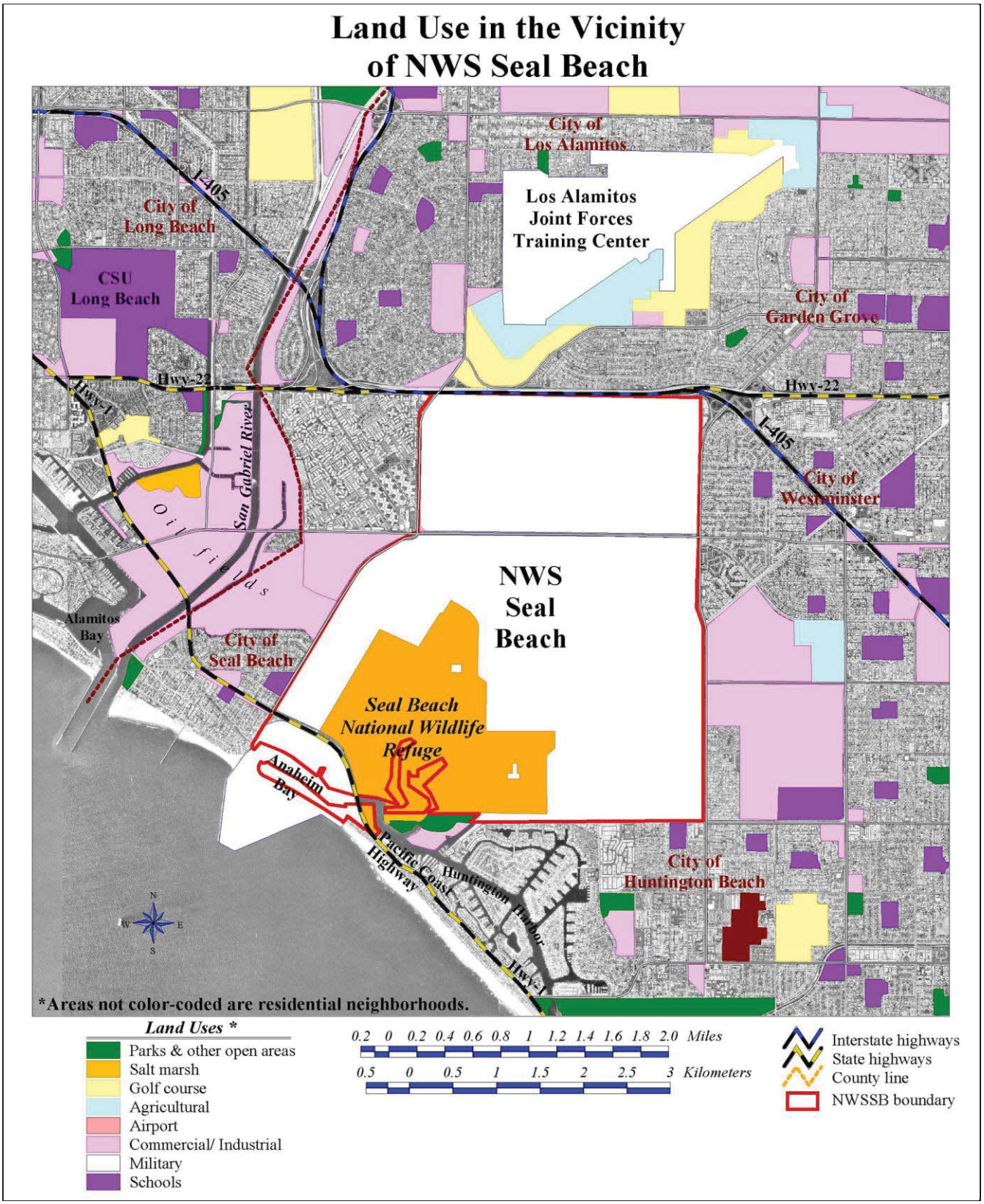
Because of the military mission of storing and handling ordnance, access to the Station for the general public and base personnel is restricted. Military personnel must have a valid Armed Forces identification card, civilian employees must have an employee badge, and military dependents must have a dependent's identification card. Nonmilitary visitors may enter the Station with a military escort or a pass indicating a valid purpose for being on the Station. A guarded gate on Westminster Avenue provides secured entrance utilized by heavy trucks and service vehicles. However, permitted public access is sometimes allowed for special events through Liberty Gate on the west side of the Station.

2.3 Relationship to Neighboring Land Uses

NAVWPNSTA Seal Beach is located amidst a heavily urbanized group of cities. It is bordered on the northwest by the city of Long Beach in Los Angeles County and the city of Seal Beach in Orange County. The Station is bordered on the north by Los Alamitos, northeast by Garden Grove, east by Westminster, and south by Huntington Beach, all in Orange County. The southwestern property borders the Pacific Ocean (Map 2-8). The Los Angeles-Long Beach Port Complex is the largest in the U.S. and the third largest in the world (SCWRP 2001).

There is little open space left in the vicinity of NAVWPNSTA Seal Beach. Next to the property on the northwest side, across Seal Beach Boulevard in Seal Beach, is Hellman Ranch, used as a golf course, some residential use, and for oil production. Located at the south side of NAVWPNSTA Seal Beach, in unincorporated Orange County, is Sunset Aquatic Park, a marina with parking facilities, picnic tables, a boat launch, boat slips, a marine repair yard and a Harbor Patrol office. Directly adjacent is Huntington Harbour, a marine-oriented residential development.

Because of the limited amount of open space left available to the surrounding communities of NAVWPNSTA Seal Beach, there is a keen interest in the management of NAVWPNSTA Seal Beach natural resources. Neighbors of NAVWPNSTA Seal Beach usually interact through the NWR Interpretive Center, but also interact with management of the Station's natural resources when activities there begin to impact their quality of life. The city of Westminster has complained about dust believed to be originating from the agricultural fields, and NAVWPNSTA Seal Beach has worked with its lessee to improve the situation by implementing the planting of new crops and using new techniques in an attempt to control the dust. Quailbush and Catalina cherry were planted as a visual and dust barrier between the Station and adjoining neighborhoods. However, this is now a security issue because trees and shrubs were planted within the 30-ft. Clear Zone inside the fenceline. Leisure World, the retirement community that borders NAVWPNSTA Seal Beach, had problems with rabbits, and inquired as to whether they were originating from NAVWPNSTA Seal Beach.



Map 2-8. Naval Weapons Station Seal Beach neighboring land uses.

NAVWPNSTA Seal Beach also has interests in the activities of its neighbors. For example, the perimeter fence near Barney's Beach House is covered in plantings by residential neighbors that look attractive, but interfere with the Station's mandate to keep a 20-foot clear zone on the outside of its perimeter fence for security purposes (Photo 2-14).

Photo 2-14. Residential homes beyond vegetated Naval Weapons Station Seal Beach perimeter.

2.4 Regulatory Context

NAVWPNSTA Seal Beach is subject to regulation by several federal, state and local agencies pursuant to a number of federal environmental laws. The purpose of this section is to give an overview of the most influential regulations that can pertain to all types of projects occurring on the Station. The Navy's guidance under NEPA is described in more detail in Chapter 4. Descriptions of other laws impacting natural resource decision-making at NAVWPNSTA Seal Beach are in Appendix C.

2.4.1 Federal Laws

Table 2-4 provides an overview of government regulations that must be considered when managing NAVWPNSTA Seal Beach's natural resources. Natural resources consultation requirements, including any current or planned consultations, consistency with ESA Recovery Plans, RWQCB Basin Plans, and with EFH permit and consultation processes are all discussed in the chapters that follow.

2.4.1.1 Endangered Species Act

If a species becomes listed as endangered or threatened, regulations to protect the species from illegal "take" are applicable to any project carried out or funded by federal departments such as DoD that may affect the species or its habitat. A "take" is defined as to: "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect" a listed species, or attempt to do so. The USFWS was charged by Congress with overseeing ESA implementation for all species except most marine species, which are under jurisdiction of the U.S. Department of Commerce NMFS.

Table 2-4. Federal Agencies with responsibilities for natural resources on Naval Weapons Station Seal Beach coastal properties. [1]

Federal Agencies and Applicable Laws	Authority and Activities
U.S. Army Corps of Engineers (USACE)	
■ Clean Water Act, Sect. 404	■ Responsible for issuing Sect. 404 permits for placement of dredge and fill material into waters of the U.S. (up to higher high water line in tidal waters) and into wetlands in compliance with EPA regulations.
■ Rivers and Harbors Act of 1899, Sect. 10	■ Regulates construction, excavation, and deposition in navigable waters (up to mean high water in tidal waters).
■ Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, Sec. 103	■ Regulates transport of materials for the purpose of disposal in U.S. waters.
■ National Environmental Policy Act	■ Commenting or lead agency authority for environmental review of proposed projects.
U.S. Environmental Protection Agency	
■ Clean Water Act, as amended	■ Develops Sect. 404 regulations and may veto USACE Sect. 404 permit. ■ Regulates waste disposal in coastal waters. ■ Administers (with NOAA) the Coastal Nonpoint Pollution Control Program. ■ Administers National Estuary Program (NEP). ■ Commenting authority on proposed projects.
■ National Environmental Policy Act ■ Marine Protection, Research, and Sanctuaries Act of 1972, Sec. 102	■ Regulates waste disposal in coastal waters.
Department of Interior (DOI), U.S. Fish and Wildlife Service	
■ Fish and Wildlife Coordination Act	■ Reviews/comments on federal actions that affect many habitat-related issues, including wetlands and waters considered under Clean Water Act Sect. 404 and Rivers and Harbors Act Sect. 10 permit applications.
■ Federal Endangered Species Act	■ Regulates, monitors, and implements programs for protecting the ecosystems upon which freshwater and estuarine fishes, wildlife, and habitat of listed species depend. Enforces international treaties and conventions related to species facing extinction.
■ Migratory Bird Treaty Act	■ Enforces prohibition against the taking of migratory birds, their eggs, or their nests.
■ National Wildlife Refuge System Administration Act	■ Designates lands for the conservation of fish and wildlife as part of the National Wildlife Refuge System.
■ National Environmental Policy Act	■ Commenting authority on proposed projects.
NOAA, National Marine Fisheries Service	
■ Fish and Wildlife Coordination Act	■ Reviews and comments on federal actions that affect marine fishery resources and many habitat-related issues, including Clean Water Act Sect. 404 and Rivers and Harbors Act Sect. 10 permit applications.
■ Federal Endangered Species Act	■ Jurisdiction over most threatened or endangered marine species, including the green sea turtle (outside of beach nesting sites).
■ Magnuson-Stevens Fisheries Conservation and Management Act	■ Responsible for maintaining and conserving fisheries and rebuilding overfished stocks. Responsible for determining whether projects or activities adversely impact Essential Fish Habitat zones (those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity).
■ Marine Mammal Protection Act	■ Enforces protection provisions for marine mammals.
■ National Environmental Policy Act	■ Commenting authority on proposed projects.
U.S. Coast Guard	
■ Ports and Waterways Safety Act	■ Manages maritime transportation and bridges over navigable waters. Permitting for marine events (e.g. America's Cup). Responsible for maritime safety/law enforcement, and environmental protection. Establishes safety standards and conducts inspections.
■ Oil Pollution Act of 1990	■ Ensures cleanup of marine oil spills and other pollutants. Responsible for oil spill responses based on Area Contingency Plan. Prepares most regulations needed for implementation of Oil Pollution Act.
■ Fish and Wildlife Coordination Act	■ Commenting authority on navigational issues, such as structures affecting navigation, USACE Sect. 404 dredge and fill permits, and new pilings.
■ Rivers and Harbors Act of 1899, Sect. 10	■ Issues permits for bridges over navigable waters (up to mean high water line).
■ Clean Water Act/Marine Protection, Research, and Sanctuaries Act	■ Enforces standards of oil and other hazardous waste discharge in marine waters.

[1]Sources: Cylinder *et al.* 1995; Bass and Herson 1993; California Resources Agency 1997.

Section 7(a)(1) of the ESA states that all federal agencies shall utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of the ESA. "Conservation" is defined in the ESA as "to use...all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this [ESA] are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regular taking."

Under Section 7(a)(2) of the ESA, federal project proponents must consult with USFWS or NMFS if one or more listed species may be affected by an action. Consultation with USFWS or NMFS may range from informal discussions to formal consultation requiring a Biological Assessment (BA) by the project proponent (Figure 2-2). For nonfederal project applicants, the USACE takes the lead in this consultation if the issue is within their jurisdiction. Other federal agencies may appropriately be named as the action agency that must conduct the consultation. With the issuance of a Biological Opinion (BO), "terms and conditions" are stated, which are measures to avoid or minimize the take of any listed species. When an "incidental take statement" is issued with the BO, the federal project proponent may be excused from incidentally taking a listed species as part of the agency's otherwise lawful activity as long as the specified taking conditions are met. Section 10 of the ESA also provides for a similar incidental take permit for private, state, and local government projects. To qualify, the project proponent must submit a habitat conservation plan and also seek to minimize and mitigate the impacts of the taking to the "maximum extent practicable." This INRMP must undergo an internal Section 7 review by staff to determine if consultation is needed.

Critical habitat may be designated for a listed species, in which case such habitat may require special management consideration or protection. Section 318(a) of the National Defense Authorization Act for Fiscal Year 2004 (P.L. 108-136) made changes to the ESA regarding INRMPs, which were justified on the basis of the need to promote military readiness while protecting listed species. Under new Section 4(a)(3)(B)(i) of the ESA, the Secretary of the Interior or the Secretary of Commerce, as appropriate, is precluded from designating critical habitat on any areas owned, controlled, or designated for use by DoD where an INRMP has been developed that, as determined by the Interior or Commerce Secretary, provides a benefit to the species for which critical habitat designation is proposed.

There is currently no critical habitat designated at NAVWPNSTA Seal Beach.

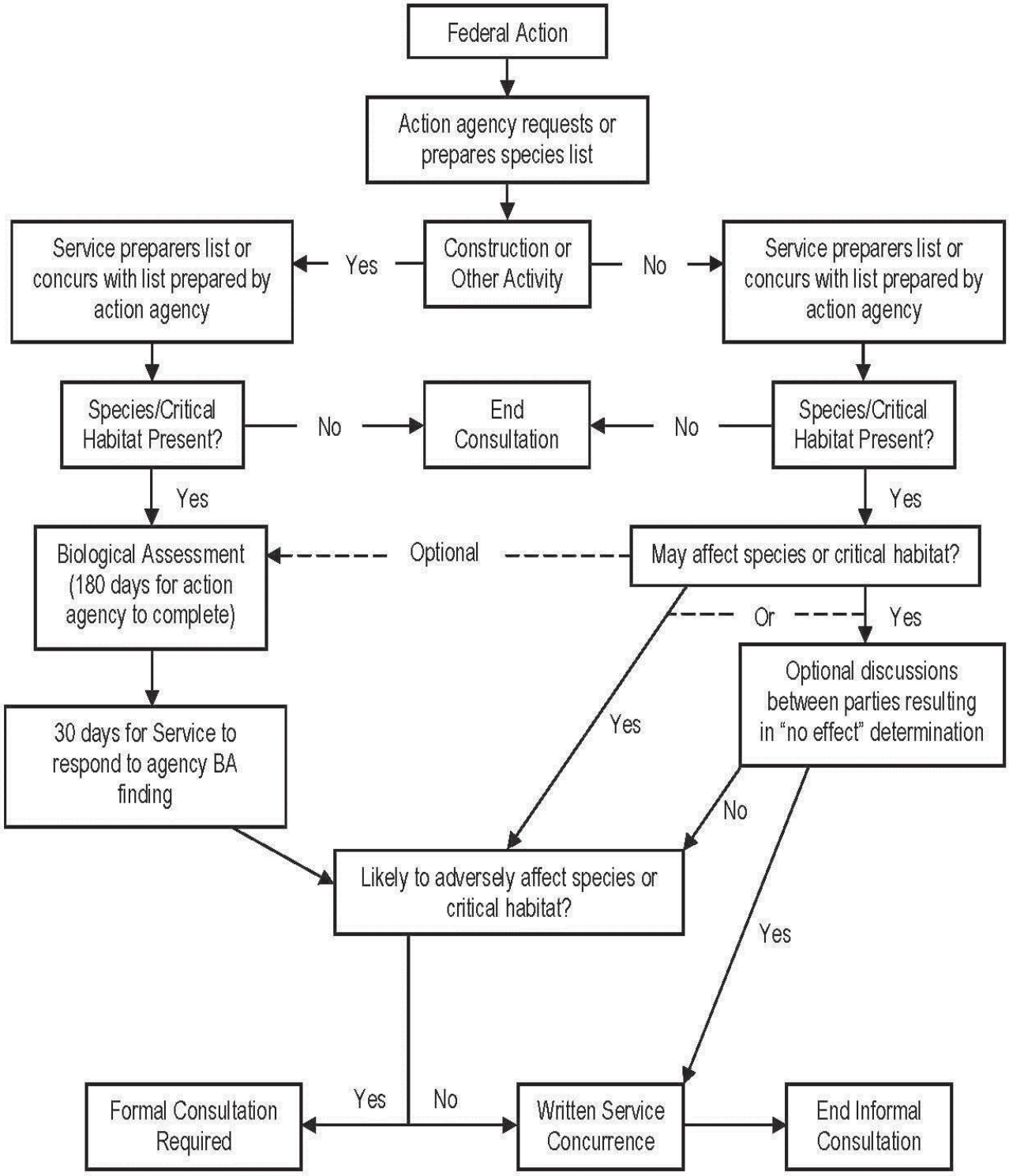


Figure 2-2. Informal consultation process, adapted from Final ESA Section 7 Consultation Handbook, March 1998.

2.4.1.2 Clean Water Act and Executive Order 11990

Section 404 of the federal CWA, passed in 1972 and jointly administered by the USACE and the EPA, is of the one of the most common federal laws that affects federal projects and properties. This section of the law regulates the discharge of dredged or fill material into the "waters of the United States," and also includes "jurisdictional wetlands." The USACE is responsible for developing regulations for the Section 404 permit process and issuing permits, with the EPA maintaining power to veto the USACE's decisions. USACE's regulatory jurisdiction for tidal waters in the Anaheim Bay and all adjacent marshlands or wetlands under Section 404 extends up to the high tide line (higher high water mark).

In the coastal zone, the USACE requires permits for certain structures, such as groins, breakwaters, riprap, jetties, and beach nourishment activities. Overlapping with the CWA, below the mean high water line, is authority under Section 10 of the Rivers and Harbors Act of 1899, which gives the USACE jurisdiction over projects involving construction, excavation, and deposition. Tidal and subtidal zone projects such as new marinas, piers, wharves, floats, intake and outfall pipes, pilings, bulkheads, boat ramps, and dredge and fill, require USACE permits.

Comments are provided to the USACE on specific projects by the USFWS and the NMFS, because of requirements of the Fish and Wildlife Coordination Act. If the USACE supports these comments, then proposals for project mitigation can become conditions of the permit, even though USFWS and NMFS do not have direct regulatory authority under the CWA. Their mitigation concerns may become measures added to permits to ensure marine habitat protection and restoration as a means to protect fish and wildlife populations.

EO 11990 "Protection of Wetlands," requires federal agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when:

- Acquiring, managing, and relinquishing of federal lands and facilities;
- Providing federally undertaken, financed, or assisted construction and improvements; and
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

Since the issuance of this EO, the focus of national policy has shifted from "minimizing" destruction, loss, and degradation of wetlands to "no net loss" of wetlands in carrying out the above federal activities.

2.4.1.3 Migratory Bird Treaty Act and Executive Order 13186

The Migratory Bird Treaty Act (MBTA), 6 USC 703, protects migratory birds against "takings" for normal and routine operations such as Installation support functions. EO 13186 (10 January 2001), *Responsibilities of Federal Agencies to Protect Migratory Birds*, imposes substantive obligations on the U.S. for the conservation of migratory birds and their habitats.

Migratory birds face serious challenges that have resulted in species declines, including reductions in habitat quality and quantity, direct bird mortality attributable to human activities, invasive species, collisions with artificial structures, and environmental contaminants. Because migratory birds cross the boundaries of nations, watersheds, and ecosystems, protecting them requires a coordinated effort involving multiple jurisdictions and interests.

The 2004 NDAA exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities. Military readiness activities include all training and operations of the Armed Forces that relate to combat

and the adequate testing of military equipment, vehicles, weapons and sensors for proper operation and suitability for combat use. The MBTA also requires that the Secretaries of Defense and Interior identify ways to minimize, mitigate and monitor the take of migratory birds during military readiness activities.

In 2004, Congress mandated the DoD Migratory Bird conservation revision to the MBTA through language in the 2004 NDAA. The Secretary of Interior was charged with developing an incidental take process for migratory birds on DoD lands involving military mission activities (e.g., training, research and development). DoD and the USFWS (on behalf of the Secretary of Interior) developed a MOU for Migratory Bird Conservation in 2006; shortly thereafter, the USFWS published the 2007 Final Rule for Migratory Bird Conservation on Military Lands, and DoD followed up by establishing guidance for natural resources managers to work cooperatively with the USFWS to implement the MOU. The Final Rule governs the incidental take on military installations in mission areas where training, research and development occur, whereas the MOU governs the mission-essential and non-mission-essential areas (e.g., family housing, post exchanges, laundry facilities). The Final Rule requires that military installations evaluate any proposed action in the mission areas that may impact any migratory bird population (through NEPA analysis) and consult with the USFWS if the military determines that a potential effect may occur.

1.0 EO 13186 requires that federal agencies avoid or minimize the impacts of their activities on migratory birds and make efforts to protect birds and their habitat. DoD guidance also requires each military installation with an INRMP to ensure that they incorporate migratory bird conservation into the INRMP and implement such elements as necessary. A Migratory Bird Depredation Permit from the USFWS is needed to harass or harm most birds. A listing of birds not protected by the MBTA can be found in the FR (70 FR 12710-12716). Examples of these birds would include pigeons, house sparrows and Eurasian collared doves (*Streptopelia decaocto*).

2.0 Migratory birds are protected under the MBTA against take for normal and routine operations such as Installation support functions. Under the MBTA, take could include mortality, pesticide application, nest and egg removal, and occasionally, tree removal. However, nest removal outside nesting season would not constitute a take. Before routine Installation support action is initiated that may affect any migratory bird species at NAVWPNSTA Seal Beach, the Station Biologist will be informed.

2.4.1.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act assigns to NMFS responsibility for identifying EFH for all species which are federally managed, and for determining whether projects or activities adversely impact EFH zones, broadly defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

When projects are planned that can adversely affect EFH, NMFS can recommend conservation measures to minimize problems. While such habitat-related comments (outside of ESA consultations) have had little effect in the past, new requirements for federal agency consultation on activities that may affect EFH have changed that. Once the Navy receives NMFS comments on means to better avoid or minimize habitat damage, it must respond in writing within 30 days, outlining the measures it is proposing to avoid, mitigate, and offset the impact of the activity on EFH. The Navy must also explain any inconsistencies between the avoidance and mitigative actions they propose to take and the recommendations made by NMFS.

2.4.1.5 Coastal Zone Laws

Coastal Zone Management Act. Two additional federal laws operate in the coastal zone: CZMA of 1972, and the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990. The CZMA provides that a state that develops a coastal zone management program (CCMP) that is approved by the Secretary of Commerce (NOAA), is entitled to federal financial support in administering the program, and to apply the program to some areas that otherwise would be subject to only federal regulation (16 U.S.C. Sec. 1455-1456).

Federal agency activities affecting any land use or water use or natural resource of the coastal zone shall be carried out in a manner "which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs" (16 U.S.C. Sec. 1456). The term "enforceable policies" is defined by regulation as those legally binding laws, regulations, land use plans, ordinances, or judicial or administrative decisions that are part of a NOAA approved program. The California Coastal Commission (CCC) has authority to implement provisions of the CCMP. Although DoN lands are excluded from the CZMA definition of "coastal zone" as "lands held in trust by or which uses are subject solely to the discretion of the federal government," activities on these lands may require a consistency determination if there are coastal zone impacts. According to OPNAVINST 5090.1C: "federal actions that affect any land or water use or natural resource of the coastal zone must be consistent with the state program to the maximum extent practicable." Federal rules for federal consistency can be found in 15 CFR Sec. 930.35–37. See further discussion on CZMA consistency under state agencies and laws below.

2.4.1.6 National Environmental Policy Act

The NEPA was signed on 01 January 1970, and became the basic national policy for protection of the environment. Its passage was driven by the broadly felt sentiment that federal agencies should lead the nation in environmental protection. It established a systematic, interdisciplinary framework for agencies to prevent environmental damage, and contains "action-forcing" procedures to ensure that environmental factors are taken into account on major decisions, and to document those decisions. There are four stated purposes of NEPA (42 U.S.C. 4321):

1. Declare a national policy which will encourage productive and enjoyable harmony between people and the environment.
2. Promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate health and welfare.
3. Enrich the understanding of the ecological system and natural resources important to the nation.
4. Establish a Council on Environmental Quality (CEQ).

Activities directly undertaken by, financed by, or requiring approval of federal agencies, respectively, are subject to NEPA environmental review processes, with only certain specified exceptions.

NEPA is implemented by CEQ regulations (40 CFR 1500-1508). The most important function of agency compliance with NEPA procedure is to fully disclose and consider environmental information in decision making and to inform the public of potential impacts and alternatives. However, if adverse environmental effects of a proposed action are identified and disclosed to the public, the agency may decide that other factors outweigh environmental impacts and continue with the action.

The NEPA has three decisional mechanisms. A proposed federal agency action is first reviewed to see if it can qualify for a categorical exclusion (usually small, routine projects with no potential significant environmental

effect; categories are identified in agency NEPA policies) or other exemption to the process. If not, then an EA or EIS is prepared. If an EA is prepared and it concludes that adverse environmental impacts will be insignificant, then the agency can file a Finding of No Significant Impact (FONSI), followed by implementing its preferred alternative. If the proposed project has the potential to "significantly affect the quality of the human environment," then the EIS process must be followed. Briefly, these steps are: Notice of Intent (NOI), Scoping Process, Draft EIS, Agency/Public Review and Comment, Final EIS, ROD, and Agency Action.

Project mitigation is usually used as a means to address adverse environmental impacts through the federal (NEPA) process. However, NEPA establishes no requirement to mitigate against adverse environmental impacts. "A solution to an environmental problem" is a simple definition of a mitigation measure (Bass and Herson 1993). In order to be adequate and effective, mitigation measures should be placed in one of five categories, defined by the CEQ as:

1. **Avoiding** the impact by not taking certain action or parts of an action.
2. **Minimizing** the impact by limiting the degree or magnitude of the action and its implementation.
3. **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment.
4. **Reducing** or eliminating the impact over time by preservation and maintenance during the life of the action.
5. **Compensating** for the impact by replacing or providing substitute resources or environments.

An EIS must identify all relevant, reasonable mitigation measures that could lessen impacts to the human environment. However, a federal agency does not have to adopt mitigation measures included in an EIS unless agency-specific NEPA procedures require adoption of mitigation measures or the agency commits to implementing mitigation measures in the ROD.

For DoN projects, DoD has issued policy and procedures, including a supplement providing policy and assigning responsibilities adopted by DoN (32 CFR part 775). These U.S. Navy procedures meet the NEPA requirement that every federal agency adopt procedures to supplement CEQ regulations. Following the U.S. Navy directive, specific policy for compliance with procedural requirements was issued under OPNAVINST 5090.1C. This latter document tasks each Naval installation with ensuring that U.S. Navy actions are in accordance with NEPA.

NEPA compliance for INRMPs is specifically addressed by the CNO guidance (10 April 2006) on INRMP and compliance with SAIA compliance. The guidance is intended to be consistent with a SECNAV memorandum (12 August 1998), which stated:

> All projects essential to fulfill the selected alternative (mix of management objectives) must be implemented within a timeframe indicated in the INRMP. Any deviation or change from achieving the selected alternative may require supplementation to the EA or EIS and an opportunity for public comment. AN installation may add or modify projects for achieving the selected alternative without additional review under NEPA if the projects are consistent with the existing NEPA analysis.

The memorandum also provided specific language for the Purpose and Need section of the NEPA document for the INRMP, for the Proposed Action and No Action alternatives, and for structuring each other alternative.

The CNO letter provided the following guidelines:

- The EA for an INRMP should be a separate document, but a case-by-case decision may be made.
- The INRMP and NEPA process should occur concurrently, and an integrated schedule was suggested in which the EA is expected to be 75 percent when the INRMP is ready for public comment, and 90% complete when letters of concurrence are requested from stakeholders.

- A FONSI is required before an INRMP may be signed.

A site approval process for activities within the ESQD arcs is dictated by OP-5. In a separate project and site approval process, NEPA guidance is provided by NAVWPNSTA Seal Beach Instruction (NAVWPNSTASBINST) 5090.5 30 September 1998 *NEPA Compliance Procedure Handbook.* NAVFACINST 11010.45 requires site approvals in non-explosive areas.

2.4.1.7 National Wildlife Refuge System Improvement Act

The National Wildlife Refuge System Improvement Act is the first true "organic act" for the federal refuges. It establishes a conservation mission for refuges, gives policy direction to the Secretary of the Interior and refuge managers, and contains numerous innovative provisions that require the integration of the most up-to-date scientific concepts and techniques into the management of the National Wildlife Refuge System's diverse network of wildlife habitats. The Act dramatically departs from prior law in establishing a mission for the entire system, imposing stewardship duties on the Secretary of the Interior and requiring conservation planning for all refuges (Hood 1998).

2.4.1.8 Cultural Resource Laws

National Historic Preservation Act

The National Historic Preservation Act (NHPA) expanded the National Register of Historic Places and created an Advisory Council on Historic Preservation. Section 106 of the Act requires that federal agencies allow the Council an opportunity to comment whenever their undertakings may affect National Register resources or resources eligible for listing in the Register. Section 110 requires federal agencies to identify, evaluate, inventory, and protect National Register resources or resources eligible for the Register on property they control. NHPA imposes no absolute preservation requirement, as long as the U.S. Navy follows and documents mandated procedures for any U.S. Navy decision not to preserve.

Archeological Resources Protection Act of 1979

The Archeological Resources Protection Act (ARPA) (16 U.S.C. §§ 470 *et seq.*1982) sets up penalties for destruction or removal of archeological materials from federal land without the proper permits. Requirements for obtaining these permits are also established by this regulation.

2.4.2 State Laws and Jurisdictions

California's natural resource laws provide another level of environmental protection. State agencies are responsible for implementing certain federal laws as well as state laws. For example, delegation has been given to the SWRCB by the EPA to administer portions of the federal CWA and CZARA and also to the CCC to implement the federal CZMA and CZARA (as noted above). Table 2-5 lists the state agencies, laws, and authority that pertain to NAVWPNSTA Seal Beach lands and associated waters.

2.4.2.1 California Endangered Species Act

The California Endangered Species Act (CESA) is very similar to the federal ESA and is administered by CDFW. The term endangered species is defined under CESA as a species of fish, wildlife or plant that is "in serious danger

of becoming extinct throughout all,–or a significant portion of its range". It is concerned with species and subspecies native to California. CESA prohibits the "taking" of listed species, but in addition to protecting listed species, it also applies the take prohibitions to species that are candidates for listing.

Certain listed bird species are further classified by CDFW as "fully protected", wherein possession or taking of animals or parts thereof is prohibited at all times (T. Conkle, *pers. comm.*). The following species known or expected to occur on NAVWPNSTA Seal Beach are listed as fully protected by CDFW– American peregrine falcon (*Falco peregrinus*), brown pelican, California least tern, light-footed clapper rail (*Rallus* l*ongirostris levipes*), white-tailed kite (*Elanus leucurus*).

State-listed species on a military installation need to be identified and considered in the NEPA process (National Environmental Policy Act).

2.4.2.2 Coastal Land Use Regulations

Coastal land use is also controlled by the state. The California Coastal Act (CCA) of 1976 implements California's Coastal Zone Management Program as required by the federal CZMA of 1972 (California Resources Agency 1997). It regulates public access, recreation, marine resources, land resources, and development within the coastal zone. Overseeing the Act's implementation is the CCC. The CCC can concur with or object to a Coastal Consistency Determination or Negative Determination submitted by a federal agency concerning a proposed federal action. The CZMA Section 307 specifically provides that each "federal agency activity within or outside the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs." The CCC also seeks to ensure that local governments within the coastal zone prepare an adequate local coastal plan (LCP) based on the California Coastal Management Plan. Once an LCP is certified by the CCC, the local government can issue its own development permits for most projects. The CCC has regulatory control over federal activities in the federal Outer Continental Shelf that affect the state's ocean and coastal resources.

For federal lands, all lands that are held in trust by or which uses are subject solely to the discretion of the federal government are excluded from California's coastal zone. Examples would include all property owned by NAVWPNSTA Seal Beach. Most U.S. Navy projects are reviewed on a case-by-case basis with no specific criteria established to identify which types of U.S. Navy activities have no effect on the coastal zone and, therefore, do not require review for federal consistency. A Negative Determination, usually done on a case-by-case basis, avoids formal review. Projects can get this determination if:

1. The project clearly has no impact on the coastal zone; or
2. The project is clearly similar to another project that was previously determined by the CCC to have no impact.

Projects that could fall under the "no impact" category can often be determined using the "common sense" rule, which means "if in doubt, ask" the CCC if a similar project has been determined to have no impact, or if in their view the project would clearly have no impact. For example, projects involving modification to existing buildings are routinely exempt. However, certain routine projects, such as maintenance dredging, are not exempt because the CCCs need to ensure that all relevant federal and state agency concerns (e.g. eelgrass, least terns) are addressed, such as the disposal of dredge spoils (Delaplaine, *pers. comm.*).

2.4.2.3 Water Quality Regulation

Water quality protection is the responsibility of the SWRCB and the Santa Ana RWQCB. Authority comes from the state's Porter-Cologne Water Quality Control Act and the federal CWA. With the SWRCB setting statewide water quality objectives, the RWQCB carries out specific aspects of surface and coastal water regulations. A Comprehensive Water Quality Control Plan for the Santa Ana Region, adopted by the nine-member RWQCB, identifies existing and potential beneficial uses and establishes water quality objectives for coastal waters including Anaheim Bay. The SWRCB adopted the Water Quality Control Plan for Enclosed Bays and Estuaries" effective August 25, 2009, which provisions supersede those of the Regional Plan.

Implementation of the plans occurs through the issuance of permits for waste discharges under the National Pollution Discharge Elimination System (NPDES) by the RWQCB. Regulations initially focused on controlling "point source" (end-of-pipe) discharges, such as from sewage treatment, industrial, and power plant outfalls. With control of point sources improving, emphasis has turned to regulating stormwater discharges from various sources through storm drains as well as runoff sources of nonpoint source pollution. As the result of amendments to the CWA (Sec. 402[p]) and to the CZMA (CZARA Sec. 6217), storm drains are being treated as a point source of pollution and are required to come under NPDES permit. Enforcement of NPDES permits by the RWQCB is done when monitoring or another source indicates a violation of permit conditions. Cease and Desist Orders and Cleanup and Abatement Orders along with stiff financial penalties can be issued for noncompliance.

A tiered approach is used by EPA in implementing the stormwater permit program. Phase I requires NPDES permits for municipal storm sewers serving large and medium sized populations (greater than 250,000 or 100,000 respectively) and for stormwater discharges associated with industrial activity that is already permitted. Phase II, which became effective in 2002, addresses smaller municipalities and small construction sites (at least one but less than five acres of land). The CZARA and RWQCB's requirements for management measures also apply to those activities not covered by Phase I or II, including discharges from wholesale, retail, service, and commercial activities, including gas stations (SWRCB 2007; RWQCB 2001).

Orange County and its cities are all under a General Municipal Stormwater Permit. The U.S. Navy has coverage under two types of stormwater permits: the statewide General Industrial NPDES Stormwater Permit and the statewide General Construction NPDES Stormwater Permit. The General Industrial permit requires wet and dry season monitoring and an annual report to regulators with stormwater sampling results. The permit also requires a Stormwater Pollution Prevention Plan and a Geographic Information System (GIS) record-keeping system. The U.S. Navy's General State Water Quality Certification was approved on 02 November 1998 (98C-127). The U.S. Navy filed a NOI in 2003 with the RWQCB to comply with Phase II of the industrial stormwater program, in which it will come under a permit for small municipalities.

Recently, the CRWQCB Santa Ana Region issued a Staff Report regarding waste discharge requirements for the National Guard Bureau for discharges of extracted and treated groundwater resulting from the cleanup of groundwater polluted by petroleum hydrocarbons, solvents and/or solvents mixed with petroleum hydrocarbons at Joint Forces Training Base (JFTB) at Los Alamitos (CRWQCB 25 October 2002, Order No. R8-2002-0079 [NPDES No. CA8000398]). Discharges from the treatment systems flow into buried storm drains onsite or into the open storm water channel along JFTB's western boundary. These flows come together and flow onto the golf course adjacent to the southwestern corner of the JFTB. The discharges, commingled with any irrigation tailwater and stormwater, flow across the golf course via culverts, landscape ponds and open channel and under the 405 Freeway, and thence into an unlined channel on the northeastern corner of NAVWPNSTA Seal Beach. This storm water channel then drains southwest across Leisure World and merges with a storm channel that drains south at

Westminster Avenue and thence into the Los Alamitos Retarding Basin, which is unlined. Water in the retarding basin is pumped into the San Gabriel River when the water level in the basin reaches a certain height. Normally, under non-storm conditions, wastewater discharges infiltrate into underlying groundwater upstream of the 405 Freeway.

2.4.3 Local Laws and Jurisdictions

Local agencies include the land use, environmental, and public works departments and divisions within Orange County, the POLB, and the cities surrounding NAVWPNSTA Seal Beach lands. As with the state, local government is charged with implementing state and federal laws, as well as local laws. Table 2-5 provides a general listing of the pertinent agencies, laws, and authorities of these various local agencies.

Table 2-5 Local agencies with responsibilities for natural resources in the vicinity of Naval Weapons Station Seal Beach.

Local Agencies and Applicable Laws	Authority and Activities
City and County Planning/Community Development Departments	
■ State Planning and Zoning Law	■ Establishes state rules and guidelines for cities and counties.
■ State Subdivision Map Act	■ Establishes state rules and procedures for local subdivision ordinances.
■ Local general plan	■ Provides policy direction for land use, conservation, transportation, housing, and safety.
■ Local Ordinances: zoning, grading, etc.	
■ CCA of 1976	■ Implements policies of the general plan.
■ Local Coastal Plan element of general plan	■ Authority to issue own coastal development permits once LCP certified by CCC.
■ California State Redevelopment Law	■ Lead agency and commenting authority on projects and plans.
City and County Public Works Departments	
■ State Safety and Public Works Statutes	■ Establishes state rules and guidelines for cities and counties.
■ Ordinances (flood control, stormwater, etc.)	■ Regulates use and procedures for maintaining public facilities.
Orange County Department of Health Services, Environmental Health Division	
■ State Health and Safety Code	■ Establishes state rules and guidelines for cities and counties.
■ Local Ordinances	■ Regulates use and procedures for maintaining public health.
Port of Long Beach	
■ State Port District Act of 1962	■ Enables Port to operate and to promote the development of commerce, navigation, fisheries; and recreation within the Port.
■ Port Master Plan	■ Provides planning policies for the physical development of the Port's trust lands.
■ Port Ordinances/Code	■ Regulates the conditions of use within Port's jurisdiction.
■ CCA of 1976	■ Authority to issue its own coastal development permits once Master Plan is certified by CCC.

2.4.3.1 Land Use or Water Use

State planning and zoning law establishes the rules and guidelines for local government plans and their implementation (Governor's Office of Planning and Research 2000). Each of the NAVWPNSTA Seal Beach's neighboring cities and the county have adopted general plans to govern their current and anticipated land uses, along with required Elements (e.g. Housing, Transportation, Conservation, and Open Space) and specific plans for subareas within their jurisdiction. These land use strategies have goals, objectives, and policies within their text and

depicted in maps. Land use zones depict where different uses and densities are to be allowed, with zoning ordinances defining the allowable uses for each zone. Local coastal plans provide more specific strategies for the portion of their jurisdictions lying within the state-defined coastal zone. All LCPs for neighboring jurisdictions have been approved by the CCC as being in conformity with the CCMP.

2.4.3.2 Water Quality Protection

Implementation of federal and state water quality mandates occurs a great deal at the local government level. To comply with the RWQCB's NPDES permit, the Port is managing stormwater pollution through Port ordinances and the enforcement of its member cities' stormwater ordinances. Some local agencies have adopted Grading Ordinances to minimize runoff pollution from construction sites. The Orange County Environmental Health Division seeks to protect public health from the effects of polluted water and can close sites to fishing, swimming, or other uses when needed. Applying for a local development permit within the county, cities, or Port jurisdictions triggers a multiagency project review to ensure compliance with the state and federal water quality regulations.

2.4.4 Summary of Planning Jurisdictions

For projects and federal activities within Anaheim Bay waters, Figure 2-3 depicts the key jurisdictions and the underlying laws pertaining to each, since the location can trigger different regulations based on the tidal elevations in which the footprint of the project occurs. Location, based on tide level such as mean higher high water, is important in identifying which agencies become involved in project review. The tidal elevations for NAVWPNSTA Seal Beach are specific to the Long Beach area (Table 2-6).

Table 2-6 Tidal elevations for the Naval Weapons Station Seal Beach area (based on Los Angeles Outer Harbor NOAA Tidal Station ID: 9410660).

Tide	Elevation (feet)
Mean High Water, Spring	6.7
Mean Higher High Water	5.5
Mean High Water	4.8
Mean Sea Level	2.8
Mean Low Water	0.9
Mean Lower Low Water	0.0
Mean Low Water, Spring	-1.3

All tide levels based on a 19-year mean, averaged from monthly means, December 1987 to December 2006.

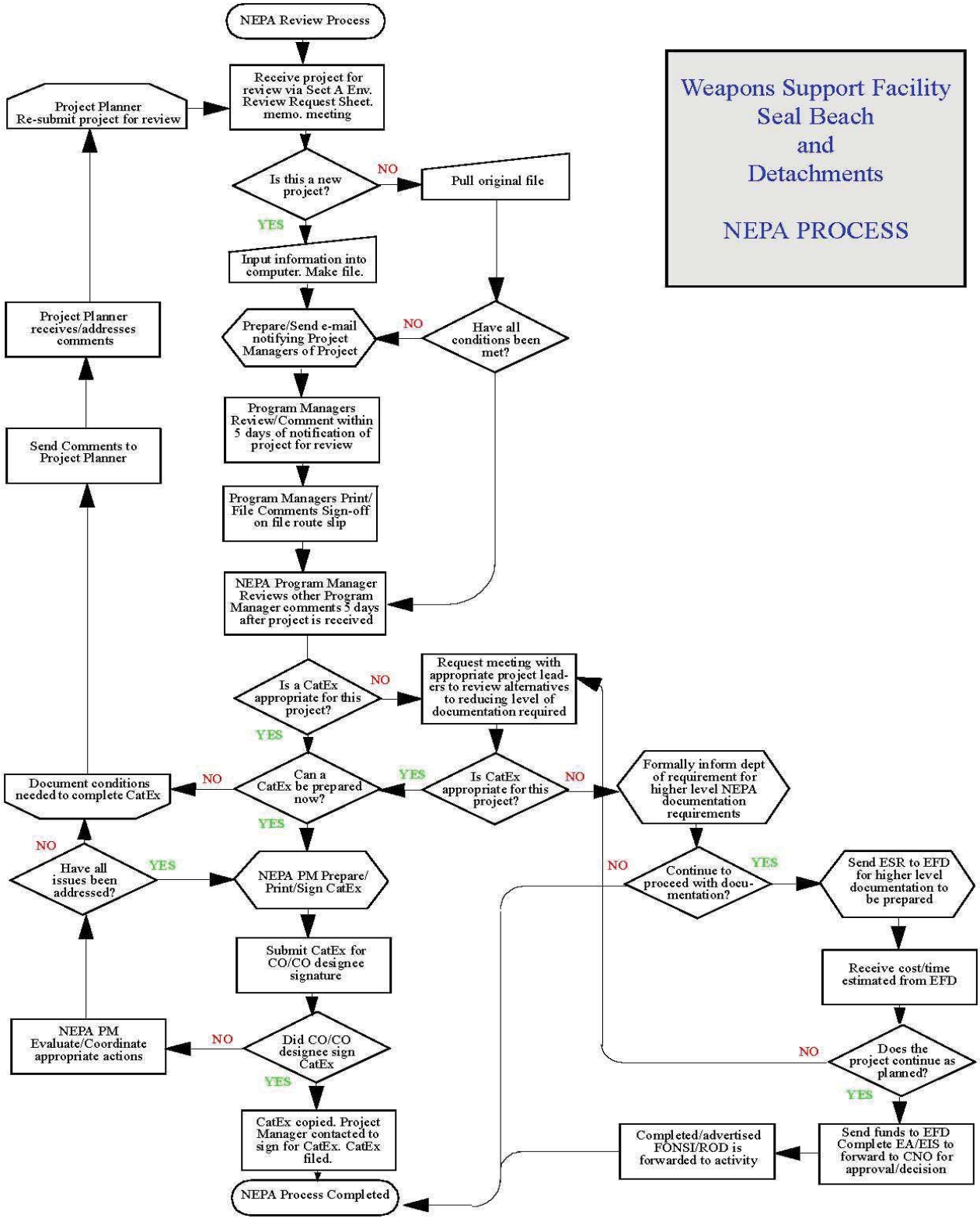


Figure 2-3 Regulatory jurisdictions relevant to managing Naval Weapons Station Seal Beach and Anaheim Bay and the tidal elevation they pertain to. Depth is given in nautical miles.

This Page Intentionally Blank

Naval Weapons Station Seal Beach

3.0 Natural Resource Setting

The nature of NAVWPNSTA Seal Beach's military mission makes it unusually suited to support a variety of natural resources. Because of ordnance handling and storage requirements (Section 2.2.1 "Land Use Areas and Constraints") necessary low-use safety zones extend to the perimeter property line (Map 3-1). This has enabled approximately 1,558 acres to remain as open space with relatively undisturbed plant communities and wildlife habitat. About 3,469 acres are intensively developed with buildings, roads, agriculture, and landscaping. Thus, the Navy's presence at Seal Beach since 1944 has allowed a sizable portion of Anaheim Bay and its associated wetlands to escape the fate of its neighboring estuaries. Indeed, the estuary and salt marsh at NAVWPNSTA Seal Beach remains one of the finest in southern California because of its relatively good tidal circulation, healthy vegetation, habitat diversity and abundant wildlife.

The nature of NAVWPNSTA Seal Beach's military mission makes it unusually suited to support a variety of natural resources. Because of ordnance handling and storage requirements (Section 2.2.1 "Land Use Areas and Constraints"), necessary low-use safety zones extend to the perimeter property line. This has enabled approximately 1,558 acres to remain as open space with relatively undisturbed plant communities and wildlife habitat. About 3,469 acres are intensively developed with buildings, roads, agriculture, and landscaping. Thus, the Navy's presence at Seal Beach since 1944 has allowed a sizable portion of Anaheim Bay and its associated wetlands to escape the fate of its neighboring estuaries. Indeed, the estuary and salt marsh at NAVWPNSTA Seal Beach remains one of the finest in southern California because of its relatively good tidal circulation, healthy vegetation, habitat diversity and abundant wildlife.

3.1 Physical Setting

3.1.1 Climate

Hot, dry summers and relatively mild winters characterize the typically Mediterranean climate at NAVWPNSTA Seal Beach. Rainfall during the winters can range from drought to torrential downpours. Average annual rainfall is 11.0 inches, most of which falls from December through February (Figure 3-1), Data Source—National Climatic Data Center [NCDC] 2002, Newport Beach Harbor weather station data 1934-2005). Annual rainfall totals can vary widely, from a low of 3 inches in 1989 to a high of 27.9 inches in 1977 (Figure 3-2).

Average monthly temperatures range from a low of 55 degrees Fahrenheit (°F) (12.7 degrees Celsius [°C]) in December and January, to 68°F (20°C) in August (Figure 3-3). Heavy fog and low clouds occur during winter, generally between the months of February and April. In the summer months, low clouds often persist until early afternoon, but then burn off, leaving clear skies and temperatures up to 100°F (37.7°C). Winds from the southwest keep these months relatively cool with occasional autumn winds from the inland deserts (known locally as Santa Ana winds) that create very dry, warm weather lasting from a few hours to a few days (USFWS and DoN 1990).

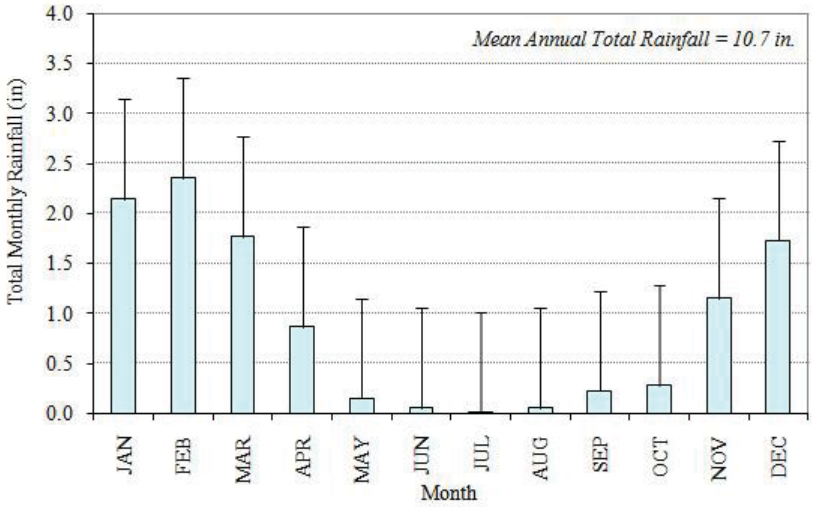


Figure 3-1. Average monthly rainfall in the vicinity of Naval Weapons Station Seal Beach (Data Source— NCDC 2002, Newport Beach Harbor weather station data 1934-2005).

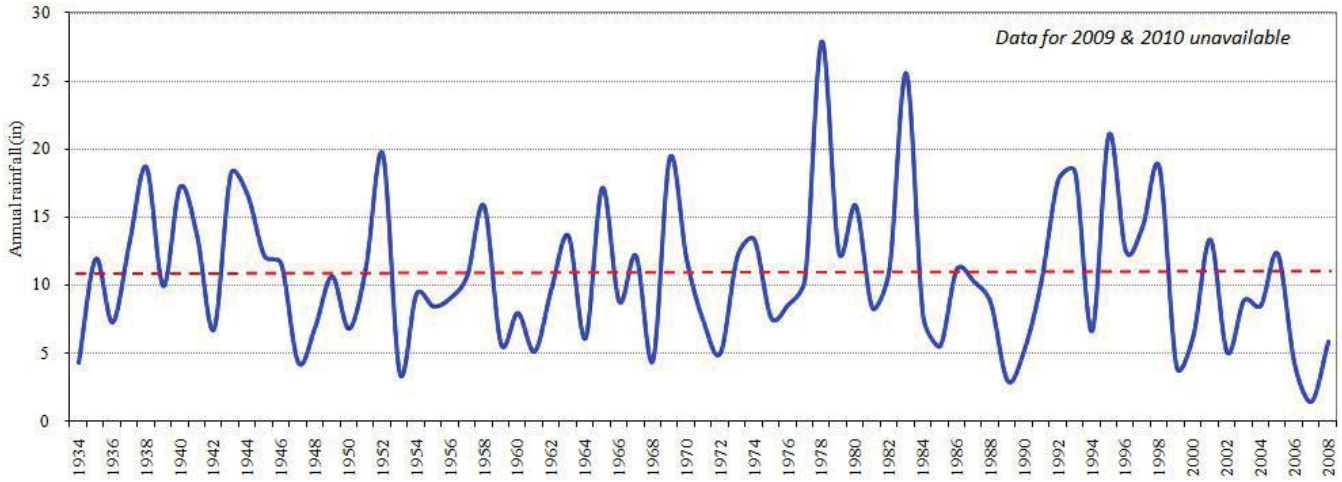


Figure 3-2. Annual precipitation in the vicinity of Naval Weapons Station Seal Beach for 1934–2005 (Data Source— NCDC 2002, Newport Beach Harbor weather station data 1934-2005).

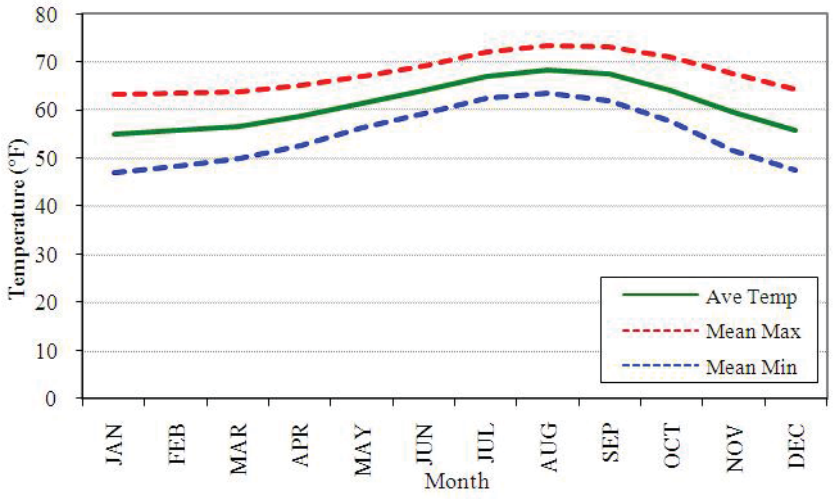


Figure 3-3. Average monthly temperature regime in the vicinity of Naval Weapons Station Seal Beach (Data Source— NCDC 2002, Newport Beach Harbor weather station data 1934-2005).

3.1.1.1 Climate Cycles: El Niño and La Niña

Climatic cycles related to El Niño and La Niña events can drastically alter the region's precipitation for a given year. El Niño conditions have been observed to occur at irregular intervals of two to seven years, averaging once every three to four years. El Niño typically lasts from 12-18 months and produces significantly more rainfall in southern California. El Niño are characterized by a warming of the surface layers in the eastern and central equatorial Pacific Ocean combined with a great weakening of the trade winds. La Niña has the opposite impact in this region, causing less rainfall and cold ocean surface temperatures.

3.1.1.2 Climate Change

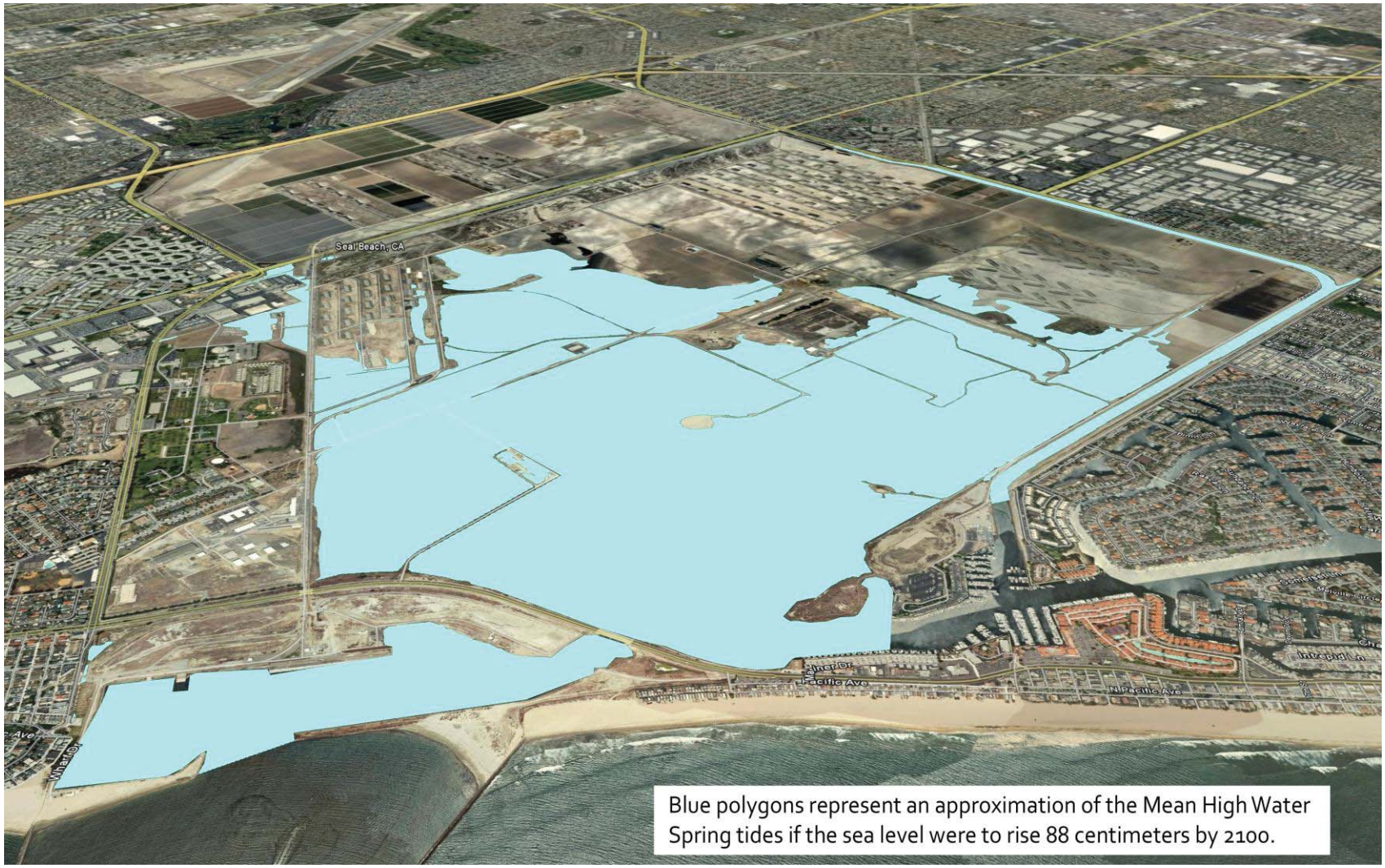
Global warming has the potential to raise the sea level from 9cm to 88cm by 2100 (UNFCCC 2006). The coastal wetlands of NAVWPNSTA Seal Beach and most of the Station are at risk from inundation in a mild to worse case sea level rise scenario. Because the surrounding areas are so heavily developed, low lying zones of NAVWPNSTA Seal Beach between dikes and the sea would likely flood (SCWRP 2001). Combining a detailed elevation map for the Station with the maximum predicted sea level rise of 88 centimeters, Map 3-1 depicts the worst case inundation scenario for the year 2100.

3.1.2 Air Quality

Air quality is defined by ambient air concentrations of specific pollutants that the EPA has determined to be of concern to the health and welfare of the general public. The pollutants are classified as 'primary' if they are emitted directly from a source into the atmosphere. Examples of primary pollutants monitored for health concerns include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur oxides (SO_X), particulate matter (PM_{10}), and lead. 'Secondary pollutants' develop over time in the atmosphere by chemical and photochemical reactions. Secondary pollutants include ozone (O_3) and smog.

In addition to the federal standards set by the EPA, the State of California Air Resources Board (CARB) has also set its own, more stringent air quality standards. Table 3-1 shows the federal and state standards for air pollutants. Areas in California that exceed a state standard for a particular pollutant are considered to be in "non-attainment" status for that pollutant. An area is designated in "attainment" status if the state standard for a particular pollutant was not violated at any site in the area during the past three years. The days exceeding the federal and state standards are presented in Table 3-2.

Naval Weapons Station Seal Beach is in the South Coast Air Basin (Basin) regulated by the South Coast Air Quality Management District (SCAQMD), with the nearest monitoring stations in Costa Mesa and North Long Beach. The South Coast Air Basin includes Orange County and major portions of Los Angeles, San Bernardino, and Riverside Counties. With respect to the more stringent state standards, the Basin is currently in nonattainment for O_3 and PM_{10} (Table 3-2). The Basin has shown marked improvements in air quality since the mid-1970s when measurements were first taken regularly, despite an increase in population since that time (18.1% increase in Orange County from 1990–2000 [U.S. Census Bureau 2002]).



Map 3-1. Predicted sea level rise of 88 centimeters by the year 2100.

Table 3-1. Federal and state standards for air pollutants (California Air Resources Board 1999 (This chart updated 11/29/05 http://www.arb.ca.gov/aqs/aaqs2.pdf).

Pollutant	Averaging Time	California Standard	Federal Standard	
			Primary[a]	Secondary[b]
Ozone (O_3)	1 Hour 8 Hour	0.09 ppm ----------[c]	0.12 ppm 0.08 ppm	0.12 ppm 0.08 ppm
Particulate Matter (PM_{10})	24 Hour Annual Geometric Mean Annual Arithmetic Mean	50 *u*g/m^3 30 *u*g/m^3 ----------[c]	150 *u*g/m^3 ----------[c] 50 *u*g/m^3	150 *u*g/m^3 ----------[c] 50 *u*g/m^3
Fine Particulate Matter ($PM_{2.5}$)	24 Hour Annual Arithmetic Mean	No separate state standard	65 *u*g/m^3 15 *u*g/m^3	65 *u*g/m^3 15 *u*g/m^3
Carbon Monoxide (CO)	1 Hour 8 Hour	20 ppm 9 ppm	35 ppm 9 ppm	----------[c] ----------[c]
Nitrogen Dioxide (NO_2)	1 Hour Annual Arithmetic Mean	0.25 ppm ----------[c]	----------[c] 0.053 ppm	----------[c] 0.053 ppm
Lead	30 days average Calendar quarter	1.5 *u*g/m^3 ----------[c]	----------[c] 1.5 *u*g/m^3	----------[c] 1.5 *u*g/m^3
Sulfur Dioxide (SO_2)	1 Hour 3 Hour 24 Hour Annual Arithmetic Mean	0.25 ppm ----------[c] 0.04 ppm ----------[c]	----------[c] ----------[c] 0.14 ppm 0.03 ppm	----------[c] 0.5 ppm ----------[c] ----------[c]
Sulfates	24 Hour	25 *u*g/m^3	----------[c]	----------[c]
Hydrogen Sulfide (H_2S)	1 Hour	0.03 ppm	----------[c]	----------[c]

[a] The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
[b] The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[c] Pollutant not measured at this scale.

Table 3-2. Number of days local air monitoring stations have exceeded federal and state standards for measured pollutants. Also shown is Orange County's current attainment status for state standards (California Air Resources Board 2002).

Pollutant	No. days exceeding federal standard			No. days exceeding state standard			2001 Orange County Status[a]
Year	1999	2000	2001	1999	2000	2001	
1-Hour Ozone (O_3)[b] 8-Hour Ozone (O_3)[b]	0 0	0 1	0 0	1 ------[d]	1 ------[d]	1 ------[d]	Nonattainment
Particulate Matter (PM_{10})[c]	0	0	0	13	12	10	Nonattainment
Fine Particulate Matter ($PM_{2.5}$)[c]	1	4	1	------[d]	------[d]	------[d]	Not Applicable
Carbon Monoxide (CO)[b]	0	0	0	0	0	0	Attainment
Nitrogen Dioxide (NO_2)[b]	------[d]	------[d]	------[d]	0	0	0	Attainment
Lead[c]	0	0	0	0	0	0	Not Applicable
Sulfur Dioxide (SO_2)[b]	0	0	0	0	0	0	Attainment
Sulfates	Not available						Attainment
Hydrogen Sulfide (H_2S)	Not available						Unclassified

[a] Attainment status shown is for state standards which are equal to or stricter than federal standards (California ARB 2002), except for Nitrogen Dioxide which only federal standard is available for (USEPA 2002).
[b] Measured at the Costa-Mesa monitoring station in Orange County (closest station to NAVWPNSTA Seal Beach in South Coast Air Basin that measures this pollutant).
[c] Measured at the North Long Beach monitoring station in Los Angeles County (closest station to NAVWPNSTA Seal Beach in South Coast Air Basin that measures this pollutant).
[d] Pollutant not measured at this scale.

The local source of air pollutants near NAVWPNSTA Seal Beach is primarily vehicle exhaust from the Pacific Coast Highway (State Highway 1) to the south and the San Diego freeway (I-405) to the north. In addition, a local major point source (defined as a source generating a minimum of 100 tons per year of primary air pollutants) is the Haynes Steam Plant, located approximately one mile northeast of NAVWPNSTA Seal Beach (USFWS and DoN 1990). Despite its generally low impact on air quality, occasionally NAVWPNSTA Seal Beach itself becomes a source of air quality issues. In the past, NAVWPNSTA Seal Beach received an air quality Notice of Violation due to the smell emanating from anaerobic material in dredged spoil.

3.1.3 Geology

Naval Weapons Station Seal Beach sits above a series of Quaternary beach deposits that overlay old alluvium thought to have originated from the Santa Ana, San Gabriel, and Los Angeles rivers in their ancestral, freely migrating forms (Inc. 2001). However, it is also believed that these sediments could possibly derive from tidal sources (Lane and Coastal Geotechnical Woods, cited in USFWS and CDFW 1976).

The Newport-Inglewood Fault Zone (NIFZ) runs through the National Wildlife Refuge portion of NAVWPNSTA Seal Beach, and the Palos Verdes fault zone lies about eight and a half miles offshore to the southwest; both faults are classified as active (Coastal Geotechnical Inc. 2001). The proximity of faults is considered a serious earthquake hazard. The NIFZ was the source of a destructive 1933 Long Beach earthquake (magnitude 6.3), and is considered to have a magnitude potential of 7.5. The resulting damage could be exacerbated by potential liquefaction near the coast. This phenomenon, in which saturated soils develop a fluid consistency, can cause considerable damage to structures, especially retaining walls and foundations.

Emergency response for earthquakes and any other natural or man-made disaster is guided by WPNSTA SB INST 3440.1E on emergency management programs. NAVWPNSTA Seal Beach is identified in the Emergency Program Manual as a relocation site for evacuated personnel during a natural or man-made emergency.

3.1.3.1 Tsunami Threat

Tsunamis are an ever present threat to the people and infrastructure of the coastal regions along the Pacific rim. While large tsunamis of the scale experienced in the Indian Ocean in 2004 tend to be rare, over 80 smaller scale tsunamis have occurred along the Californian coastline in the past 150 years (Seismic Safety Commission 2005). Four of these resulted in deaths, and two caused major damage to ports (Seismic Safety Commission 2005).

A Tsunami's Origin

Tsunamis are a series of waves generated by ocean floor earthquakes that, within moments, displace enormous volumes of water. Earthquakes could also generate tsunamis secondarily, by effecting landslides both on the ocean floor and along the coast. If a tsunami were generated in the mid or western Pacific, warning times would range from 6 to 12 hours for southern California (City of Long Beach 2007). However, warning times could be severely restricted in the event of nearshore-generated tsunamis. Recent research indicates that potentials for oceanic landslides exist around faults situated amongst the Channel Islands[2] (Borreo *et al.* 2004). Tsunamis generated there

[2]Several studies have analyzed the nearshore tsunami threat to the Los Angeles area (Borreo *et al.* 2004, Borreo *et al.* 2005). A tsunami initiated in the Channel Islands would reach Santa Barbara and Santa Monica within a few minutes.

could be devastating in terms of life and property, and leave only minutes for public warnings (Seismic Safety Commission 2005; Borreo *et al.* 2004, 2005).

Local Tsunami History

To date, a majority of the historical tsunamis that have affected California have been relatively small (City of Long Beach 2007). Still, tsunamis have the potential to significantly affect vulnerable low lying areas such as ports. Typically, a port's docks and terminals conduct operations only 9 feet above the water's surface level, thus making a moderately strong tsunami highly destructive (Seismic Safety Commission 2005). Economic studies suggest that a two month closure of ports due to a tsunami in the Los Angeles area could result in nationwide losses from 42 to 60 billion dollars (Seismic Safety Commission 2005).

In 1964, a tsunami generated by an 8.2-magnitude earthquake in Alaska struck Orange County with four to five foot tidal surges (City of Long Beach 2007). A paraphrased personal account of the event by a local life guard, Walt Snyder, is reproduced here (City of Long Beach 2007).

"'I was called out at daybreak due to the tidal surges in the Huntington Harbor. I got in the City's only rescue boat. The tidal surges were huge and making whirlpools. They were moving at a much faster and higher rate than normal tide. When the surges would come in, they would tear the boats away from their moorings. Then when the surges would go out, they would take the boats through the bridge at Pacific Coast Highway to the Seal Beach (Anaheim Landing Bridge) and when they hit the pilings it would tear the boats apart. The high tides were carrying the boats into the weapons station. When surges retreated, the boats would end up on dry land at the weapons station – high and dry and broken up.'

"In 1964 there were only about 200-300 boats in the harbor and today Walt estimated there are 3,500 plus boats. There were only 300-400 homes then and now he estimates an excess of 5,000. This occurred during a low tide. The sea wall in Huntington Harbor is 9'. Had this occurred during a high tide, Walt stated the surges would have easily gone over the sea walls and damaged many homes." (City of Long Beach 2007 pg. 8-9).

This account demonstrates the historical vulnerability of the seaward property at NAVWPNSTA Seal Beach to tsunamis of moderate strength under favorable tidal conditions. In the event of a more intense disaster, the most secure areas of the base are where ground elevation is at its highest, and along the base's northern border where the distance from the ocean is maximized. Thus, maintaining property rights over these areas is of great importance to NAVWPNSTA Seal Beach's ability to rebound and fulfill its mission in the event of such a catastrophe.

Tsunami Preparedness

In the event of a tsunami, NOAA has a statutory responsibility to provide warnings to the California Governor's Office of Emergency Services, which in turn disseminate warnings throughout the state. In 2005, Orange County issued a tsunami warning after a 7.2-magnitude earthquake off the northern California coast. Some cities considered evacuations before the warning was canceled. In response, the city of Seal Beach decided to upgrade its tsunami warning procedure using a telephone based system that can dial 3000 households simultaneously (Agopian 2005).

However, the same tsunami would arrive at NAVWPNSTA Seal Beach up to 23 minutes after initiation due to the shallow ocean floor of San Pedro Bay (Borreo *et al.* 2004). Therefore Borreo *et al.* (2004) believe that an effective early warning system would prove helpful to mitigate the loss of life in this area.

3.1.3.2 Oil Production

In Los Angeles and Orange counties, hundreds of oil extraction facilities have been constructed in the coastal wetlands, causing impacts ranging from local disturbance to larger scale habitat destruction (SCWRP 2001). In Seal Beach, the Oil Field is situated under NAVWPNSTA Seal Beach about one-half mile inland from the coast. A portion of the field was discovered in 1927, and an additional portion in 1979 (Hesson and Olilang 1990). Both oil and natural gas are extracted, with the ratio managed to avoid depletion of the resource. The oil wells on Oil Island have been in operation since 1954, and have exceeded their original life expectancy of 15 years. The original agreement between the Navy and the oil operator stipulated that the land's surface be returned to its original state once oil production ceases.

3.1.3.3 Subsidence and Rebound

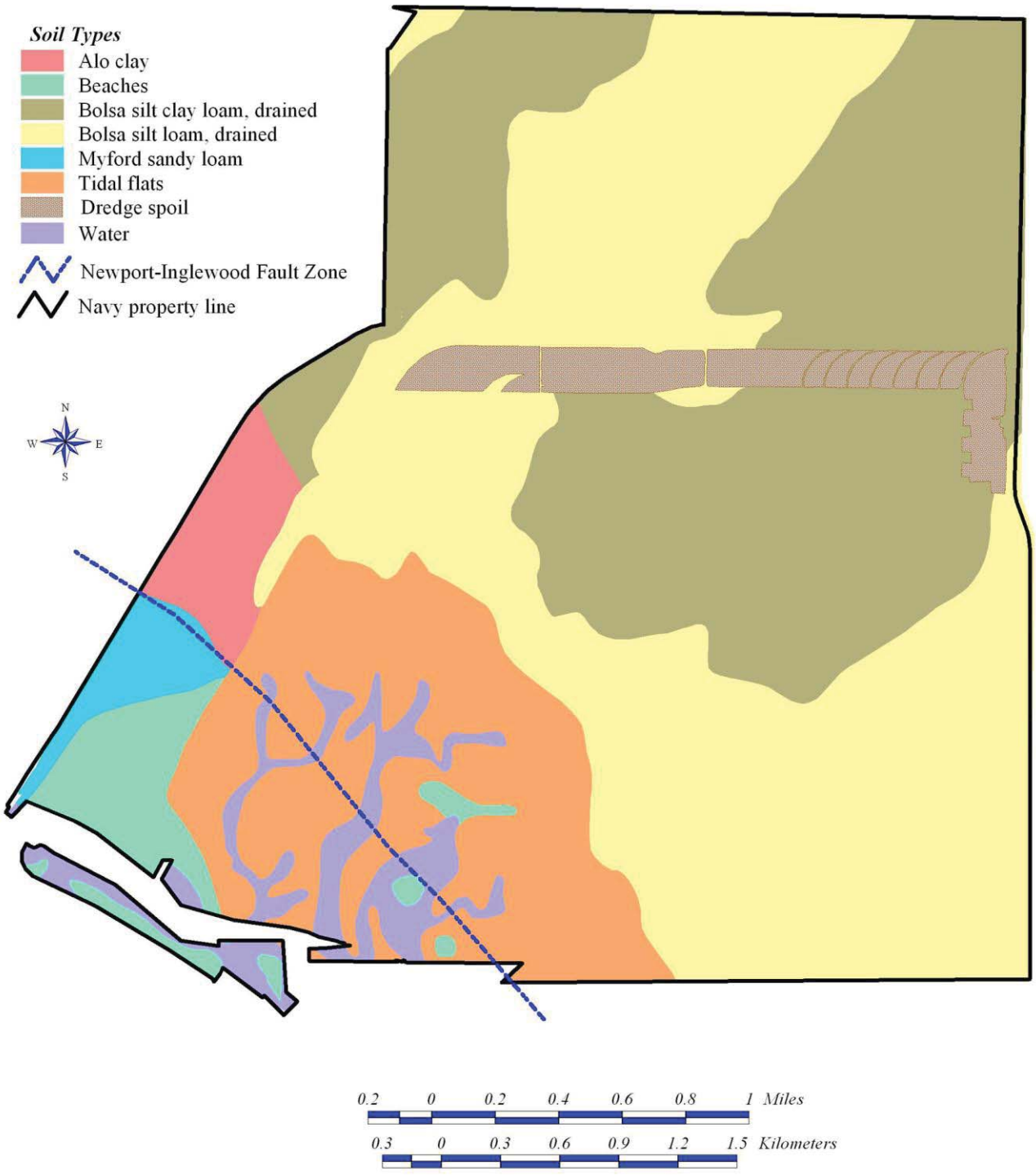
Both subsidence and rebound on NAVWPNSTA Seal Beach lands have been documented in studies between 1968 and 1994 (RBF/Sholders & Sanford 1994). The most dramatic change occurred between 1968 and 1985 with an average subsidence of 0.2 feet to 0.5 feet. However, the period between 1985 and 1994 showed a basewide rebound of 0.02 feet to 0.08 feet.

Subsidence of shallow marine sediments can be due to groundwater extraction, oil extraction, or tectonic activity. Oil extraction appeared to be the cause of subsidence in the Long Beach area between 1937 and 1958 (DoN 1988 [cited in USFWS and DoN 1990]). Groundwater extraction may contribute to local subsidence in the Seal Beach area. It is not known what combinations contribute to subsidence trends at NAVWPNSTA Seal Beach, nor the relative importance of these three factors.

3.1.4 Soils

The Orange County Soil Survey shows several soils of NAVWPNSTA Seal Beach divided into five types (Map 3-2). Most of the Station is Bolsa silt loam or Bolsa silty clay loam (USDA SCS 1978), except for portions along Seal Beach Boulevard. Beaches, tidal flats, and areas filled with material dredged from Anaheim Bay and the Port of Long Beach mitigation ponds comprise the remainder, although the latter are not mapped by the soil survey. Soil types are described in Table 3-3. The soils of the tidal marsh are predominantly fine, silty sands, clayey silts, and silty clays. Layers of peat up to 18 feet thick lie along the edges of the Alamitos Gap and at the south edge of Landing Hill within the Station. Thinner layers of peat are located under the salt marsh; lagoonal-alluvial deposits of the salt marsh are 35 to 50 feet thick. A narrow beach comprised of sand and gravelly cobble borders the southwestern perimeter of the Station. It reaches a maximum elevation of 10 to 15 feet above sea level and extends inland approximately 800 feet. It acts as a barrier to the ocean, but occasionally heavy winter storm waves can break over its top (USFWS and DoN 1990).

Soils on NWS Seal Beach



Map 3-2. Soils of Naval Weapons Station Seal Beach. All mapping units are based on USDA SCS (1978), except for locations of dredge spoil, which are based on J. Johnson (pers. comm. 2002).

Table 3-3. Soil types on Naval Weapons Station Seal Beach (USDA SCS 1978).

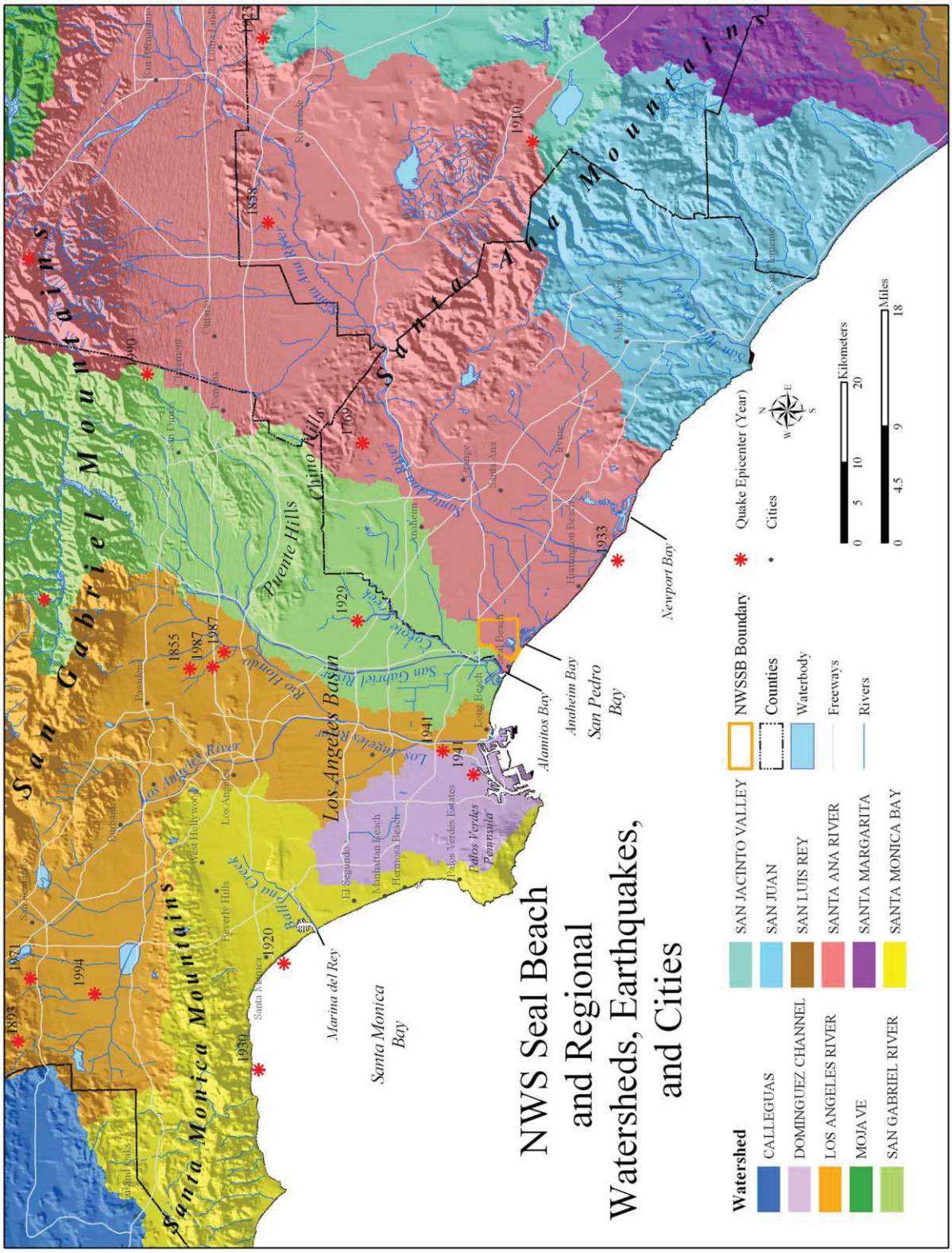
Soil Type	Slope	Runoff	Erosion Hazard	Limitations for Site Development	Comprised of	Uses	Location at NAVWPNSTA Seal Beach
Alo Clay	Slopes of 9–15%	Medium	Moderate	Severe, due to high shrink-swell and low strength	13% clay, formed from material weathered from calcareous sandstone and shale	Range, dryland barley, dryland pasture, irrigated citrus, urban development	Area of the administration and residential buildings
Beaches		Slow	High		Sandy, gravelly, or cobbly coastal shores		Around entrance to the harbor; extend a short way north along the northwest side of the Refuge
Bolsa silt loam and Bolsa silty clay loam	Nearly level	Slow	Slight	Severe, due to flooding	Formed in mixed alluvium and are moderately alkaline throughout	Row crops, field crops, urban development	All the Station except the southwest corner; all the agricultural outlease land
Myford sandy loam	Slopes of 2–9%	Medium	Moderate	Moderate–Severe, due to high shrink-swell	Formed from sandy sediments	Citrus, pasture, range, barley, urban development	Southwest corner, just north of the entrance to the harbor; housing/personnel support, public works, and supply facilities
Tidal flats	Nearly level				Stratified clay to sand deposits, poorly drained and high in salt content		Seal Beach Refuge
Dredge spoil	----------unknown----------					Ruderal vegetation, some pickleweed establishment, some alfalfa.	Near Anaheim Bay and along Westminster Ave. and portion of Bolsa Chica Rd.

3.1.5 Hydrology

3.1.5.1 Regional Hydrology

Two geomorphic provinces, the Transverse Ranges (which include the San Gabriel and San Bernardino mountains) and the Peninsular Ranges (which includes the Santa Ana Mountains) form a natural amphitheater around the coast from the city of Santa Monica to the southern end of Orange county (Refer to Map 3-3). This hydro-geographic area is known as the Los Angeles Basin.

The Los Angeles Basin once served as an expansive floodplain into and through which the Los Angeles, San Gabriel, and Santa Ana Rivers flowed. Historical records show that extensive flooding led to major changes in the location of the Los Angeles, San Gabriel and Santa Ana Rivers. The overlapping alluvial fans from these rivers suggest that their course has shifted and migrated through time. Indeed, historical records show that extensive floods occurred 10 to 20 times within each century on one or more of the major streams, leading to major changes in the location of these rivers (USFWS and DoN 1990).



Map 3-3. Naval Weapons Station Seal Beach and regional watersheds, earthquakes and cities.

The rivers that used to meander across the coastal plain are now confined by detention dams and concrete-lined channels. Channelization of the Santa Ana River (construction of levees in place of riverbanks, Prado Dam, and other flood control structures) has eliminated the floodplain leading to the loss of hundreds of acres of riparian and marsh habitat. Sediment flows have been blocked by dams and grade control structures, exacerbating channel erosion that has led in turn to increased armoring of the river channel. These modifications prevent the river from seasonally flooding the marshes, replenishing sediment, and filtering the outflows to the sea.

In addition to removing valuable riparian habitat along the Santa Ana River, these channel modifications and dam construction have restricted aquifer recharge (Santa Ana River Watershed Profile 2001).

3.1.5.2 Local Hydrology

The current watershed area for Anaheim Bay is between 48,000 and 50,000 acres (DoN SWDIV 1995) (see Figure 3-4 and Map 3-4). Drainage from these watersheds enters the Anaheim-Huntington harbor complex through two flood control channels, with the main storm drain being the Bolsa Chica Channel which enters in the areas between Sunset Aquatic Park and Huntington Harbor. Its flow is mainly storm runoff, amounting to less than 100 acre-feet per month on average. Occasionally, severe storms result in massive run-off and overwhelm storm-water channels. A storm in December 1974 caused the Wintersburg Channel to overflow in several locations, and a more catastrophic flood, such as the flood of 1938, could still occur in the region.

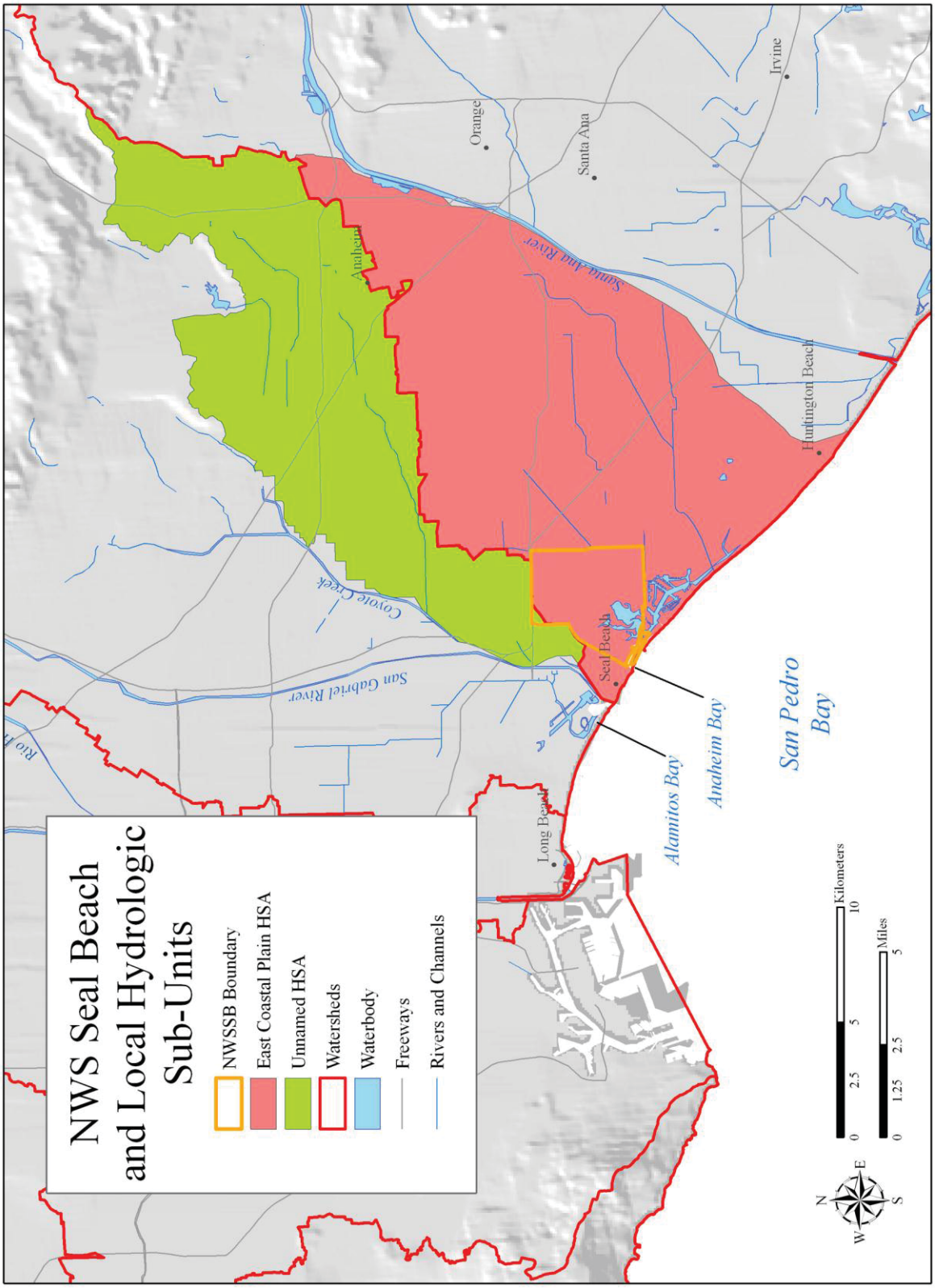
Runoff from the Station itself either ponds or finds its way through man-made channels, natural ditches, and tidal sloughs through flat-lying clay deposits. Flow in channels and ditches is intermittent and is dependent on rainfall and excess landscape irrigation runoff. The runoff eventually discharges into the city of Seal Beach municipal storm drain system, the Orange County flood control channels, the National Wildlife Refuge, and Anaheim Bay (NAVWPNSTA Seal Beach 2001).

3.1.5.3 Historical Modifications to Anaheim Bay

The first man-made modification to Anaheim Bay took place in the late 1860s when a small boat port was constructed at Anaheim Landing to service Orange County area. Soon thereafter, the Pacific Railroad was built in 1875. From 1875 until 1944 the area was primarily used for fishing and hunting. The construction of the Pacific Coast Highway during the mid-1940s blocked the primary drainage outlet of the western tributary channel. As a result, the total tidal volume was restricted to a much smaller tributary channel which connects with the trunk channel leading into Huntington Harbor. The result was considerable erosion to the seaward reach of this arm and deposition in the landward reaches of the tidal channel, reducing the channel's width. Interpretation of the channel geometry between 1963 and 1972 suggests that tidal marsh accretion and loss of tributary channel width is still continuing in the landward portions of the western arm, whereas, tidal channel geometry appears to be stabilized in the seaward section of this arm (Reardon 1981).

Construction of the beach and harbor jetties resulted in the salt marsh being insulated from the effects of storms and waves. The recent development of the Huntington Harbor small boat marina and residential complex has resulted in the loss of most of the southeastern portion of salt marsh. Construction of the Sunset Aquatic Park marina resulted in blockage of the southern tributary channel into the eastern arm tidal flats, and does not appear to have noticeably changed the erosional or depositional patterns within this arm (Reardon 1981).

Figure 3-4. Depiction of the nearby watershed affecting Naval Weapons Station Seal Beach. Elevations are exaggerated by 100 percent. (Source: Google Image).



Map 3-4. Watershed influence area for Naval Weapons Station Seal Beach. Map from U.S. Navy Southwest Division 1995.

3.1.6 Salt Marsh Processes

3.1.6.1 Tidal Circulation and the Tidal Prism

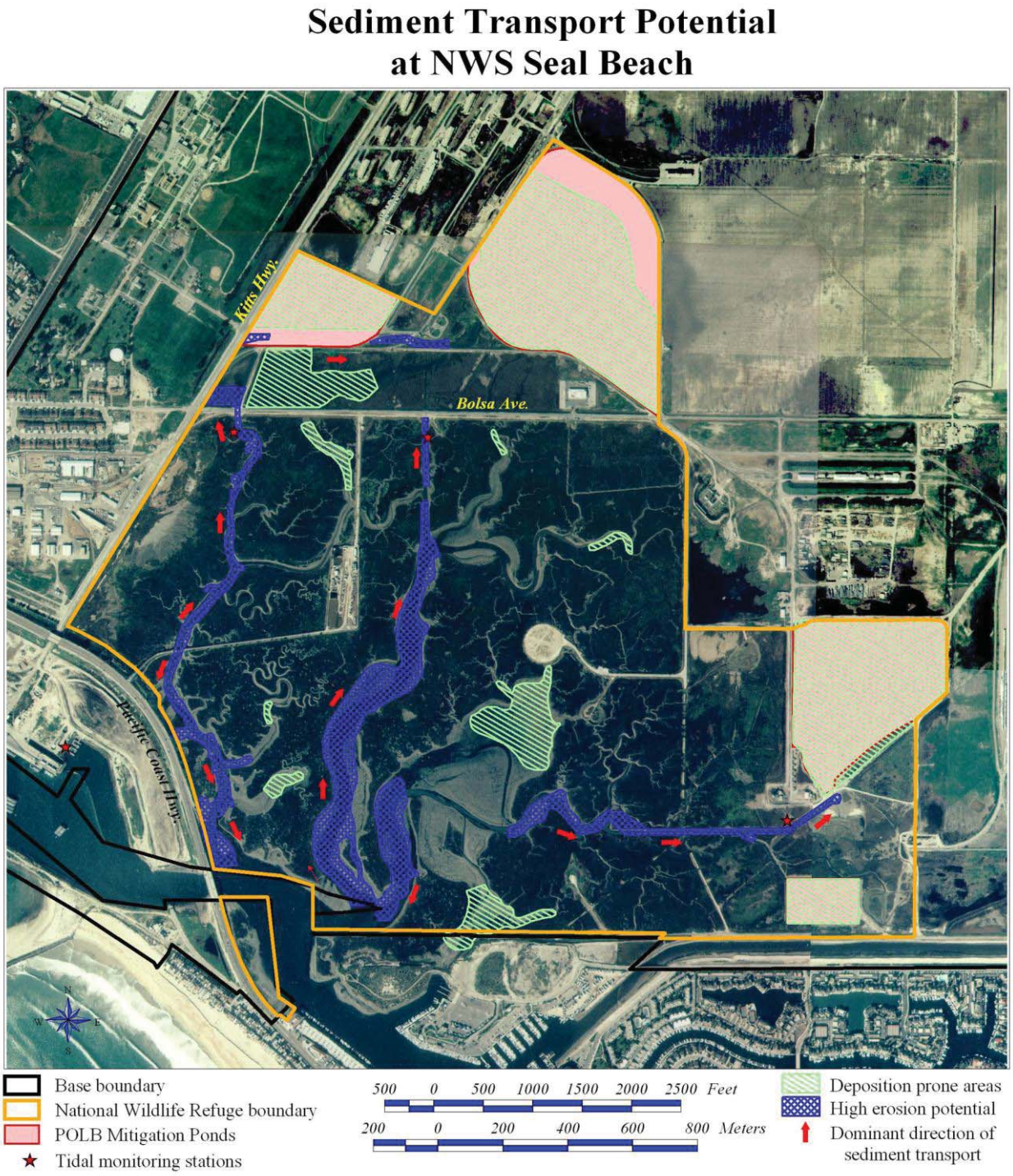
Tidal waters enter and exit the Anaheim wetland complex through one opening under the Pacific Coast Highway Bridge. Water from this entrance feeds three major tidal channels, the east, middle and west arms. At high tide, the marsh is almost completely submerged with only patches of cordgrass showing above the level of the water. When the tide is extremely low, extensive mudflats with only a small trickle of water in the upper arms in the tidal slough are visible. The volume of water in the main channel is reduced by 40 to 50 percent during low tides (Chan and Lane 1975).

The channel volume can also decrease over time by what it known as shrinkage of the tidal prism. As an intertidal wetland develops, a balance is reached between the volume of water that flows in and out of the system on a tidal cycle, and the geometry of the tidal channels that accommodate this flow. The three dimensional area of a tidal channel is known as the 'tidal prism' (Williams 1986; Coats *et al.*1989, cited in Callaway 2001). When the tidal prism is reduced due to a lack of flushing, the velocity of water entering the salt marsh is concomitantly reduced. Slower currents allow more sediment deposition and further reductions in channel cross-sectional area. This process results in a progressive reduction of the tidal prism, leading to the eventual closure of the tidal inlet.

The marked reduction in area of the Bay from its historical dimensions has reduced the volume of the tidal prism, and it is probably this reduction concomitantly reduced the flushing rate. Besides the reduction in the Bay's size, tidewaters are also restricted between the Outer and Inner Anaheim Harbor by both the 600-foot shipping channel that connects them, and the Pacific Coast Highway Bridge. Tidal flow is further dampened in the Refuge by roads, culverts, and tidal gates, with the overall effect of inhibiting much of the tidal regime especially in the upper reaches of the marsh. Hence, maintenance of a voluminous tidal prism should be considered when designing wetland restoration projects.

3.1.6.2 Erosion and Depositional Processes

Biota, hydrology, tidal channel geometry, and geologic structure all contribute to the competing processes of sediment erosion and deposition within Anaheim Bay and its associated wetland salt marshes. Predicted areas of erosion and deposition are depicted in Map 3-5. Under natural conditions, southern California salt marshes are primarily depositional systems, characterized by low velocity flow in tidal channels and over the marsh (Calloway and Zedler 2004). This results in the gradual accumulation of finer-textured, highly organic sediment. In the case of the wetlands at NAVWPNSTA Seal Beach, sediment deposits previously originated in the San Gabriel Mountains, and were transported into the area by fluvial processes. Conversely, the network of tidal channels delivers sediment and nutrients to the wetland surface from the ocean.



Map 3-5. Tidal gaging stations, and expected erosion and deposition areas based on modeled tidal circulation and velocity (U.S. Navy Southwest Division 1995).

Reardon (1981) concluded that erosional processes have dominated over depositional processes over the last 100 years within Anaheim Bay. Aerial photo analysis supports these findings, and suggests that made-made modifications to the natural drainage systems of the marsh has significantly altered its internal geometry. The overall net loss of salt marsh sediments may be in part the result of the loss of sediment deposition from fluvial sources, and the periodic dredging of the harbor area and trunk channel which prevents ocean-derived sediments from being transported into and deposited within the salt marsh.

Two major seed plants found within the marsh, *Salicornia* and *Spartina*, affect erosion and depositional patterns in the Bay. *Salicornia* has extensive root systems that enhance soil retention beneath the plant, but also contribute to channel migration through undercutting, which adds sediments to the channel for redistribution. *Spartina* plants, which typically occupy lower elevations, trap sediments, helping to develop tidal flats.

3.1.6.3 Temperature Fluctuations

Water temperature fluctuates both diurnally and seasonally because of the shallow depths of the tidal channel. Temperatures range from 78.8°F (26°C) in the summer to 51.8°F (11°C) in the winter. Additionally, temperatures in the water column are stratified during the summer with surface temperatures approximately 32.9°F (0.5°C) warmer than bottom temperatures. This stratification is less acute during the winter. The landward parts of the marsh experience greater seasonal temperature fluctuations than the seaward parts (Reardon 1981).

3.1.6.4 Salinity Variations

Salinity of marsh waters also varies seasonally, due to variation in freshwater inputs. May through October are the driest months, contributing little freshwater to the system. Salinity values during these months range from 34.2 parts per thousand (ppt) and 34.5 ppt. Freshwater contributions during the rainy season significantly reduce salinity values; salinity is often 30 ppt following heavy rains (Reardon 1981).

3.1.7 Bay and Marsh Water Quality

Water quality has deteriorated with development and the channelization and removal of riparian habitat in the Los Angeles Basin. Currently, southern California is the only major region in the country where contaminated urban runoff flows directly into streams and drains into nearshore waters rather than to sewage treatment plants for possible reuse. Despite progress, the County of Orange has been operating under a controversial waiver that allows for up to 50 percent deposition of raw sewage into the ocean. This exemption is now up for renewal.

Anaheim Bay is a known Toxic Hot Spot for certain metals (Cd, Cu, Pb, and Cr), and a Potential Toxic Hot Spot for certain pesticides/herbicides (Aldrin, Chlordane, Lindane Chlorbenside, PCB, DDT, Chlorpyrifos, Endosulfan, Heptachlorepoxide, and Hexachlorbenzene) (RWQCB 1995). Two major storm drains, the Bolsa Chica Channel and the East Garden Grove Wintersburg Channel, as well as other tributaries, drain into the Anaheim Bay/Huntington Bay complex. Inputs of stormwater flows appear to be a significant source of the pollutants. Orange County's general stormwater permit requires the implementation of best management practices (BMPs) and other measures in the watershed to control these inputs to the maximum extent practicable. A work plan for cleanup of these problem areas to protect Beneficial Uses is partly implemented through the Bay Protection and Toxic Cleanup Program (mandated under California Water Code Sections 13390-13396).

In order to evaluate whether water quality is adequate in a specific location, the RWQCB identifies specific thresholds for designated "beneficial uses" in its Santa Ana Basin Water Quality Control Plan. For Outer Anaheim Harbor, these beneficial uses are: navigation, water contact recreation, non-contact water recreation, biological habitats of special significance, wildlife habitat, rare (including threatened/endangered) species, spawning or reproductive habitat for fish and wildlife, and marine habitats. For the marsh portion (SBNWR) of Anaheim Bay, the designated beneficial uses are: water contact recreation, non-contact water recreation, biological habitats of special significance, wildlife habitat, rare (including threatened/endangered) species, spawning or reproductive habitat for fish and wildlife, marine habitat, and estuarine habitat.

3.1.7.1 Regional Beach Closures

The 2007 Annual Ocean and Bay Water Quality Report (County of Orange 2008) provides an analysis of bacteriological water quality data for the 112 miles of Orange County's ocean and bay waters for the years 2000 – 2007, and incorporates sewage spill and related ocean and bay water closure data from 1987 – 2007. Major findings of the 2007 Annual Ocean and Bay Water Quality Report are:

The number of sewage spills reported to the Ocean Water Protection Program decreased five consecutive years from 2003 – 2007. This represents the first five-year decrease since 1987. Private property owner (e.g. apartment/condominium complexes, restaurants, vessel pump stations, etc.) sewage spills continued to be responsible for more than half (54%) of all sewage spills reported in 2007. In 2007, the total number of ocean and bay water closures due to sewage spills (12) was the lowest number of closures since 1993 and represents a 50 percent reduction in the number of ocean and bay water closures from the previous year. The total number of closure days and the total number of beach-mile days that ocean and bay waters were closed due to sewage spills in 2007 were the lowest number of closure days and beach-mile days on record for the nine-year period from 1999 – 2007. Pipeline blockages remain the major cause (62%) of all ocean and bay water closures from 1999 – 2007. Root infiltration and grease deposition continue to be the major types of blockages (together totaling 60%) causing ocean and bay water closures.

Beach water postings at Seal Beach and Surfside, similar to county-wide trends, declined 2000-2007, with 14.4 beach-mile days posted in 2000, and 0.7 beach-mile days in 2007 (County of Orange 2008). There are a number of suspected or potential sources that cause water quality impairment of ocean waters in Orange County. These include sewage spills and leaks, urban runoff, Orange County Sanitation District's (OCSD) ocean outfall, AES power plant discharge, vessel pump out stations, septic systems, coastal wetlands and marshes and wildlife. However, the beach water closures above were mainly due to sewage spills or leaks that reached or threatened to reach ocean waters.

General rain advisories of 72 hours each are issued in Orange County following 0.2 inches of rain. These advisories affect all beaches. There is also an Annual Mussel Quarantine in California in effect 01 May through 31 October. The purpose is to protect shellfish harvesters from deadly poisons that may be present in bivalve mollusks, such as mussels, clams, oysters, and scallops.

Nutrient levels are highest in Anaheim Bay in the spring due to surface runoff. Urban drainage, agricultural runoff and erosion contribute phosphorus, nitrogen and silicon to the system. Nutrient input during the rest of the months is relatively uniform and low (Reardon 1981).

3.1.7.2 Continuing Quantification of Water Quality

A variety of ongoing projects are currently researching water quality in Anaheim Bay and its associated salt marshes. The following sections describe these efforts.

Mussel Watch

Mussel Watch is California's primary program for monitoring long-term marine water quality. Naval Weapons Station Seal Beach has been part of the State of California's Mussel Watch program since 1981, with several monitoring stations located here. Although inclusion in the program is not mandatory, the Navy provides annual funding since it provides early detection of any problems for both the Navy and its neighbors up and down the coast. The analysis of tissue is efficient for determining pollutant loads because (1) they are common along the California coast; (2) they are immobile in nature; (3) they have the ability to concentrate pollutants above ambient sea water levels; and (4) they can provide a time-averaged sample. Results are published in State of California Water Quality Monitoring Reports.

3.1.7.3 Management of Marine Water Quality

In addition to the above monitoring work, other efforts continue to protect marine and marsh water quality. Anaheim Bay and Huntington Harbor are designated as no discharge areas for vessel sanitary wastes, and pump out facilities are located throughout the Harbor to facilitate compliance. The County of Orange monitors for coliform bacteria in waters adjacent to the Refuge and is responsible for public beach closures when levels exceed those designated acceptable for public use. The Orange County Sanitation District monitors the Navy's and others' compliance with wastewater requirements.

Oil Spill Response

Oil spill response in the marine environment is guided by the U.S. Coast Guard Marine Safety Office's "Area Contingency Plan" (ACP) for 2000, which covers all counties from Orange north to San Luis Obispo. The ACP coordinates, prioritizes, and defines an incident command system for joint oil spill response, as part of a national planning and response system under the Oil Pollution Act of 1990. As part of this system, Area Committees are set up in each area designated by the President under the direction of the Federal On-Scene Coordinator. The ACP shall be adequate to remove a worst case discharge of oil or a hazardous substance, and to mitigate or to prevent a substantial threat of such a discharge, from a vessel, offshore facility, or onshore facility operating in or near their geographic area.

This planning process identifies and rates environmentally sensitive areas to guide oil spill first responders, based on the following criteria:

- Habitat for species either listed or candidates for listing as rare, threatened, or endangered under state or federal law
- Habitat that is of extraordinary biological productivity
- Habitat that is of extraordinary biological diversity
- Habitat for organisms that are extremely vulnerable and sensitive to oiling and that would be difficult to restore if contaminated by oil

Based on these criteria, Anaheim Bay and associated marshlands have received a rating of Priority A, the highest rating possible. The area is described as critical habitat and the most extensive and valuable wetlands in southern California.

Hazardous Material Spill Prevention Control

Marine waters, mainland surface water, and groundwater quality are all protected by the Spill Prevention Control and Countermeasures (SPCC) Plan. This Plan complies with Title 40, CFR Parts 110 and 112, and OPNAVINST 5090.1C Environmental and Natural Resources Program Manual, Chapter 9, Section 9-4.2. This Instruction charges Naval installations with actively protecting and enhancing environmental quality by requiring all facilities to develop and update SPCC Plans and Programs.

A revised SPCC Plan was completed in February 2012 to address petroleum and hazardous substance storage, transfer, and handling operations and facilities at NAVWPNSTA Seal Beach. The plan establishes procedures and identifies equipment required to prevent the discharge of oils within navigable waterways.

Ballast Water Controls

Ballast water exchange is not permitted in Anaheim Bay as it represents the biggest potential threat of exotic species introduction which can devastate the marsh ecosystem.

Ballast water exchange is regulated under the CWA and the National Invasive Species Act (NISA). Recently, the regulatory framework for ballast water management has gone through a number of changes to make it more effective and more consistent among various extant programs (McDowell 2002). Internationally, voluntary guidelines and reporting were adopted in 1993 and amended in 1997 by the International Maritime Organization, and draft standards were considered in 2003.

At the national level, the U.S. Coast Guard (USCG) recently submitted a report to Congress recommending a national, mandatory ballast water exchange program. The USCG is the lead agency in charge of ballast water management under the NISA of 1996, the primary U.S. legislation currently regulating ballast water and aquatic nuisance species. After voluntary guidelines proved unsatisfactory, the USCG made compliance with ballast exchange guidelines mandatory in 2004. The mandatory program requires ships to use one of three ballast water management methods: (1) retaining ballast water on board, (2) conducting a mid-ocean exchange, and/or (3) using an approved ballast water treatment method. All vessels are required to submit ballast water management reports (failure to submit a report can now result in penalties). Under the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA)/NISA, states are specifically permitted to regulate ballast water on ships. Because of concerns that national and international efforts to minimize and prevent introductions from ballast did not go far enough to protect state waters, California passed the Ballast Water Management for Control of Nonindigenous Species Act of 1999. With this legislation, the state became the first to require ships to exchange ballast water at sea to minimize the possibility of transporting invasive species. Other states, such as Washington and Oregon, soon followed with their own legislation.

In addition to reporting requirements, California required the state to issue a ballast water discharge standard in 2007. In January 2006, the State Lands Commission (SLC) approved the report titled “California State Lands Commission Report on Performance Standards for Ballast Water Discharges in California Water” (Falkner *et al.* 2006). This report included interim performance standards, an implementation schedule, final discharge standards and other programmatic recommendations. The report’s recommendations were adopted by the California Legislature in 2006 under Senate Bill 497, which among other provisions required the SLC to adopt, via regulations,

the interim standards and implementation schedule. This legislation also deleted the sunset provision that would have ended CDFW's Marine Invasive Species Monitoring Program.

OPNAVINST 5090.1C describes U.S. Navy policy for ship ballast water and anchor system sediment control. The following are the main points described in OPNAVINST 5090.1C:

- Waters are considered to be potentially polluted in harbors, rivers, inlets, bays, landlocked waters, and in the open sea within 12 miles of the entrance to these waterways. Potentially harmful species, if taken up with ballast water and transferred to a different location, are more prevalent within 3 nautical miles (nm) from shore or within the polluted areas described above.
- If it is necessary for a surface ship to load ballast water in an area that is either potentially polluted (as defined above) or within 3 nm from the shore (e.g. amphibious ships operating in such waters and ballasting to operate landing craft, or tankers ballasting to replace off-loaded cargo), the ship shall pump the ballast water out when outside 12 nm from shore and twice fill the tank(s) with clean sea water and pump prior to the next entry within 12 nm from shore. Surface ships will affect a ballast exchange twice in clean water, even if ballast water was pumped out before exiting the polluted waters or 3 nm limit, since residual water remaining in a tank after emptying may still contain unwanted organisms that could transfer during the next ballasting evolution. *NOTE: Ballast water exchange is not required during local operations or when reentering within 12 nm in the same locale as the ballast water was initially loaded.*
- Surface ships' engineers shall record in the ship's engineering log loading of ballast water in potentially polluted areas or within 3 nm from land and the flushing of ballast tanks to rid them of possible pollutants or unwanted species. Entry shall include geographical position and amount of ballast water taken on.
- Surface ships with seawater compensated fuel stowage systems shall also record seawater intake occurring in potentially polluted areas or within three nm of shore during routine internal fuel transfer for propulsion plant operation (but need not affect a ballast water exchange).
- Surface ships shall routinely wash down anchors, chains and appendages with seawater when retrieving them to prevent on board collection of sediment, mud and silt. Where possible following anchor retrieval, surface ships shall also wash down chain lockers outside 12 nm from land.

Uniform National Discharge Standards for Vessels

When the CWA was amended in 1996, new requirements were enacted at the national level. In response, the DoD (with U.S. Navy as lead), EPA, and USCG, are leading an effort to develop national standards for controlling discharges from U.S. Armed Forces vessels. Uniform National Discharge Standards (UNDS) are currently being developed with the purpose of providing a comprehensive system for regulating discharges incidental to the normal operation of an Armed Forces' vessel. The development of the UNDS has several benefits.

- Enhance environmental protection of coastal waters
- Encourage environmentally sound management practices
- Help standardize training for crews to perform missions
- Determine how future ships will be built

3.1.8 Water Resources

3.1.8.1 Water Supply and Water Rights

Water for Station use is currently purchased from the city of Seal Beach, and is comprised of 60 percent well water and 40 percent water from the Metropolitan Water District (P. Nguyen, *pers. comm.*). This water is tested regularly for drinking water standards. There is a Drinking Water Plan for NAVWPNSTA Seal Beach (P. Nguyen, *pers. comm.*). The County Department of Health Services monitors the quality of these wells. Water conservation is handled by Public Works as part of grounds maintenance.

3.1.8.2 Groundwater

RWQCB designates the groundwater subbasin under NAVWPNSTA Seal Beach and the Los Alamitos Armed Forces Reserve Center (location of the golf course) as the Santa Ana Pressure Subbasin. Fuel plumes and landfills have been identified as water quality issues in this subbasin (RWQCB 1995). Groundwater underlies NAVWPNSTA Seal Beach at levels from five to fifteen feet below the surface, rising to even shallower depths during heavy rain years.

The Orange County Water District monitors the intrusion of salt water into groundwater. To prevent intrusion, treated water is injected into wells maintained along the coast. The water district also monitors aquifer levels approximately quarterly in test wells, 10 of which is owned and operated by the Navy. There are also an additional six proposed test wells.

3.1.8.3 Stormwater

Stormwater runoff from industrial facilities discharging off NAVWPNSTA Seal Beach flows through the stormwater conveyance system, which includes overland flow and man-made drainage ditches. Stormwater runoff is primarily generated in locations with impervious surfaces such as buildings and paved areas. These impervious hardscapes total nearly 340 acres, or six percent, of the total area of the Station (NAVWPNSTA Seal Beach 2001).

The U.S. Navy's storm water pollution protection program is outlined in OPNAVINST 5090.1C, which directs all commands and activities to comply with all requirements as stipulated in permits under which the activities are covered. To comply with this policy and federal and state regulations, NAVFAC SW developed a program for Naval activities in their purview, including southern California. The program began in 1992 when the Navy filed NOIs with the State Water Resources Control Board (SWRCB) to gain coverage for specific Naval activities under California's NPDES General permit No. CAS000001 for Discharges of Storm Water Associated With Industrial Activities.

The original Stormwater Discharge Management Plan (SWDMP) was completed in 1993. The NAVFAC SW SWDMP is a complete and comprehensive compliance document. It established policy, responsibilities, procedures, and technical guidance on the prevention and reduction of pollution of storm water runoff from industrial areas. Since then, NAVWPNSTA Seal Beach has complied with the requirements of the General permit, as reported in each Annual Report submitted to the RWQCB by 01 July of each year. The original SWDMP for NAVWPNSTA Seal Beach was completed in 1993, and has been updated to reflect changes in both operations and

changes to the General Permit. The SWDMP contains a Non-storm Water Discharge Elimination and Prevention Program, a Storm Water Pollution Prevention Plan (SWPPP), and a Monitoring and Reporting Program Plan.

Objectives of the SWPPP are to (1) identify and evaluate sources of pollutants associated with industrial activities that may affect the quality of stormwater discharges and authorized non-storm water discharges form the facility, and (2) identify and implement site-specific BMPs to reduce or prevent pollutants associated with industrial activities in storm water discharges and authorized non-storm water discharges.

3.2 Ecoregional Setting

Naval Weapons Station Seal Beach is within a distinct bioregion known as the Southern California Bight (SCB or "the Bight"). This diverse and productive ecological region stretches from its northern border at Point Conception to just south of the Mexican border south of Tijuana (Map 3-6).

Coastline geography, ocean floor topography, and a complex mixing of currents all contribute to the Bight's diversity and productivity. Point Conception marks a sharp break in sea temperatures, with waters north being cooler and waters just south of the Mexican border temperatures becoming much warmer. In the case of marine animals, these sharp temperature clines represent the northern end of the range of many tropical species, and the southern end for many temperate species.

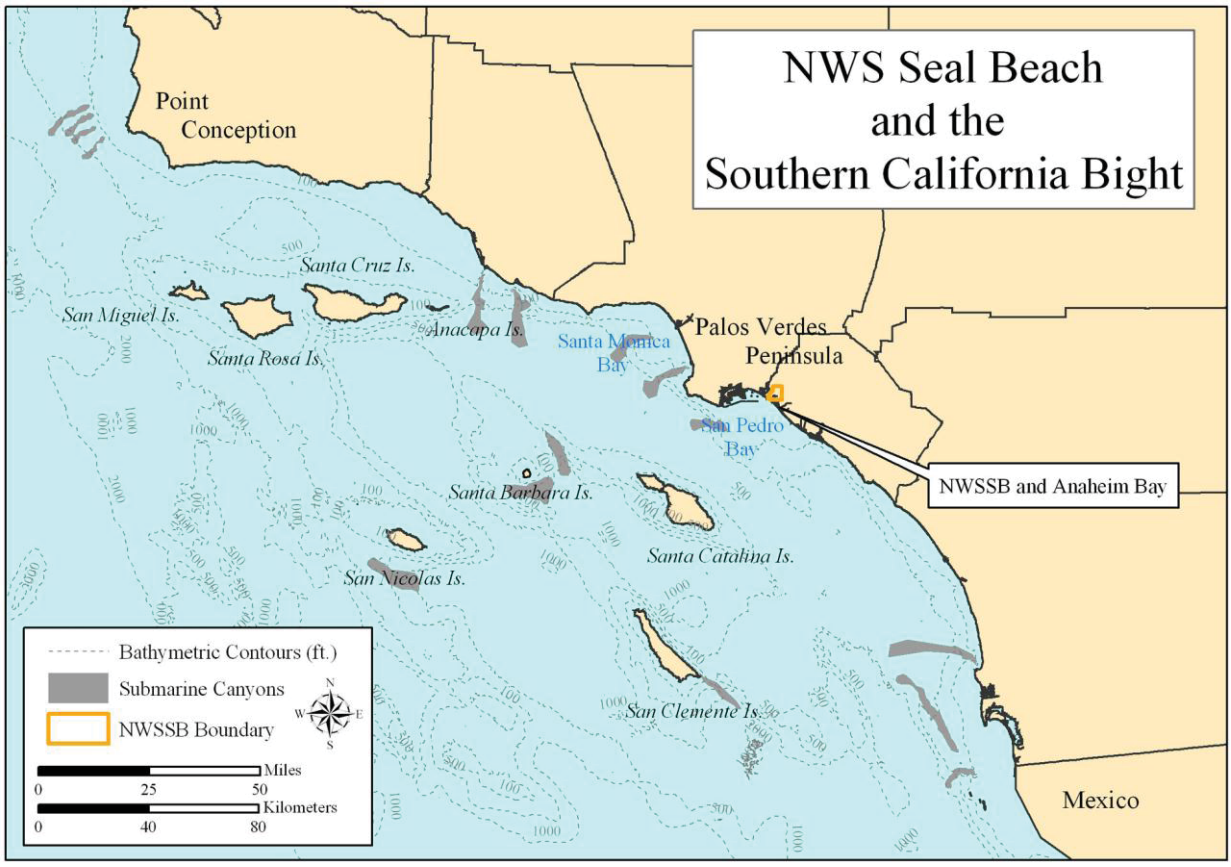
Similarly, subarctic and equatorial currents collide within the SCB to create regions of both warm and cool water. Sea temperatures fluctuate regularly due to the changing strengths of these currents. These temperature fluctuations are reflected by the rise and fall of plankton populations.

The Bight is also the landfall terminus of a complex underwater topography. A system of thirteen large and nineteen smaller submarine canyons, as well as offshore islands, provides habitat for a full range of species with different depth and temperature preferences. Special communities such as kelp beds add habitat structure in shallow water, fostering rich species assemblages.

In addition, the Bight's embayments, including Anaheim Bay, contain intertidal habitat and subtidal eelgrass habitat required by a number of fish species as rookeries. Eelgrass habitat is naturally scarce in southern California when compared to the east and gulf coasts. These ecological "edges" are even more limited today due to commercial development in the harbors and estuaries of the SCB, such as the largest one just north of NAVWPNSTA Seal Beach at Long Beach. Over 60 species of fish and 195 species of birds have been observed frequenting bays and estuaries within the Bight. The now-rare coastal marshes and wetlands serve as nurseries for fish and nesting and roosting grounds for many birds, including federally endangered species.

Today, about 40 salt marsh habitats occupying a combined area of about 12,000 acres can be found between Point Conception and Mexico (including the Channel Islands) (Murray and Bray 1993). Anaheim Bay is one of only six that have a large enough tidal flow to maintain continuous contact with the ocean (MacDonald 1977, cited in Murray and Bray 1993). The remainder is composed of marshes of smaller, shallower embayments that close periodically from the ocean, and experience more environmental extremes.

Because of extensive human modification of the coastline, and a low volume of freshwater drainage, expansive estuarine and salt marsh communities are absent from the SCB (Murray and Bray 1993), compared with the east coast which has large rivers that flow into the sea on a year-round basis-these systems can support a larger area of salt marsh. The low volume of fresh water in southern California makes salinities comparable to ocean water rather than more brackish with freshwater influence.



Map 3-6. Naval Weapons Station Seal Beach's relation to the Southern California Bight.

3.2.1 Historical Habitat Losses

Anaheim Bay's wetlands currently cover an area of about 1,300 acres. This area is just over a third of the estimated 3,253 acres area of the historical extent of the wetlands (2,452 acres of low marsh and 801 acres of high marsh) (USFWS and CDFW 1976). The chronology of these losses is detailed in Table 2-1. Photo 3-1 through Photo 3-4 show historical conditions of NAVWPNSTA Seal Beach lands. Following regional trends, most of this habitat loss has occurred in the intertidal, upland transition, brackish, and freshwater wetlands as they are more easily developed.

Historically, three to four sources contributed fresh water to Anaheim Bay's wetlands. Willows mostly likely lined the upland lengths of these riparian drainages, while tules and wetland scrub surrounded the more brackish downstream margins.

In addition to the loss of freshwater inputs, there was an additional entrance/exit for tidal waters on the northwestern margin of the wetlands. This tidal entrance was closed off by construction of Pacific Highway. Alterations like these, along with the dredging of Anaheim Bay, have drastically reduced eelgrass populations (Ho 1974, cited in Murray and Bray 1993).

With the closing of tidal entrances and exits, and the destruction of riparian areas that once contributed freshwater, large ecosystem level inputs of fresh water, sediment, organic material, etc., no longer are directed into the marsh. The lack of these inputs has had significant negative consequences for its productivity and biodiversity.

Photo 3-1. Aerial photo from 1928 showing the Naval Weapons Station Seal Beach marsh and adjoining uplands.

Photo 3-2. Aerial photo from 1928 showing portions of Naval Weapons Station Seal Beach and Huntington Harbor.

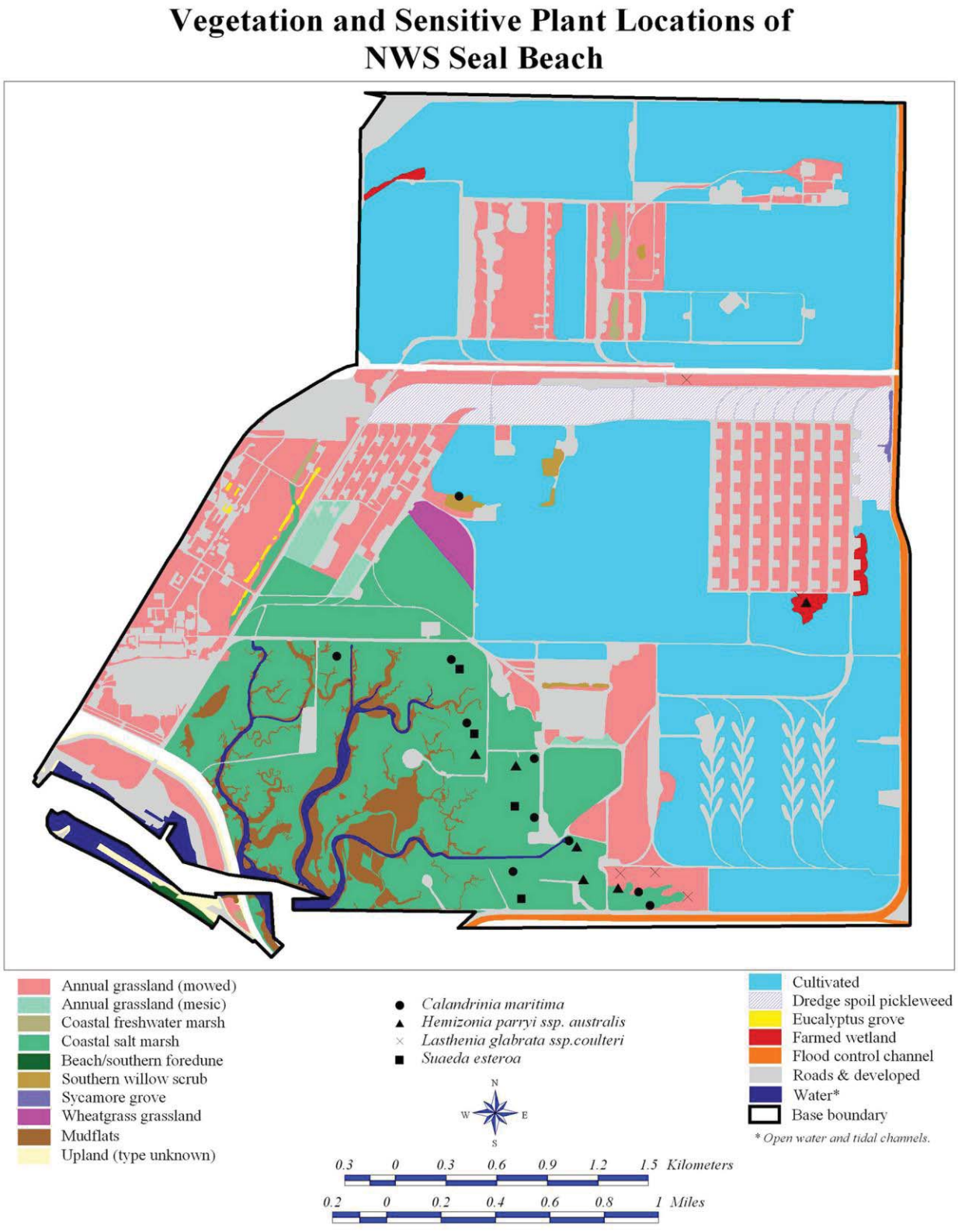
Photo 3-3. Aerial photo of Naval Weapons Station Seal Beach from 1955.

Photo 3-4. Oblique aerial of Anaheim Bay from 1964.

3.3 Vegetation Communities and Habitats

The distribution of different vegetation and habitat types within the estuary is a result of balance of geomorphic processes such as sea-level rise, sediment inputs, protection from wave energy, scour of tidal flow, etc. (Callaway *et al.* 2001, in Zedler 2001). In order for marshes to develop, there must be a relative balance between sediment accretion and relative sea-level rise, which is equal to eustatic sea level rise plus local changes due to subsidence or tectonic processes. Under conditions of relative balance of these factors, intertidal salt marshes tend to develop a flat marsh plain near the Mean High Water (Myrick and Leopold 1963; Pestrong 1965; Redfield 1972; Zedler *et al.* 1999).

Vegetation communities described here were mapped for the 1997 INRMP, with some adjustments, including a more accurately depiction of the distribution of mudflats and tidal channels within the salt marsh areas (Map 3-7). Vegetation community descriptions are based on Holland (1986) with supplemental information from Sawyer and Keeler-Wolf (1995). The salt marsh descriptions parallel those described in Zedler, Norby and Kus (1992). Plant nomenclature is from The Jepson Manual (Hickman 1993). See Table 3-4 for vegetation types.



Map 3-7. Vegetation and Sensitive Plant Locations of Naval Weapons Station Seal Beach. Plant locations are taken from DoN SWDIV 1997.

Table 3-4. Vegetation types at Naval Weapons Station Seal Beach.

Vegetation type	Acres	Vegetation Type	Acres
Annual grassland	731.7	Cultivated	1933.4
Annual grassland (mesic)	26.9	Dredge soil/pickleweed	170.2
Coastal freshwater marsh	8.1	Eucalyptus grove	4.6
Coastal salt marsh	771.3	Farmed wetland	14.2
Beach/southern foredune	24.7	Flood control channel	65.2
Southern willow scrub	11.6	Roads & developed	785.2
Sycamore grove	2.3	Water (and tide channels)	293.3
Wheatgrass grassland	21.0	Mudflats	126.6
Uplands (type unknown)	22.0		

3.3.1 Upland Communities

Upland communities consist of native and non-native grasslands, agricultural areas, ruderal fields, dredge spoil, natural and man-made islands, several inactive landfills, and maintained landscape and structures. Some riparian pockets of willows and sycamores are scattered sparsely within the uplands. Overlap of vegetation types occurs as salt marsh/upland mix in a transition zone in several areas along the salt marsh fringe.

3.3.1.1 Grasslands

Non-native grasslands are dominated by several species of the genus *Bromus*, along with *Avena* spp., rat-tail fescue (*Vulpia myuros*), and several other non-native annual grasses and annual forbs (Photo 3-5). Native grasses such as needlegrass (*Nassella* sp.) can also be found in varying densities within predominantly non-native grasslands. Mature native grasslands occur, dominated by *Nassella* sp. with relatively few non-natives in patches. Grasslands may contain some woody vegetation, but cover is predominantly herbaceous. Close to 580 acres on NAVWPNSTA Seal Beach is mapped as annual grassland.

A mesic phase of grassland occurs near wetland edges, and is dominated by native saltgrass (*Distichlis spicata*).

Photo 3-5. Upland community with planted wheatgrass dominating.

3.3.1.2 Ruderal

Further from the marsh edge, past and current disturbance of the land has led to the proliferation of weedy introduced plants in the fields, in dredge spoil deposits, and along levees and road edges. Common and locally dominant species include tumbleweed (*Salsola iberica*), mustards (*Brassica* spp.), and, most abundant in terms of total cover and distribution, exotic annual grasses. The grasses include ripgut grass, red brome (*Bromus rubens*), soft chess (*Bromus hordeaceus*), barleys (*Hordeum* spp.), fescues (*Festuca* spp.), and wild oats (*Avena* spp.). Additional species of regular occurrence include telegraph weed (*Heterotheca grandiflora*), sow-thistle (*Sonchus oleraceous*), sourclover (*Melilotus indicus*), white sweetclover (*Melilotus albus*), filaree (*Erodium cicutarium*), wild radish (*Raphanus sativus*), milk thistle (*Silybum marianum*), pigweed (*Chenopodium album*), curly dock (*Rumex crispus*), and London-rocket (*Sisymbrium irio*). A small number of native species, other than the salt marsh elements, are conspicuous for their local abundance, stature, or color. These natives include Emory's mulefat (*Baccharis emoryi*), lupine (*Lupinus* spp.), and fiddleneck (*Amsinckia intermedia*) (DoN SWDIV 1997).

3.3.1.3 Eucalyptus Grove

Eucalyptus woodland is a tree community composed of >50% *Eucalyptus* spp., ranging from single species thickets, with little or no understory, to scattered trees with a well-developed understory of herbaceous perennials and annual grasses (Photo 3-6). Often planted by early settlers for windbreaks or wood production, *Eucalyptus* spp. grow quickly and prohibit understory growth through allelopathic chemicals in the leaf litter. Eucalyptus, once established, will exclude most other plant species and tends to be a relatively depapaurate understory environment (McArthur 1962; Smith 1976).

Photo 3-6. Eucalyptus grove on Naval Weapons Station Seal Beach.

Eucalyptus groves are used by raptors for roosting, nesting and perching. Many raptors such as red-shouldered hawks (*Buteo lineatus*) and red-tailed hawks perch in the tops of these trees and search for prey in the surrounding marsh and grasslands. Pellets from barn owls (*Tyto alba*) are often found below roosting locations in eucalyptus trees, and often these trees are the only ones large enough to support the nests of large raptors such as golden eagles (*Aquila chrysaetos*).

Some migratory birds use eucalyptus trees as a nectar source, perhaps to their detriment (Williams 2002). North American leaf gleaners such as kinglets, vireos, and wood warblers do not possess, as their Australian counterparts do, bills that are sufficiently long enough to manage the sticky gum produced by the tree's flowers. Consequently, the gum clogs their faces, bills, and nares, eventually suffocating them or causing them to starve. In addition, eucalyptus may be creating sink populations for some species that breed in them. The Point Reyes Bird Observatory found that 50 percent of Anna's hummingbird nests in eucalyptus are shaken out by the wind, compared to 10 percent in native vegetation. Overall, species diversity may drop by at least 70 percent within eucalyptus groves (Williams 2002).

Four acres of eucalyptus grove are found in the developed western portion of the Station near the administrative center.

3.3.2 Riparian Woodlands

There are six small pockets of riparian habitat on NAVWPNSTA Seal Beach, which consist of willows or willows and sycamores in combination. The most extensive of these is located just to the north of the northern-most boundary of the Refuge. The entire stand covers less than an acre and is most conspicuous with its 24 or so arroyo willows *(Salix lasiolepis).* About half the trees attain heights approaching 25 feet. A few small stands of mulefat *(Baccharis glutinosa)* occur on one edge among scattered trees. Arroyo willow and mulefat are the dominant components of the other stands as well. The understory and edges of these stands consist mostly of ruderal field elements.

The riparian patches at NAVWPNSTA Seal Beach most closely resemble two communities as defined by Sawyer and Keeler-Wolf (1995). The Southern Willow Scrub community is defined by the presence of three willow species, Goodding's black willow (*Salix gooddingii*), red willow (*Salix laevigata*), and arroyo willow, as well as mulefat (*Baccharis salicifolia*). It occurs in areas with seasonal fresh water flooding or saturation along low-gradient depositions along rivers and streams (Sawyer and Keeler-Wolf 1995). This community is represented on NAVWPNSTA Seal Beach by small, deteriorated remnant patches (DoN SWDIV 1997) with a high percentage of exotic species.

Two acres of sycamore trees (*Platanus racemosa*) planted in a row on the northeastern edge of the Station are not considered a sycamore riparian community (Sawyer and Keeler-Wolf 1995) because they lack other riparian elements that make up this community, including riparian geomorphology. Typically, such a community would be composed of widely spaced California sycamore trees sometimes interspersed with willows, oaks and cottonwoods in corridors where the alluvial or rocky soils are permanently saturated at depth with fresh water.

3.3.3 Southern Foredune and Sandy Beaches

The shoreline is a dynamic environment, subject to wind and wave turbulence, salt spray, shifting sands, high temperatures, and desiccation. Prior to extensive development of the California coastline, dunes acted as a buffer in the unstable zone between the tidal and upland environments. A number of plants and animals have become adapted to this dynamic environment and are found only on dunes or beaches. Sandy beaches are more strongly zoned than mudflats (Castro and Huber 1997), because they tend to have a steeper topographic gradient and because the sand's coarse grain sizes allows for rapid leaching and evaporation.

Plants of the coastal strand habitats are adapted to sandy soils. These soils are characterized by low water-holding capacity, low fertility, low humus content, and high concentrations of sea salts (Schoenherr 1992; Holland and Keil 1995). Many of the plants that inhabit coastal strand environments have taproots, enabling them to reach fresh water at depth. They are also commonly prostrate, and many are succulent. Over time, wind-blown sand will accumulate under and around coastal strand vegetation, gradually building up distinctive sand hummocks and dunes. Plants typical of the coastal strand include dune buckwheat (*Eriogonum parviflorum*), beach ragweed (*Ambrosia chamissonis*), red sand verbena (*Abronia maritima*), and beach evening primrose (*Camissonia cheiranthifolia*) (Schoenherr 1992; Holland and Keil 1995).

Seaward from coastal strand habitats, foredunes are situated closest to the seashore are subject to the greater degrees of salt stress, wind, and wave action. Primary foredune species are red sand verbena, pink sand verbena (*A. umbellata*), Watson salt bush (*Atriplex watsonii*), and sea rocket (*Cakile maritima*). Within the foredune, plant diversity tends to increase with distance from the beach, with less salt tolerant species becoming more abundant, particularly species of *Artemisia*, *Baccharis*, *Ericameria*, *Eriogonum*, *Lotus*, *Lupinus*, and *Salvia* (Holland and Keil 1995). Naval Weapons Station Seal Beach has 21 acres of foredunes.

Human disturbance of coastal strand and foredune habitat has resulted in the decline of some native species, such as lemonade berry (*Rhus integrifolia*), while several exotics, such as hottentot fig (*Carpobrotus edulis*), sea rocket, Australian saltbush (*Atriplex semibaccata*), and ice plant have become more common (Photo 3-7).

Photo 3-7. Ice plant on dune.

The 21 acres of southern foredunes on NAVWPNSTA Seal Beach and their adjacent beaches have the potential to support specialized invertebrate fauna, such as the wandering skipper *(Panoquina errans),* tiger beetles (*Cincedela* spp.), and the globose dune beetle (*Coelus globusus),* sand spiders, robber flies, kelp flies, and ants. In addition, beaches serve as important habitat for nesting, roosting, and foraging birds, including the federally endangered California least tern (*Sternula antillarum browni*) and federally threatened western snowy plover (*Charadrius alexandrinus nivosus*). The plover also uses coastal dunes for roosting outside of nesting season. Belding's savannah sparrow (*Passerculus sandwichensis beldingii)* feeds on dune and beach insects. Other sensitive plant and animal species that have the potential to inhabit dune and beach areas of NAVWPNSTA Seal Beach include coast woolly-heads (*Nemacaulis denudata* var. *denudata*), San Diego horned lizard (*Phrynosoma coronatum blainvillei),* San Diego black-tailed jackrabbit (*Lepus californicus*), and coast horned lark (*Eremophila alpestris*). Dunes also provide habitat for the silvery legless lizard (*Anniella nigra argentea =Anniella pulchra pulchra*) (DoN SWDIV 1997).

3.3.4 Coastal Freshwater/Brackish Marsh

Naval Weapons Station Seal Beach contains about ten acres of non-tidal freshwater marsh (Photo 3-8). They are generally contiguous with the upland side of the salt marshes and are occupied by southern cattail *(Typha domingensis*), mulefat, and prairie bulrush (*Scirpus robustus*). Freshwater marshes their associated upstream riparian have been severely impacted both by development and from reduced fresh water input from rivers and creeks.

Photo 3-8. Fresh water marsh on Naval Weapons Station Seal Beach.

3.3.4.1 Upland Transition Marsh

Near the edge of the marsh, salt-laden fields contain vegetation typical of a salt flat or lower transition zone with an additional ruderal weed component. Common plants found in these areas include pickleweed (*Salicornia virginica* and *Salicornia subterminalis*) and the higher marsh grasses, along with fivehorn smotherweed (*Bassia hyssopifolia*), slender-leaved iceplant (*Mesembryanthemum nodiflorum*), crystalline iceplant (*Mesembryanthemum crystallinum*), and Australian saltbush.

In other areas, the upland transition represents a gradient between the upper marsh and coastal scrub community (Zedler *et al.* 1992). The lower end of the transitional zone is characterized by glasswort, salt grass, shore grass, alkali heath *(Frankenia grandifolia*), and alkali weed (*Cressa truxillensis*), while the upper transition zone is characterized by Australian salt bush, California buckwheat, laurel sumac (*Rhus laurina*), lemonade berry, and sage (*Salvia* and *Artemisia* species) (Zedler *et al*.1992; Holland and Keil 1995).

3.3.5 Coastal Salt Marsh

Coastal salt marsh assemblages comprise the majority of habitat found within SBNWR. About 739 acres of the Refuge's 911 acres are subject to regular tidal influence, creating a salt marsh environs that includes about 565 acres of salt marsh vegetation (USFWS and DoN 1990).

Nineteen species of vascular plants regularly occur in the salt marsh (Baker 1975) with 12 of these comprising the majority of the vegetation (Massey and Zembal 1980). Most of the lower marsh within the regularly inundated tidal zone is heavily dominated by cordgrass (*Spartina foliosa*) and pickleweed (*Salicornia virginica*). Also present is saltwort (*Batis maritima*) and annual pickleweed (*Salicornia bigelovii*).

Intact salt marsh habitat provides nesting, feeding, and a high-water escape area for many species of birds, as well as food and cover for fish and invertebrates. The California state endangered Belding's savannah sparrow nests in patches of pickleweed or boxthorn in some areas, and forages in salt marsh and intertidal flats. The federally endangered light-footed clapper rail depends entirely on salt marsh habitat for feeding, resting, and nesting, especially in cordgrass thickets.

3.3.5.1 Biological Zonation of the Salt Marsh

Intertidal wetlands are structured by their degree of tidal inundation, freshwater inflows, sediment inputs, sea-level rise, subsidence, storm impacts, and other extreme events (Callaway *et al.* 2001). Plant species have adapted differentially to these factors, resulting in the formation of distinctive vegetative zones. Zedler *et al.* (1992) has termed these zones lower, middle, upper marsh, and upland transition. The plant species that occupy these zones are depicted in (Figure 3-5).

As is typical in other estuarine environments in southern California, there is a lack of abundant higher marsh at NAVWPNSTA Seal Beach. Because the higher portions of the salt marsh are generally inundated less often by tides, they have been the easiest to fill for development. Most of the higher marsh that remains on SBNWR occurs in narrow strips along the edges of the road fills, along old berms in the marsh.

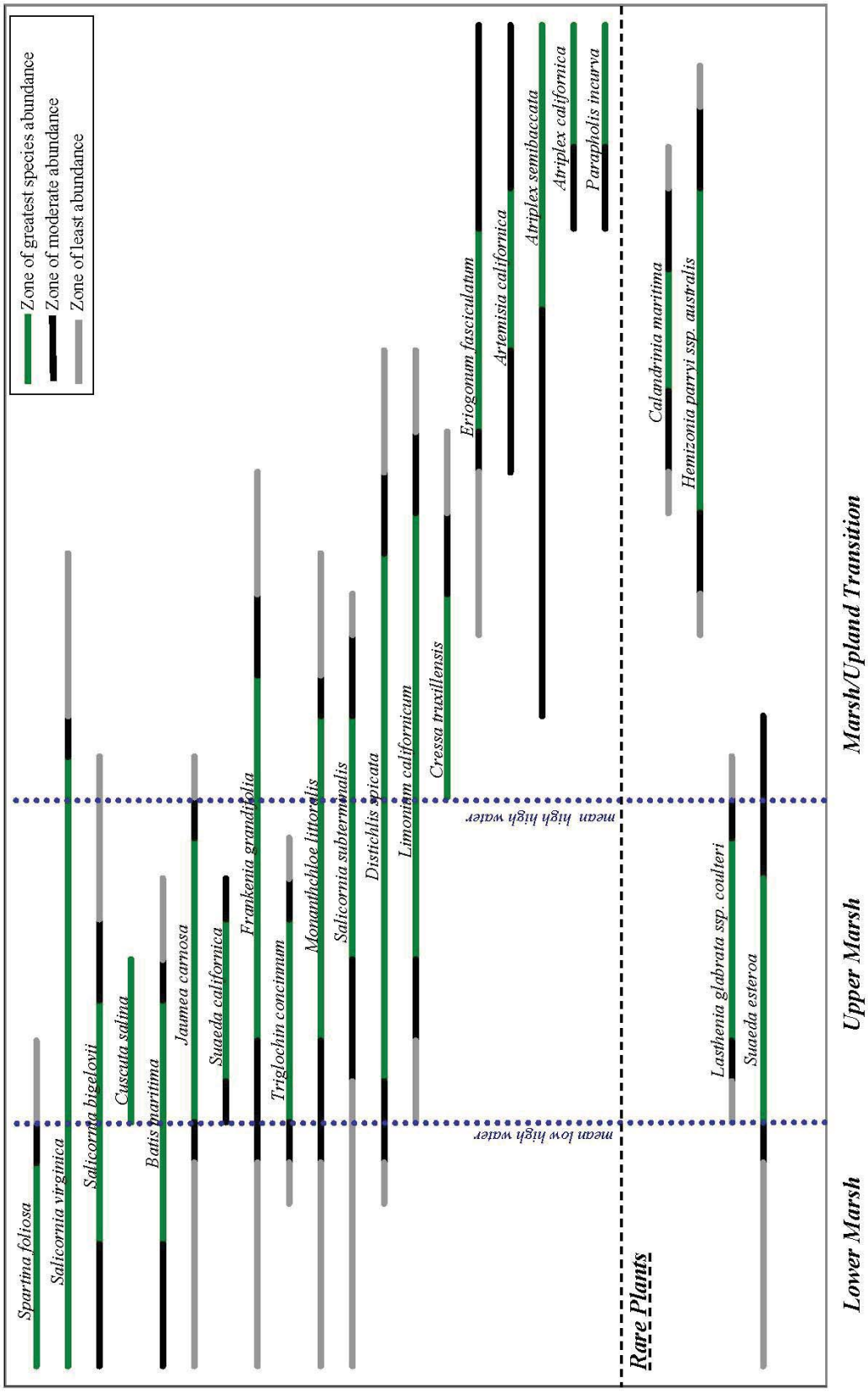


Figure 3-5. Vegetation zonation patterns in salt marsh habitats.

3.3.6 Tidal Channels and Intertidal Mudflats

The intertidal habitat encompasses the area between high and low tides and is subject to varying degrees of tidal submergence. About 60 acres of mudflats are regularly exposed at lower tides, with about 114 acres of tidal channels and open water (USFWS and DoN 1990). The principal vegetation here is mat algae.

Intertidal flats occur between the highest high and lowest low tide zones, or otherwise between the lowest cordgrass (beginning of the salt marsh) and highest eelgrass, approximately 3 to 0 feet (1 to 0 meters [m]) mean lower low water (MLLW). A well-developed mudflat is anaerobic within the sediment due to a lack of significant wave action. Sand flats remain aerobic and typically experience more turbulence from waves, preventing development of permanent burrows. Tidal channel networks (for example see Photo 3-9) play an important role in the distribution of marsh species as small differences (e.g. 3.9 inches [10 centimeters (cm)]) in elevation can greatly influence the duration of tidal inundation and potentially stress salt marsh plants.

Photo 3-9. Marsh tidal channel.

Mudflats contain abundant organic matter and microorganisms, but typically less so than eelgrass beds or salt marsh. Normally devoid of flowering plants, these flats may be covered with algae. Toward the uppermost elevations, green algae such as *Enteromorpha* sp., *Cladophora* sp. and *Ulva* spp. may form extensive mats (Mudie 1970). Burrows and siphon-holes of benthic invertebrates, tiny invertebrates that live among the grains of substrate (meiofauna), and algae and detritus fill the sediment with hidden activity and form an important component of the marsh's food chain. Snails, crabs, and polychaete worms (deposit feeders) glean the surface for detrital bits and algae. Filter-feeders such as clams, mussels, and small crustacean isopods and amphipods collect plankton, algae, and detritus as tides ebb and flow.

When the tide flows, numerous fishes, sharks, and rays move in to take advantage of the productivity of the flats. While most mudflat fishes are tidal visitors, and some remain at low tide in shallow drainage channels, a short list of species are full-time residents. These commonly live in the burrows of marine invertebrates (Moyle and Cech 1982). Other fishes are seasonal visitors during juvenile life stages. Studies on tidal flats elsewhere have demonstrated that it is frequently only the juvenile decapod crustaceans such as shrimp and demersal fish that

forage on tidal flats while the adults and pelagic larvae stay offshore. The tidal flats function as nurseries for the resident juveniles and the subadults, which migrate to the subtidal area to avoid low tide conditions on the flats. While relatively constant salinities and temperatures in offshore waters benefit larval development, these larvae eventually drift onto tidal flats so that the juvenile stages of these fish may take advantage of high temperatures, abundant food, and the absence of large predators (Reise 1985). The tidal channels support important nurseries for several species of sport and commercial fish like the California corbina (*Menticirrhus undulatus*) and California halibut (*Paralichthys californicus*) which are important links in a much larger food chain that includes man.

When the tide recedes, shorebirds congregate sometimes by the thousands to consume invertebrate prey. Each species specializes in a certain zone, evident by the length of its bill and feeding behaviors that help access the different lifestyles and niches of mud-dwelling species. Shorebirds are the most visible species depending upon intertidal habitat for feeding, roosting, and resting. Boland (1981) consistently found the highest densities of nearly all shorebirds in intertidal flats and channels; likewise, Kus and Ashfield (1989) observed that the majority of large and small waders seen during low-tide surveys occurred in those habitats (citations from Zedler *et al.* 1992).

3.3.7 Man-Made Landforms within the Marsh

3.3.7.1 Oil, NASA, and Hog Islands

When the Navy acquired lands for NAVWPNSTA Seal Beach, mineral rights were retained by the former owner, the Alamitos Land Company. In 1954, Hancock Oil Company began extracting oil under the marsh from the 6.5 acre "oil island". The island is connected to both Pacific Coast Highway and Bolsa Avenue (on Navy land) by roads built atop fills through the marsh. The island is completely developed with very little vegetation occurring only along the access levees. Nonetheless, there are plans for reclaiming the site as an additional least tern nesting site once oil resources are spent.

From 1963 through 1974 a 40-acre section of the Station was granted to the National Aeronautics and Space Administration (NASA) for design and manufacture of the second stage of the Saturn V rocket as part of the Apollo program. The massive rocket stages were assembled in special extant multi-story structures currently utilized by the Station (NAVWPNSTA Seal Beach 2002).

As part of the NASA program, the 2.9 acre NASA Island was built in the marsh for rocket testing and remained until 1977, when it was turned over to the USFWS for conversion to a nesting site for California least terns (see Figure 1-11). Leveling and sand capping of NASA Island resulted in a nesting site safe from development, consistent with the California Least Tern Recovery plan (USFWS 1985a). A mix of sand and shells, similar to that found on southern California beaches, was used to cover the site. California least terns first nested on NASA Island in 1979 after about 5 percent of the island was capped with sand. Full capping was eventually completed, and in 1996 an additional 3,000 cubic yards of sand from Shellmaker Island in Newport Beach, California, was used to enhance 2.6 acres of the island. Nesting has occurred annually since 1979.

Hog Island is the only natural island in the marsh. It contains a plant community reminiscent of upland transition marsh with elements of coastal sage scrub. There have been efforts to control exotics on Hog Island, which is an archeological site.

3.3.7.2 Port of Long Beach Mitigation Ponds

In the early 1990s, POLB restored 116 acres of wetland habitat within SBNWR as mitigation for the construction of the 147-acre Pier J Landfill in a protected, deep-water area of Long Beach harbor. The new wetland habitat consisted of four tidal basins with tidal channel connections to Anaheim Bay, constructed from upland and former wetland areas with little to no marine influence. A small salt marsh area present before development was retained in one of the ponds. The ponds were completed in March–April 1990. For three of the sites, culverts were constructed through existing road beds to provide tidal flushing. Their design was documented in an MOU between the Board of Commissioners of the city of Long Beach, CDFW, NMFS, and USFWS (MEC Analytical Systems 1995).

The four ponds placed around the marsh perimeter are described as follows (MEC Analytical Systems 1995):

- *Forrestal (14.4 acres).* Surrounded on three sides by roads, has a flat upland field on the northern boundary, no islands. See Photo 3-10. *Case Road (52.4 acres).* Three artificial islands, each with several higher mound areas. Pre-development pickleweed marsh retained on west side. Upland on northeast side. Construction involved excavating a channel to provide tidal flow to both this site and Forrestal. See Photo 3-11.
- *Seventh Street (41.3 acres).* Three artificial islands with several mounds on each.
- *Perimeter Road (7.5 acres).* Surrounded on all sides by natural, pickleweed salt marsh. Perimeter and Seventh Street ponds are connected to tidal flow by a common, man-made channel that joins a natural channel.

An MOU between the Board of Commissioners of the city of Long Beach, CDFW, NMFS and USFWS specified the design of the wetlands. It stated that 50 percent of the acreage would be subtidal, its elevation averaging -3.0 feet MLLW; not more than 35 percent of the acres were to form slopes between +2.5 and -3.0 feet MLLW (low intertidal) and not more than 15 percent of the acres would be islands with average elevations between +2.5 and +5.5 feet MLLW (high intertidal). The ponds have become important eelgrass habitat.

3.3.7.3 Anaheim Harbor

Anaheim Harbor is linked by waterway to the 63 acres comprising Sunset Aquatic Regional Park owned by Orange County, and to 900 acres which comprise the privately-owned Huntington Harbor, a marine-oriented residential community. In January of 2000 the controlling depths in Anaheim Harbor were 35 feet in the entrance channel to the turning basin, thence 33 feet to the basin (NOAA National Ocean Service U.S. Coast Pilot 7, 2000).

Photo 3-10. "Bolsa Cell" mitigation pond.

Photo 3-11. Port of Long Beach "Case Road" mitigation pond.

There has been an ongoing problem of floating trash entering the Anaheim Bay marsh. Much of the floating trash originates in Huntington Harbor, entering the system from boats or adjacent areas. A more rigid enforcement of laws prohibiting deposition of refuse in state waters as well as a program of collecting refuse is one possible solution to this problem. Installation of a trash boom to keep trash out of the marsh was proposed; however, this proposal was rejected.

Eelgrass Beds

Eelgrass beds share many species with higher-elevation marsh habitats and are recognized as key areas that provide subtidal refugia and foraging. Eelgrass is present subtidally in channels and in all the POLB mitigation ponds. The modern eelgrass beds associated with Anaheim Harbor are programmed for survey and mapping.

3.3.7.4 Artificial Hard Substrate

The waterways of inner and outer Anaheim Bay, as well as Huntington Harbor, are fully bulkheaded or riprapped. The Inner Harbor contains a 1,000-foot wharf and its maintenance buildings are situated on the northeast embankment. The Outer Harbor is created and protected from wave action by two rock jetties that extend 2,800 feet out into the ocean and angle toward each other, leaving a 600-foot wide opening for boat passage. The rock is granite and the jetties are 100 feet wide at their base and 15 feet wide above water. Neighboring Huntington Harbor is also dredged, channelized, 95 percent bulkheaded, and devoted exclusively to marine-oriented living and recreation (USFWS and CDFW 1976). In 2009-2010, a year-long baseline surveys was conducted within Anaheim Bay to assess avian use. Over 75 species were noted during these monthly surveys utilizing a variety of habitats from open water, sandy beach, and rocky shore (R. Schallmann, *personal Communication, 2013*).

All of the man-made structures support invertebrates and seaweeds, including, probably, certain exotic species. Native and non-native lobster, crabs, worms, mussels, barnacles, echinoderms (starfish, sea urchins), sponges, sea anemones, and tunicates (sea squirts) are all known to inhabit artificial structures. These areas may also provide refuge and feeding areas for certain juvenile and predator fishes, such as perches, basses, dogfish, opaleye, and croaker. A hardened shoreline typically produces a very steep shore profile that can provide elevated roosting sites for waterbirds to conserve energy and avoid harsh weather conditions (Ogden 1995). Floating structures in shallow water, which are relatively undisturbed by human activity, are used for roosting and foraging by waterbirds such as brown pelicans, cormorants, and gulls (Ogden 1995).

The SCCWRP is currently documenting the coastal zone within the SCB to identify coastal type, such as rocky, sandy, vegetated or armored, and structures, such as seawalls, jetties, groins, breakwaters, and piers. This inventory will be used as baseline data for the current condition of the shoreline, and will be compared with a 1977 inventory completed by the Department of Navigation and Ocean Development to assess how coastal management and development has evolved with respect to shoreline change over the last twenty years.

3.3.8 Historical Habitat Restoration Projects

The wetlands of southern California are of vital economic, ecological, and hydrological importance to the region. Because between 70 to 75 percent of coastal wetlands have been lost due to coastal development, conservation and restoration of the remaining fragments has been a key concern for an extensive list of partnered land managers at the international, federal, state, county, non-, and quasigovernmental levels (SCWRP 2007). These groups work together to implement education, conservation, and restoration projects within the wetlands of the SCB, including those at NAVWPNSTA Seal Beach.

A variety of wetland restoration projects have been implemented at NAVWPNSTA Seal Beach over the last 30 years. The following sections detail the restoration efforts made to date at NAVWPNSTA Seal Beach to inform planning efforts for future enhancement projects.

Tidal Flow Restoration

The construction of Case Road in the mid-1950s isolated a 35 acre wetland parcel from the remainder of the marsh system. In an effort to restore this area, in 1977 a screw-type tidegate and headwall were installed along Case Road to increase tidal flow back into the 35 acre parcel. The tidegate and headwall allowed for an influx of sea water during cool months and a restriction of tidal flow during warmer months when mosquito breeding occurs. A seasonal tidal flushing schedule was developed with the Orange County Vector Control District to avoid creating potential mosquito breeding habitat while still promoting the enhancement of wildlife and vegetation in the area (USFWS and DoN 1990).

Upland Enhancement

In 1997, NAVWPNSTA Seal Beach undertook an upland enhancement project in the extreme north portion of the Refuge in 1977 that included crested wheatgrass, a non-native bunchgrass. About 70 acres of fallow ground, consisting mainly of annually disked weedy plant species, was planted with vegetation more suitable as food and cover for wildlife.

Additional upland restoration has taken place as part of volunteer programs and events in recent years. Periodic volunteer programs with the Seal Beach National Wildlife Refuge and Friends of Seal Beach National Wildlife Refuge have resulted in several acres of restored upland transitional habitat. From 2003 through 2013, annual National Public Lands Day events that focus on these types of restoration projects have been funded through the Legacy program.

These restored areas provide shelter and forage for a wide variety of organisms including the sensitive burrowing owl and black-tailed jackrabbit.

Marsh Restoration

In 1981, the Navy in coordination with USFWS and CDFW replaced collapsed metal culverts under Bolsa Avenue. The project resulted in improved tidal flushing to 52 acres of salt marsh habitat previously isolated from the main marsh by Bolsa Avenue. The increased tidal flow and reduced tidal exchange lag time stimulated cordgrass growth and created an exposed mud flat during low tides. Shorebirds, waders, and other water-associated birds now regularly forage in this area. In April 1981, following project completion, use of the area by a light-footed clapper rail was first documented (USFWS and DoN 1990).

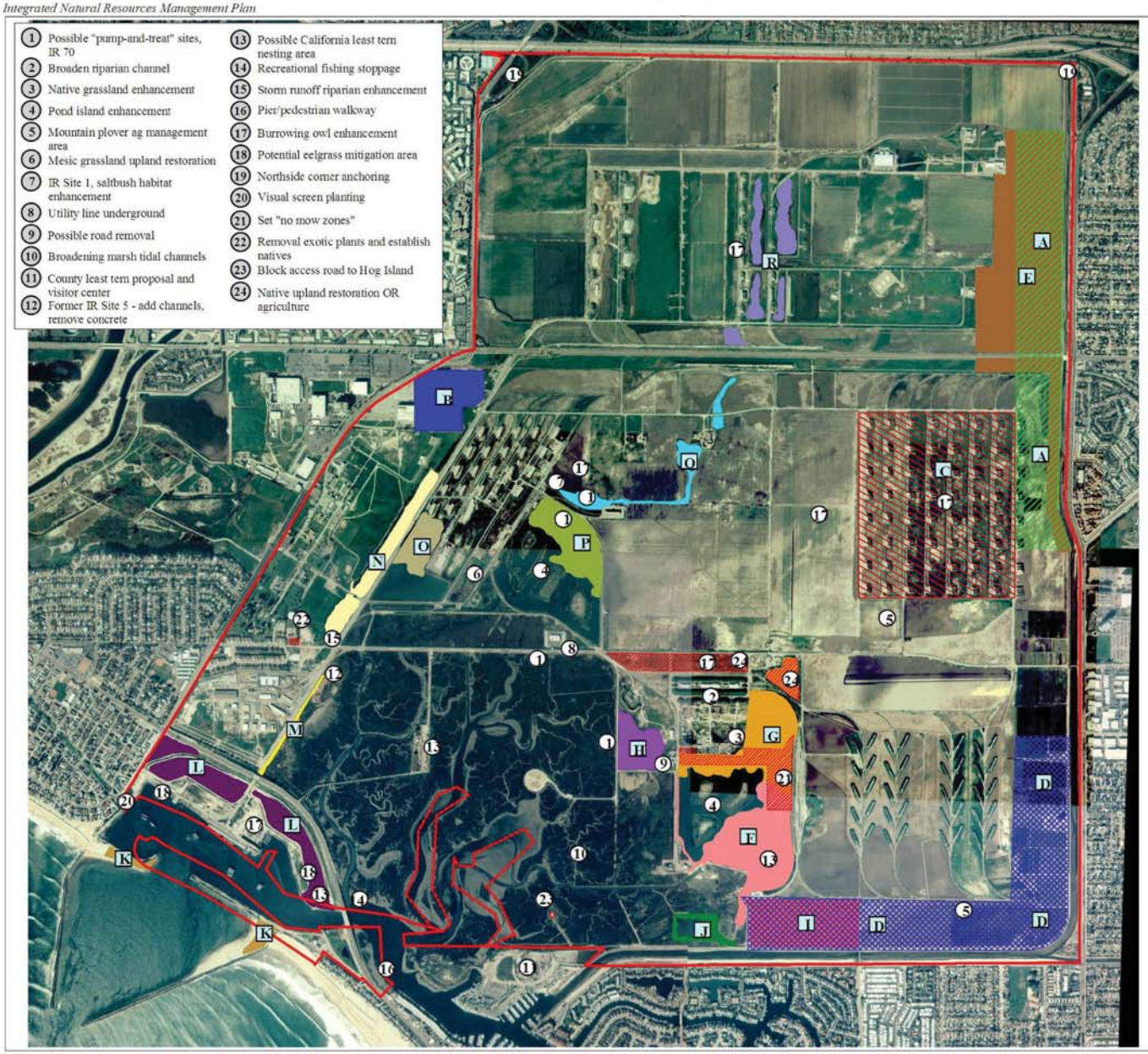
During 1981 and 1982, NAVWPNSTA Seal Beach undertook the largest marsh restoration project to date on SBNWR. This project enhanced and reclaimed about 103 acres of degraded wetland and historical marsh cut off from tidal influence for so many years that it had converted to upland vegetation. Open water, mud flat and vegetated salt marsh resulted from this enhancement project. Increased tidal flushing and benefits to endangered and other species resulted from the removal of 1.1 miles of road from within the marsh, allowing regular tidal flushing of the area east of Case Road. Three ponds also were created, each about 2 acres in size and 18 inches deep, to provide fisheries and foraging areas for California least terns and other birds, as well as mosquito control. Thirty-six nesting mounds for light-footed clapper rails were constructed at the +8.5 MLLW elevation, high enough to protect clapper rail nests from being flooded by extreme high tides. In addition, six islands, each about 91 feet long and protected from high tides, were made available for roosting and nesting birds. To accelerate channel formation and restoration, level ditches were scraped along old tide channel courses. The year the project was

completed, clapper rail activity was documented in the restored area. The project resulted in extensive bird use by both migratory and resident species (USFWS and DoN 1990).

1997 INRMP Restoration Project Proposals

The 1997 INRMP proposed 14 major and eight minor restoration projects (Map 3-8). The proposals can be grouped as follows:

- Hazardous materials cleanup for which natural resource benefits could be obtained (IR sites 3, 4, and 5). These were rated first priority for implementation due to the mandate for cleanup and funding availability through the IR implementation process. Site 3 (a cleaning water settling pond) cleanup has since been completed. Site 4, completed, involved cleanup of waste oil applied for dust control along the perimeter road. Site 5, completed, was a former construction and debris landfill that was found to contain abandoned ordnance. This site was cleaned and allowed to regain its vegetation naturally. (R. Schallmann, pers. comm. 2011)
- Establish riparian and freshwater wetlands for urban runoff filtration and control (Priority 2 1997 INRMP projects 2, 9, 10, 13, and 14; totaling 31 acres). These projects were designed to link up the disconnected fragments of riparian and freshwater habitat by excavating depressions to collect runoff to foster wetland and riparian growth. Areas of restricted drainage on the northern part of NAVWPNSTA Seal Beach would be cleared and allowed to establish as wetlands by eliminating mowing. The Bolsa Chica Flood Control Channel would have storm flows diverted into existing isolated wetlands. The only proposed impact to agriculture is to establish a riparian linkage between Case Road and Eighth Street. Compensation for the loss of land for agriculture would be made through relaxed irrigation runoff restrictions made possible by improved runoff storage and treatment by the restored wetland habitats.
- Habitat enhancement by restoring tidal hydrology to the POLB mitigation ponds (Priority 3 1997 INRMP projects 1, 11, and 12). The proposals were to re-grade the mitigation pond banks and boundary roadways to be more gradual in slope to restore a more natural habitat transition from subtidal to upland. About 14.3 acres of subtidal habitat would be converted to salt marsh, with the reduction in subtidal habitat offset by the construction of 14.5 acres of subtidal creeks and channels in the restored marsh. In addition, former salt marsh areas with blocked tidal access would have barriers removed to restore tidal flows.
- Habitat enhancement for upland buffer and dune sites (Priority 3 1997 INRMP projects 6, 7, and 8). Native uplands and wetland transition habitats are lacking, so these projects are intended to install upland transition buffers around the marsh in locations that do not interfere with agricultural operations, which are an important revenue resource for NAVWPNSTA Seal Beach as well as a source of in-kind grounds maintenance work. Annual grasslands would be converted to maritime scrub around the ship basin and in other locations along wetland margins. About six acres of foredune on the beaches of Anaheim Harbor would be weeded and restored.
- Small-scale, perhaps temporary upland enhancement projects involving weed removal, changes in mowing regime, and some reseeding. Several small-scale restoration projects were completed around the margins of the wetlands in conjunction with National Public Lands Day for the past five years and more are scheduled in 2009 (R. Schallmann, *pers. comm.* 2009).



Naval Weapons Station Seal Beach
Proposed Projects
April 9, 2003

2003 INRMP Proposed Projects*

- Small Restoration Sites (weeding, planting, mowing stoppage)
- A: Orange County Flood Control (natural treatment system)
- B: Site 70 "Pump-and-Treat"
- C: Bunker Soils and Vegetation Management
- D: Perimeter Marsh Expansion
- E: Shrub Planting
- F: Seventh Street Pond South
- G: Seventh Street Pond North
- H: Skeet Range Cell
- I: Bolsa Channel Perimeter Cell
- J: Perimeter Pond
- K: Entrance Channel Beach Restoration
- L: Harbor Sensitive Habitat Creation
- M: Kitts Highway Upland Restoration
- N: Salt Marsh and Maritime Scrub on the Kitts Highway Drainage
- O: Forrestal Pond Marsh and Upland Restoration
- P: Case Road Pond Marsh and Upland Restoration
- Q: Westminster Avenue Riparian Linkage
- R: Northside Riparian/Freshwater Marsh Habitat Cells

**For brief description of lettered items refer to text.*

- Base boundary
- Estimated Navy/State lands boundary (based on Real Estate Map ca. 1980).

N W E S

0.5 0 0.5 1 *Kilometers*

0.2 0 0.2 0.4 0.6 0.8 1 *Miles*

Map 3-8. Proposed projects on Naval Weapons Station Seal Beach, including 1997 INRMP restoration plan.

This Page Intentionally Blank

3.4 Jurisdictional Wetlands

A regulatory jurisdictional determination (Merkel & Associates 2006) was conducted on NAVWPNSTA Seal Beach in 2005 to identify regions on which expulsions of dredged and fill materials could be subjected to regulation under section 404 of the CWA (Federal Water Pollution Control Act, P.L. 92-500, as amended. 33 U.S.C. 1344). Merkel & Associates (2006) identified nine types of wetland and non-wetland water environments (Table 3-5 and Map 3-9). These are described below.

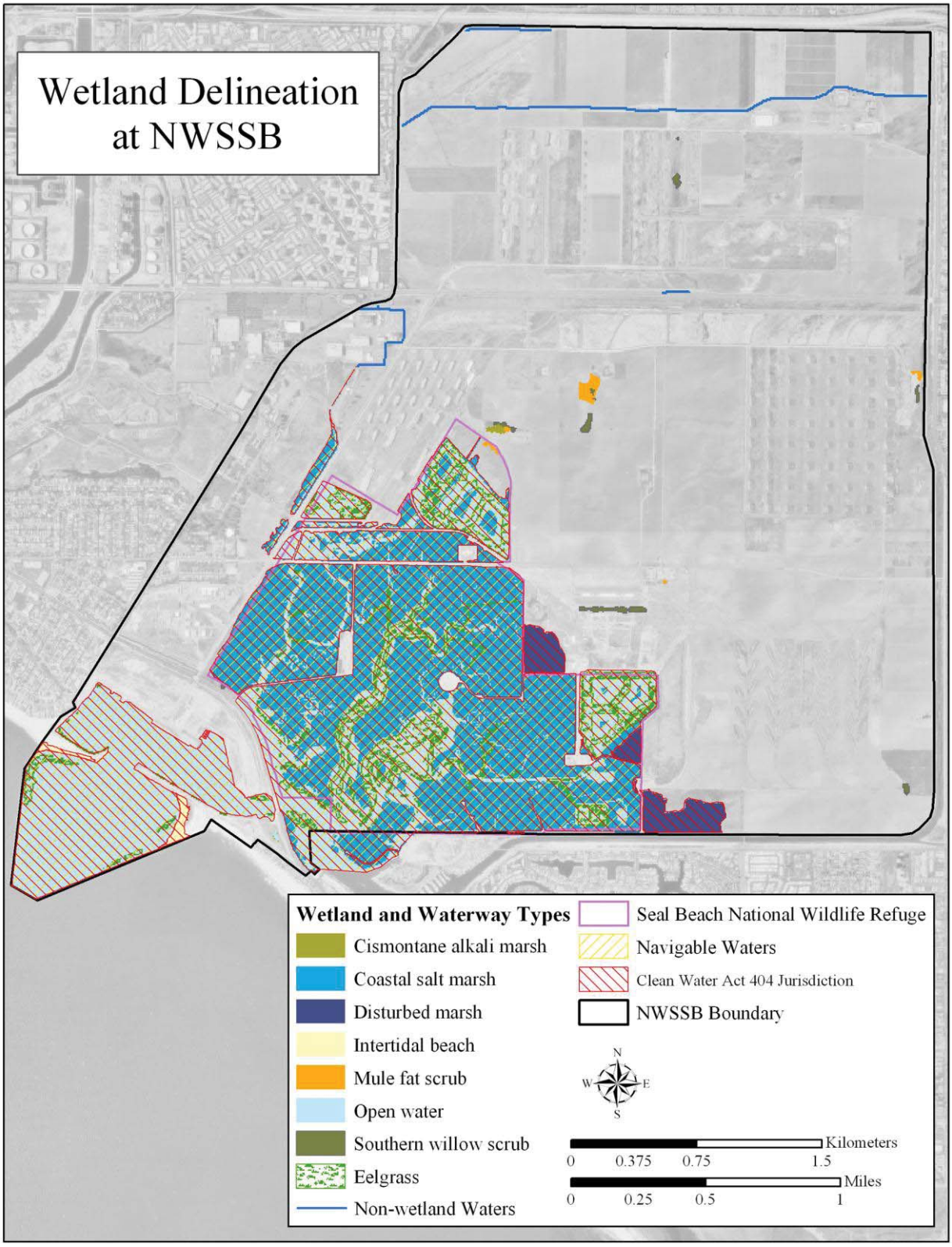
A total of 1,373 acres of Jurisdictional wetlands were delineated, comprised of the six distinct wetland types. An additional 11 acres were mapped as Non-Jurisdictional wetlands (Table 3-5).

*Table 3-5. Jurisdictional wetlands at Naval Weapons Station Seal Beach (Data Source: Merkel & Assoc. 2006). *Note that the acreages depicted here were not calculated based upon the current real estate boundary of the NAVWPNSTA Seal Beach being used elsewhere in this Integrated Natural Resources Management Plan. The acreages will be adjusted and a map generated upon receipt of the GIS layers.*

Habitat	Habitat ACOE Jurisdictional (acres)*	Non-jurisdictional (acres)*	Total (acres)*
Open Tidal Waters/Mudflats	595.66	-	595.66
Eelgrass Beds	108.16	-	108.16
Intertidal Beaches	6.25	-	6.25
Coastal Salt Marsh	618.58	-	618.58
Disturbed Coastal Salt Marsh	41.92	-	41.92
Cismontane Alkali Marsh	-	1.09	1.09
Southern Willow Scrub	-	5.3	5.3
Mulefat Scrub	-	4.83	4.83
Non-wetland Waters of the U.S.	2.12	-	2.12
Grand Total	1,372.69	11.22	1,383.91

- Areas classified as open tidal water/intertidal mudflats included all unvegetated areas that are permanently inundated by tidal marine waters at all tidal stages, as well as intertidal areas comprised of mudflats. These areas include most of Anaheim Bay and the Huntington Harbor entrance channel as well as most of the larger tidal channels and tidal ponds within the coastal salt marsh areas of SBNWR.
- Eelgrass beds occur in waters below the approximate MLLW and shallower than roughly 15 feet below MLLW. The eelgrass beds located on this property are widely distributed within the superficial tidal waters of Anaheim Bay, the Huntington Harbor entrance channel, and inside the tidal channels and ponds of SBNWR.
- Along the margins of open tidal waters are unvegetated intertidal shorelines comprised of sandy beaches. These areas are located between the lowest low tides and the highest high tides, except where vascular vegetation occurs within the intertidal region. Sandy beaches are characteristically found in the sphere of outer Anaheim Bay.

- Southern coastal salt marsh is the most common wetland habitat within the base boundaries and primarily made up of pickleweed, jaumea (*Jaumea carnosa*), alkali heath, and saltwort. This vegetation type most commonly appears within the tidal flats adjacent to Anaheim Bay.



Map 3-9. Wetlands identified as part of the 2005 delineation (Merkel and Associates 2006).

- Areas of disturbed coastal salt marsh sustain remnant salt marsh now consisting of a blend of native salt marsh plant species mingled with elevated levels of non-native wetland and upland weedy species. These areas are isolated from tidal influence.
- Cismontane alkali marsh occurs in several low-lying areas comprised of salt-tolerant plant species, such as pickleweed. These areas include locations with poor drainage that presumably retain and pond rainfall and surface runoff for the duration of rain events. After the rain, the water evaporates, leaving inundated alkali soil conditions.
- Southern willow scrub vegetation is found as isolated patches in several regions throughout the base. These areas form thickets in low-lying areas adjacent to the agricultural fields, where water runoff accumulates during wet periods. These areas are dominated by willow species, including arroyo willow and Goodding's black willow, and intermittently lance leaf willow (*Salix exigua*). The understory is relatively undeveloped, however it does include species such as mulefat, western ragweed (*Ambrosia psilostachya)*, and bristly ox-tongue (*Picris echioides*).
- Mulefat scrub, a riparian scrub community dominated by mulefat, occurs in several areas on-site. It is usually interspersed with southern willow scrub, but is also found in secluded patches. The related understory was comprised of non-native, weedy species, such as oat (*Avena* sp.), red brome, and sourclover. Areas of mulefat scrub on the base do not occur beside tributary drainages, but rather within closed basins and internally draining swales.
- Naval Weapons Station Seal Beach supports several drainages devoid of hydrophytic foliage. These non-wetland conduits are composed of incised, transient channels, varying from 1 to as much as 15 feet in width. These drainages occur along edges of the rural fields and channel precipitation and agricultural runoff.

3.5 Wildlife Populations

3.5.1 Population Inventories

Population inventories conducted on NAVWPNSTA Seal Beach are shown in Table 3-6. A full list of species that occur at NAVWPNSTA Seal Beach is provided in Appendix H.

3.5.2 Invertebrates

Over the last thirty, years a variety of surveys have investigated the invertebrate communities of the Anaheim Bay and its associated salt marsh.

3.5.2.1 Terrestrial Invertebrates

Assis de Moraes (1977) documented a total of 11 insect orders and 93 families on SBNWR, comprising an estimated 202 species. The most numerous of the insects in SBNWR are the *Coleoptera* (beetles), *Diptera* (flies), *Lepidoptera* (butterflies and moths), *Hymenoptera* (ants, wasps, and bees), and *Homoptera* (plant hoppers, aphids,

scales, and allies) (USFWS and CDFW 1976, in USFWS and DoN 1990). The carnivorous beetle families *Carabidae* (predaceous ground beetles) and *Staphylinidae* (rove beetles) represent the most species on SBNWR together with the mainly herbivorous fly families *Dolichopodidae* (long-legged flies) and *Ephydridae* (shore flies) (Powell and Hogue 1979; Morris *et al.*1980; Nagano and Hogue 1982, in USFWS and DoN 1990).

Table 3-6. Population inventories conducted on Naval Weapons Station Seal Beach property.

Species or Taxonomic Group	Project Duration and Objective	Source
GENERAL	Spring 1996, focused surveys for plants, birds, and wetlands were conducted for completion of the 1997 INRMP. Observations of other wildlife species were also recorded during focused surveys.	DoN SWDIV 1997
INVERTEBRATES	Invasive Snail (*Littorina littorea*) Surveys and Invasive Snail (*Littorina littorea*) Removal Trematode Surveys Ghost Shrimp Study	UC Davis UC Santa Barbara CSULB
MARINE	Round Stingray Surveys	CSULB
	Grunion Surveys	Pepperdine University
HERPETOFAUNA	Herpetological Surveys	Tierra Data Inc. 2008
BIRDS	National Wildlife Refuge volunteer census 1994-1996 Monthly High Tide Avian Survey Monthly Low Tide Avian Survey Christmas Bird Count Avian Predator Survey, Avian Predator Trapping and Banding Raptor study April 1996, conducted basewide to "provide support for existing inventories and to assess avian use of habitats".	DoN SWDIV 1997 DoN SWDIV 1997 WFVZ 2005 WFVZ 2005 Bloom 1996 DoN SWDIV 1997
LIGHT-FOOTED CLAPPER RAIL	Light-footed Clapper Rail Call Counts, Light-footed Clapper Rail High Tide Counts	Seal Beach NWR
CALIFORNIA LEAST TERN	California Least Tern Breeding Monitoring, California Least Tern Predator Management, NASA Island Weed Management Pilot Study	NAVWPNSTA Seal Beach AgriChem 2006
WESTERN SNOWY PLOVER	Western Snowy Plover Breeding Season Window Survey Western Snowy Plover Winter Window Survey	NAVWPNSTA Seal Beach
BURROWING OWL	Burrowing Owl Management Plan Development, Burrowing Owl Active Relocation, Burrowing Owl Passive Relocation	WFVZ 2005-2006
OTHER	Wetland Study Windbreak/Dustbreak Planting/Maintenance Invasive Weed Removal Vegetation Management Plan Herbarium Eelgrass Survey Wetland Delineation	UCLA/USACE AgriChem all years Merkel & Assoc. In Prog. Merkel & Assoc. 2006 Merkel & Assoc. 2006 Merkel & Assoc. 2006
MAMMALS	Monthly Night Mammal Surveys	Seal Beach NWR

Adult tiger beetles are terrestrial predators that are built for hunting and stalking smaller arthropods, being fast runners and agile flyers. Their larvae inhabit vertical burrows in the soft mud or wet sand, which makes them highly sensitive to being crushed by foot traffic through their habitat (Nagano 1980). Tiger beetle populations have declined in range due to habitat destruction, off-road vehicle use, insecticide use, and human foot traffic. Naval Weapons Station Seal Beach contains some of the few remaining populations of these tiger beetles in the U.S.

The wandering skipper is considered rare (The Nature Conservancy Global Rank [NCGR]: G2 - Imperiled globally because of rarity [6 to 20 occurrences], or because of other factors demonstrably making it very vulnerable to

extinction throughout its range). It occurs within SBNWR living in close association with its larval host plant salt grass (Wells *et al.* 1980, in USFWS and DoN 1990). It is thought that the larvae are only able to utilize salt grass that is subject to tidal action, and therefore are limited to marshes that have retained waterways to the ocean. Its range has been restricted to the coastal region from Goleta in the north to the Cape Region of Baja California. Refer to Appendix I for a life history description of the wandering skipper.

The sandy beaches and dunes of NAVWPNSTA Seal Beach have the potential to support rare invertebrate fauna, such as the globose dune beetle (NCGR: G1S1), sandy beach tiger beetle (*Cicindela latesignata latesignata*, NCGR: G4T1T2S1), and more common species such as sand spiders, robber flies, kelp flies, and ants. Tiger beetles of sandy beach habitats rely heavily on kelp flies and other insects which swarm around seaweed wracks (Nagano 1980).

In the mud flats and salt pannes of the marsh, two other sensitive species of tiger beetles have been recorded in the Seal Beach area (Nagano 1980), including the sensitive Gabb's tiger beetle (*Cicindela gabbii*, NCGR: G4S1), and Frost's tiger beetle (*Cicindela senilis frost* NCGR: G4T1S1). A third species, the mudflat tiger beetle (*Cicindela trifasciata sigmoidea*) currently has no listing status.

The salt-marsh mosquito (*Aedes taeniorhynchus*) also inhabits wetlands within SBNWR. Their larvae and pupae are a food source for the marsh fish. However, the adults are considered a pest and their populations are monitored and controlled within SBNWR (USFWS and DoN 1990).

Two restoration projects involving terrestrial invertebrates have been conducted on NAVWPNSTA Seal Beach lands. Sterile fruit flies were introduced at NAVWPNSTA Seal Beach to control pest populations of fruit flies (R. Schallman *pers. comm.*).

3.5.2.2 Marine Invertebrates

Invertebrates populating estuarine habitats of NAVWPNSTA Seal Beach include species such as polychaetes, sea stars, sand dollars, nudibranchs, crustaceans (especially penaeid and palamonid shrimps, portunid crabs), and a variety of bivalves and gastropods. Surveys of the salt marsh and outer bay areas have recorded 152 species of invertebrates (Reish 1975, in USFWS and DoN 1990). These organisms serve many purposes within the Bay and the marsh, including scavenging, filter feeding, detritus feeding, etc. (Morris *et al.*1980). Table 3-7 lists the most abundant groups of marine invertebrates found in the salt marsh and outer bay.

Table 3-7. The most abundant marine invertebrates found in the salt marsh and Anaheim Bay (Reish 1975; Reish et al 1975, cited in USFWS and DoN 1990).

Invertebrate Group	Salt Marsh and Outer Bay	Salt Marsh
Polychaetes	71%	65%
Mollusks	17%	13%
Crustaceans	12%	15%
Other	6%	7%

Between 1990 and 1995, in an effort associated with the POLB mitigation ponds, data were collected bimonthly at 10 stations from September 1990–July 1992, and September 1994–July 1995. The most abundant subtidal and

intertidal species were worms (polychaetes, oligochaetes, and nematodes), and crustaceans (amphipods, ostracods, and copepods).

Polychaetes

Polychaetes are primarily deposit feeders, living in and on the sediment and reaching high densities (Griffis 1987). At least eight polychaete species occurring in the area were unknown from any other bay or harbor in southern California at the time of Reish's 1975 survey: *Glycera convoluta, Glycera robusta, Lumbrinereis zonata, Protodorvillea gracilis, Rhynocospio arenicola, Dasybranchus lumbricoides, Notamastus magnus,* and *Nichomache personata*. Kauwling and Reish (1975) found that natural channels in Anaheim Bay primarily contain three species of polychaetes: *Cossura candida*, *Streblospio benedicti*, and *Capitita ambiseta*. Based on total numbers, *Cossura candida* was the most common species in the marsh, comprising almost one-third of all polychaetes in the area.

Mollusks

Mollusk communities in southern California salt marshes are commonly dominated by *Cerithidea californica*, *Melampus olivaceous*, and *Assiminea californica,* which are all epifaunal surface feeders (Zedler 1982, in USFWS and DoN 1990). Most mollusks are detritus and filter feeders or grazers, and to a lesser extent, predators (Zedler 1982; Griffis 1987). The California hornsnail (*Cerithidia californica),* which serves as food for species such as crabs and birds, is common in SBNWR (USFWS and DoN 1990). UC Davis is currently conducting surveys for invasive marine snails and initiating a removal program.

Crustaceans

Eighteen species of crustaceans have been identified in Anaheim Bay. In their larval form they are an important food source for birds and fish. Crabs are conspicuous, and are easily found foraging on mud flats. Amphipods, ostracods, and copepods were found in abundance in the subtidal and intertidal areas. Amphipods (*Orchestia traskiana* and *O. californica*) and isopods can be found under debris near the upper fringes of the marsh. Ghost shrimp (*Callianassa californiensis*) are found in the muddy sediments of SBNWR. California brackish water snails (*Tryonia imitator*) are found within the Refuge and are candidates for federal listing, but little is known about their populations or requirements (USFWS and DoN 1990).

3.5.3 Fishes

An intensive survey of fish fauna was performed in the Seal Beach area during 1969, 1970, and 1971 which used seines, trawls, and gill nets (Klingbeil *et al.* 1975). Marine Biological Consultants have conducted trawl and diving surveys in neighboring Huntington Harbor (1972), and fish surveys were completed to characterize the species assemblage of the POLB mitigation ponds (MEC 1995). At least six species spawn in Anaheim Bay or the adjacent marsh (CDFW and USFWS 1976). The federally endangered tidewater goby (*Eucyclogobius newberryi*) has potential to occur in Anaheim Bay. A list of fish species can be found in Appendix H.

Fish numbers are highest in the spring and summer months, while diversity is highest in the winter and spring months. Within the Bay, diversity is greatest throughout all seasons towards the mouth as compared with the head (Klingbeil *et al.* 1975). Regionally, Anaheim Bay is thought to be an area of high productivity and growth rates for fish (Lane and Hill 1975).

Some of the fish in Anaheim Bay's diverse species assemblage are commercially valuable, such as the longjaw mudsucker (*Gillichthys mirabilis*), and the California halibut (*Paralichthys californicus*). Anaheim Bay is used as a nursery by the halibut. Whether this species occupies the bay year round is unclear as conflicting research indicates both dispersal into the ocean and year round occupation of the bay (Clark 1930a, 1930b; Klingbeil *et al.* 1975).

3.5.3.1 Fishing

NAVWPNSTASBINST 11015.1A N01W (6 September 2007) describes fishing regulations for the Station. Fishing does not generally occur under Navy purview except minimal recreational fishing by personnel from shore. Eligible personnel include active duty military, federal civilian personnel currently assigned to the station or tenant commands, contactor personnel whose duties involve full time work onboard the station and, retired military and retired federal civilian personnel. These individuals may bring immediate family members not to exceed five (including escort).

Fishing is authorized during daylight hours including 30 minutes before sunrise and 30 minutes after sunset. Fishing is prohibited while ordnance operations are being conducted as indicated by a hoisted "Bravo" flag in the wharf area. Upon completion of ordnance operations fishing is permitted. All fishermen must possess a valid State of California fishing license and be issued a day use fishing permit by NAVWPNSTA Seal Beach. Bag and size limits will be in accordance with CDFW laws and regulations. Taking of crabs and lobster is allowed in accordance with CDFW regulations. Taking of mollusks (e.g. clams, mussels, oysters) or any other invertebrates not covered by the fishing policy (e.g. starfish, urchins) is strictly prohibited.

A fishing permit request sheet must be filled out and brought to the Pass and ID office where a fishing permit will be issued. A fishing permit may only be obtained from Pass and ID Monday through Friday during normal working hours. All anglers are required to sign in both themselves and any guests at Building 10 Dispatch each time they intend to fish. A Release of Liability Form must be completed and signed for each guest. Upon completion of fishing, checkout at Dispatch is required. The fishing permit shall be worn and prominently displayed at all times while in the approved fishing areas.

Fishing policy is for rod and reel fishing only, with the exception of hoop nets which may be used to take crabs and lobster. Spear or bow fishing is prohibited. Each angler may use no more than two fishing outfits (to include hoop nets) at any time. Outfits must be in the immediate vicinity and supervision of the angler. Catch and release fishing is recommended to preserve the local fishery; however, fish may be taken provided they meet State of California bag and size limits. Barbless hooks are encouraged at all times. The use of artificial lures is encouraged. If live or fresh-dead bait is used, it must be brought from off station. Cleaning clams or mussels from rocks or pilings or netting bait on station is prohibited.

Smoking is permitted only in designated smoking areas which include Building 303 and Barney's Beach House. Station policy prohibits smoking in any vehicle at any time. Smokers are responsible for properly disposing of cigarette butts. Violators shall have their fishing privileges permanently revoked.

Fishing is prohibited on the wharf at all times. Fishing is only permitted in designated areas. Beach fishing is prohibited when Barney's Beach House or the beach area is being used by a Morale, Welfare, and Recreation approved function. In the event of fire or other emergency, all fishermen will depart the fishing areas as directed by station security personnel.

All fishermen ten years of age and younger will wear a Coast Guard-approved personal flotation device, and be under the constant supervision of their sponsor.

Cleaning fish is only authorized in the designated cleaning area. All trash will be removed upon departure (including bait, fishing line, and hooks.) No fires, open flames or portable heaters are permitted. Only vehicles with Department of Defense stickers or an appropriate vehicle pass may be driven to the fishing area. All vehicles will be parked facing inshore, and be well clear of all rail lines and roadways. Parking is authorized only in the areas indicated. At no time will any traffic lanes, vehicular tracks, or train tracks be restricted by parked vehicles, chairs, or any other items or equipment. Doors of vehicles will be left unlocked and the keys will be in the ignition.

During certain periods of the year, the Environmental Department may provide a fishing survey to be completed. Information requested may include number and species of fish caught, length and weight information, or other related data. When appropriate, these surveys will be available for pick-up at Building 10 Dispatch. Completed surveys can be dropped off when signing out.

The Security Officer, Port Operation Officer, Command Duty Officer, Waterfront Duty Officer, and/or Security Patrol may immediately terminate fishing for that day if an angler is found in violation of any of the above requirements. If an angler is found in violation a second time, fishing privileges may be permanently revoked. A written report will be submitted to the Security Officer on any incident requiring the termination of fishing privileges.

Illegal public fishing, bait collection and clamming had occurred along the right-of-way for Pacific Coast Highway; however, it has stopped after fencing was installed.

3.5.3.2 Essential Fish Habitat

Ocean and nearshore habitat conditions are now being addressed through the EFH effort of NMFS. As defined by the Magnuson-Stevens Fishery Management and Conservation Act, EFH are "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Pacific Fishery Management Council has identified seven major habitat types that are designated as EFH: estuarine, rocky shelf, non-rocky shelf, canyon, continental slope/basin, neritic zone, oceanic zone. Any given species may require multiple habitats, depending on its life history, abundance, and competition from other species.

Under the EFH program, all federal agencies must consult with NMFS on any action or proposed action that may adversely affect EFH. An adverse effect may include direct (e.g. contamination), indirect (e.g. loss of prey), site-specific, or habitat-wide impacts. Consultations are made in conjunction with other federal statues, such as NEPA, CWA, or ESA. The NMFS provides recommendations to minimize, offset, or mitigate these impacts. Upon receiving these recommendations, federal agencies are required to respond, within 30 days, with a description of mitigation measures or with an explanation for disregarding the recommendations. The NMFS has no regulatory authority to enforce EFH compliance. However, private citizens still have the option to take legal action to ensure adequate compliance with other environmental laws such as those listed.

Non-fishing activities that have the potential to adversely affect EFH quantity and/or quality include: dredging, fill, excavation, mining, impoundment, discharge, water diversions, thermal additions, nonpoint source pollution and sedimentation, introduction of hazardous materials, introduction of exotic species, and the conversion of aquatic habitat. If these activities may result in significant adverse effects to EFH they should be avoided where less environmentally harmful alternatives are available. If there are no alternatives, the impacts should be minimized. If

adverse effects cannot be avoided or minimized, compensatory mitigation to conserve and enhance EFH should be recommended.

For the waters covered in this INRMP, the following activities require consideration to assess effects on EFH species:

- Pesticide or other introduction of hazardous substances
- Introduction of exotic aquatic weeds or invertebrates
- Non-point source pollution
- Passive introduction of exotic species by boat traffic
- Boat maintenance operations, for introduction of toxic substances
- Dredging and dredge material disposal/fills
- Oil/gas exploration/production
- Water intake structures
- Wastewater discharge
- Discharge of oil or release of hazardous substances
- Coastal development
- Fishing

NAVWPNSTA Seal Beach Species Covered Under Essential Fish Habitat Regulation

The following 12 species (Table 3-8) are known from NAVWPNSTA Seal Beach waters based on published accounts.

Table 3-8. Fish species under federal Essential Fish Habitat management that occur in Anaheim Bay.

Common Name	Scientific Name	Management Plan
northern anchovy	*Engraulis mordax*	
Pacific sardine	*Sardinops sagax*	
English sole	*Parophrys vetulus*	
leopard shark	*Triakis semifasciata*	
California grunion	*Leuresthes tenuis*	
California spiny lobster	*Panulirus interruptus*	*Crustaceans Fishery Management Plan*
Expected to occur, but not confirmed:		
soupfin shark	*Galeorhinus zyopterus*	Pacific Groundfish Fishery Management Plan
starry flounder	*Platichthys stellatus*	Pacific Groundfish Fishery Management Plan
Pacific (chub) makerel	*Scomber japonicus*	Coastal Pelagic Fishery Management Plan
Cabazon	*Scorpaenichthys marmoratus*	Pacific Groundfish Fishery Management Plan
smooth hammerhead shark	*Sphyrna zygaena*	Pelagic Fishery Management Plan
spiny dogfish	*Squalus acanthias*	Pacific Groundfish Fishery Management Plan
jack mackerel	*Trachurus symmetricus*	Coastal Pelagics Fishery Management Plan

3.5.4 Reptiles and Amphibians

Reptiles and amphibians do not typically represent a significant part of the faunal community within salt marshes, hence their species richness on NAVWPNSTA Seal Beach is quite low. They are however present in upland areas and in temporary freshwater ponds created by irrigation runoff and significant rain events.

Seven species of reptiles are known to occur on the Station: the western fence lizard (*Scheloperus occidentalis*), side-blotched lizard (*Uta stansburiana*), southern alligator lizard (*Elgaria multicarinata*), silvery legless lizard, and gopher snake (*Pituophis melanoleucus*).The silvery legless lizard is a California Species of Special Concern. The EIS reports that the San Diego horned lizard, a California Species of Special Concern, has been found on NAVWPNSTA Seal Beach in the past, but its presence has not been confirmed in recent years. The Green Sea Turtle (*Chelonia mydas*) has been observed at NAVPWNSTA Seal Beach and is listed as endangered for any breeding colonies along the Pacific Coast and all others are listed as threatened (Federal Register, July 28, 1974). The softshell turtle (*Apalone ferox*) is common to the southeastern region of the US has also been observed at NAVWPNSTA Seal Beach. The Pacific tree frog (*Hyla regilla*), African clawed frog (*Xenopus laevis*), and California toad (*Bufo boreas halophilus*) are three recorded amphibians on NAVWPNSTA Seal Beach (Tierra Data Inc. 2008).

3.5.5 Birds

The SBNWR is recognized as an Important Bird Area by the Audubon Society (Orange Coast Wetlands complex; California Audubon Society webpage 2002). On NAVWPNSTA Seal Beach, 253 bird species have been recorded, the majority of which have been observed in SBNWR. Peak diversity can be found during spring and fall migrations though several species are year-round residents. The highly productive wetlands are the habitat most frequently used by birds, but the surrounding uplands are also utilized. A species list of birds known from the Station is included in Appendix H. See Appendix I for profiles of focus management bird species.

3.5.5.1 Sensitive Species

Thirty-nine species of birds observed on NAVWPNSTA Seal Beach are considered sensitive by either the USFWS or CDFW, including two federally endangered species, one federally threatened species, one federal candidate for listing, and 22 federal species of concern (Table 3-9). The federally endangered California least tern nests at NASA Island within the SBNWR. The federally threatened western snowy plover is occasionally observed foraging in SBNWR although plovers have only rarely been observed nesting there. Year-round salt marsh residents include the federally endangered light-footed clapper rail and the California endangered Belding's savannah sparrow. The open grass fields and areas of bare ground are wintering habitat for the mountain plover, a federal candidate for threatened status. The federally delisted California brown pelican (*Pelicanus occidentalis californicus*) forages for fish in open waters along the shore.

3.5.5.2 Annual Migrations

The SBNWR is an important stopover and wintering location for many migratory birds. Spring migration occurs from February through May for species moving north. In late summer, migratory birds heading south begin arriving

at SBNWR and many species will remain in the region through the winter. Peak bird abundances are typically observed November through February.

3.5.5.3 Waterbirds

Anaheim Bay and adjacent wetlands provide highly productive feeding grounds for water-associated birds including waterfowl (ducks and geese), shorebirds (plovers, dowitchers, sanderlings, etc.), gulls, terns, grebes, cormorants, pelicans, and herons. The Bay also provides an important harbor for seabirds (petrels, shearwaters, fulmars, etc.) during storms. The largest single count of waterbirds for Anaheim Bay was in the winter of 1971 when 10,500 individuals were observed (Romero 1972). Waterbirds that have nested on NAVWPNSTA Seal Beach and SBNWR include the American avocet (*Recurvirostra americana*), black-necked stilt (*Himantopus mexicanus*), killdeer (*Charadrius vociferus*), mallard (*Anas platyrhynchos*), and black skimmer (*Rynchops niger*).

A diversity of habitats provide numerous feeding opportunities for a wide variety of birds. Shorebirds feed primarily on invertebrates in the wetlands and beaches. Gulls, terns, cormorants, grebes, and pelicans feed mostly on fish in the open waters. Dabbling ducks feed on plant material or invertebrates in shallower areas, whereas diving ducks will take invertebrates or small fish in deeper waters. Canada geese (*Branta canadensis*) forage on grasses, seed, and sprouts in uplands, and use the marsh as a resting area. Between three and five thousand geese overwinter at NAVWPNSTA Seal Beach each year (*Pers. Comm., R. Schallmann, 2013*). These counts are taken from the Christmas Bird Count. Each winter, Station staff and community volunteers participate in the annual National Audobon Society Christmas Bird Count. Counts are made throughout the world in designated "count circles." NAVWPNSTA Seal Beach falls under two of these, the Long beach and Coastal Orange County circles. Results of these surveys provide rough, landscape-scale estimates of bird population numbers in the region.

3.5.5.4 Landbirds

Though habitat for many landbird species is not as extensive as for waterbirds, several species have been observed on the Station. Breeding birds of the marsh include: marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), red-winged blackbird, northern mockingbird (*Mimus polyglottos*), loggerhead shrike (*Lanius ludovicianus*), and Belding's savannah sparrow. The Belding's savannah sparrow nests in the marsh but will forage in adjacent uplands for grasses and seeds.

The open fields of the Station are utilized as breeding grounds by several bird species including: western meadowlark (*Sturnella neglecta)*, horned lark (*Eremophila alpestris*), mourning dove (*Zenaida macroura*), and loggerhead shrike. The open fields are also used in the winter by savannah sparrows and white-crowned sparrows (*Zonotrichia leucophrys*).

Developed areas of NAVWPNSTA Seal Beach are inhabited by breeding populations of house finches (*Carpodacus mexicanus*), house sparrows (*Passer domesticus*), swallows, Brewer's blackbirds (*Euphagus cyanocephalus*), rock pigeons (*Columbia livia*), Eurasian collared dove (*Streptopelia decaocto*) , and mourning doves (*Zenaida macroura*). The several large eucalyptus trees on the Station are frequented by a variety of birds, including warblers, hummingbirds, sparrows, and finches. Corvids (jays, crows, and ravens) frequently consume eggs and young birds. Shrikes will also prey on young birds and small bird species. Crows, ravens, and shrikes have caused serious predation problems at least tern nesting colonies at other locations and are monitored on the Station.

3.5.5.5 Raptors

Despite urban encroachment by the surrounding communities, NAVWPNSTA Seal Beach has been able to support a sizeable population of mainly wintering raptors. In total 1,715 avian predators were observed between 10 November 2004 and 17 December 2005 (Refer to Figure 3-6, Figure 3-7, Figure 3-8, Figure 3-9, Figure 3-10, and Figure 3-11) (Bloom *et al.* 2006). Twenty species of avian predators are known to occur on NAVWPNSTA Seal Beach. Ten of these nest on the Station including red-tailed hawk, great-horned owl (*Bubo virginianus*), barn owl, burrowing owl, loggerhead shrike, American kestrel (*Falco sparverius*), great blue heron (*Ardea Herodias*), common raven (*Corvus corax)*, Cooper's hawk (*Accipiter cooperii*), and American crow (*Corvus branchyrhynchos*).

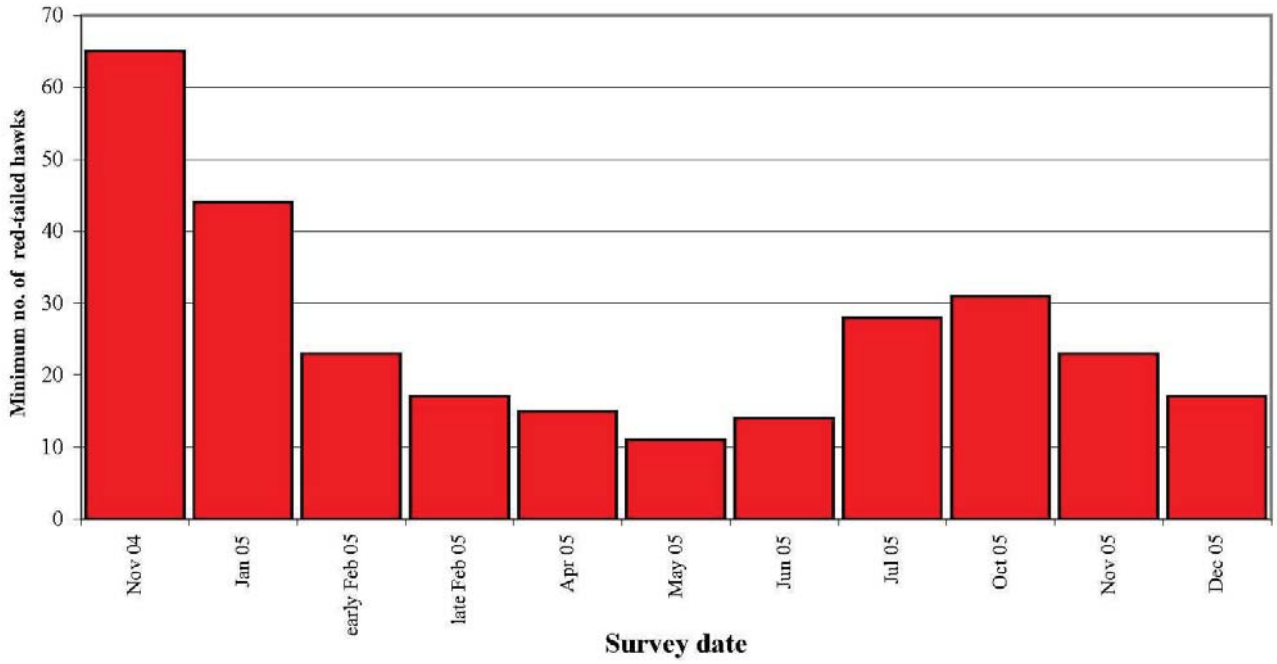


Figure 3-6. Number of red-tailed hawks (all age classes) determined from raptor activity surveys at Naval Weapons Station Seal Beach and the Natural Wildlife Refuge, November 2004 - December 2005 (Bloom et al. 2006).

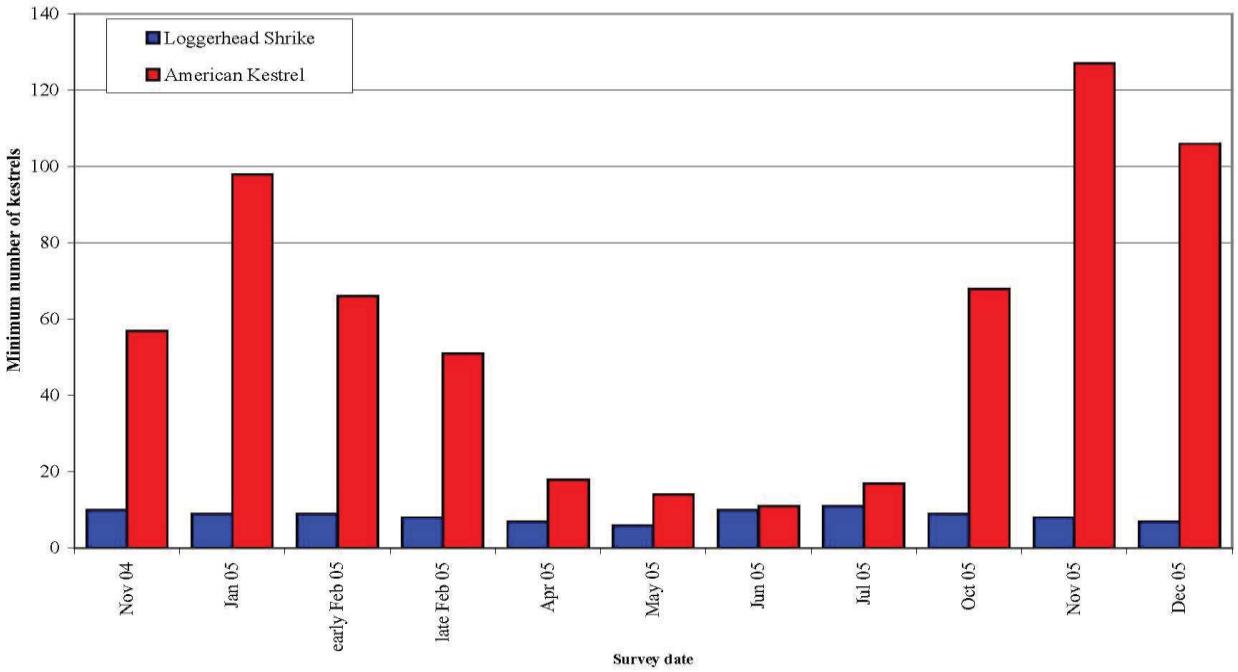


Figure 3-7. Number of American kestrels and loggerhead shrikes (all age classes) determined from raptor activity surveys at Naval Weapons Station Seal Beach and the Natural Wildlife Refuge, November 2004 - December 2005 (Bloom et al. 2006).

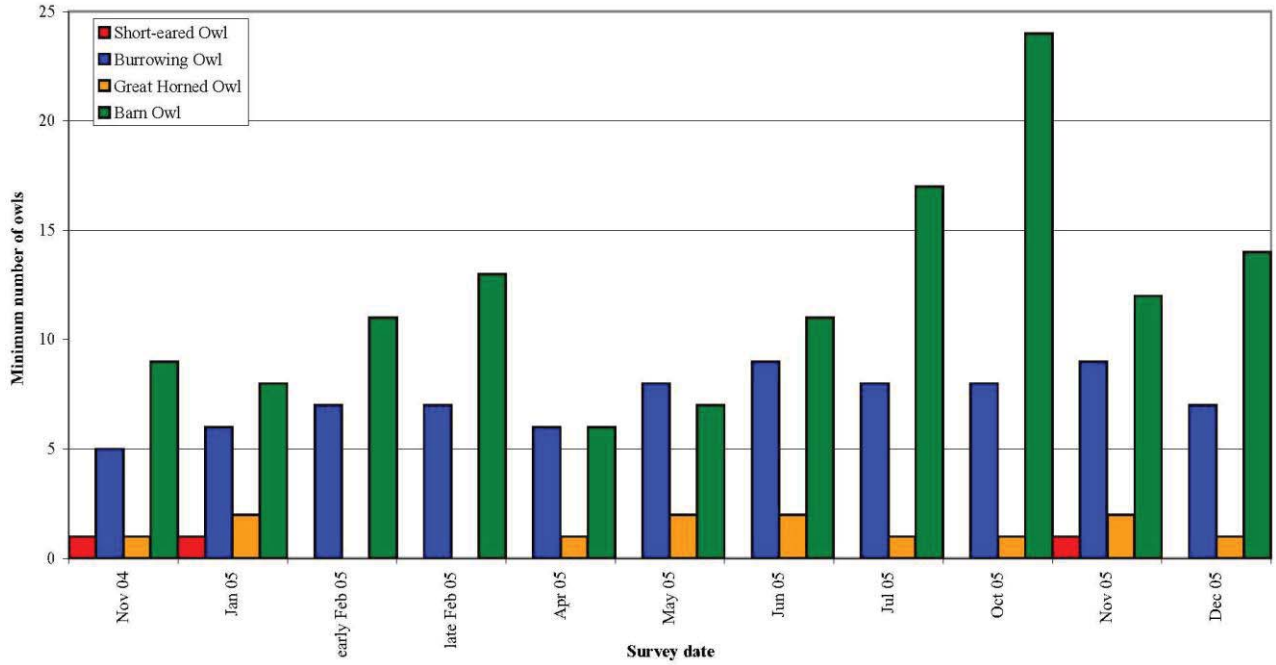


Figure 3-8. Number of short-eared owl, burrowing owl, great horned owl, and barn owl (all age classes) determined from raptor activity surveys at Naval Weapons Station Seal Beach and the Natural Wildlife Refuge, November 2004 - December 2005 (Bloom 2006).

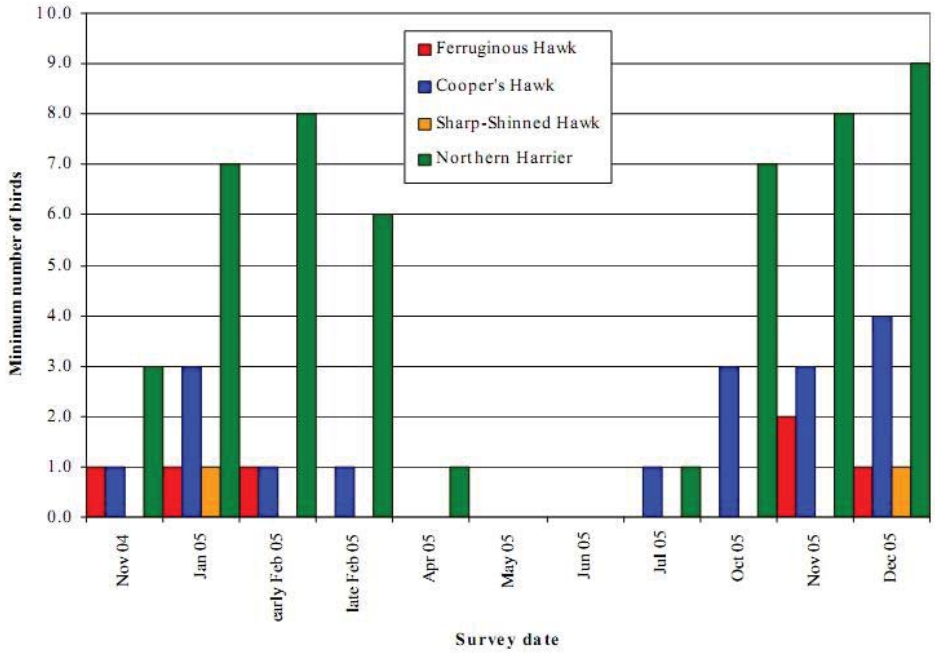


Figure 3-9. Numbers of Ferruginous hawk, Cooper's hawk, sharp-shinned hawk and northern harrier determined from raptor activity surveys at 3-week intervals on Naval Weapons Station Seal Beach and the National Wildlife Refuge, November 2004 - December 2005 (Bloom 2006).

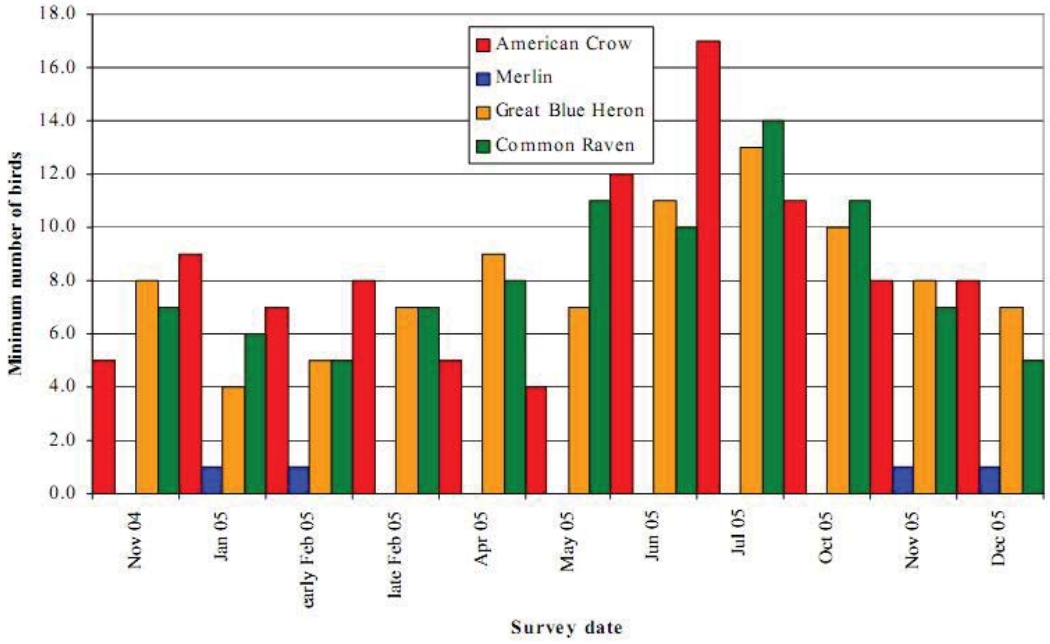


Figure 3-10. Numbers of American crow, merlin, great blue heron and common raven determined from raptor activity surveys at 3-week intervals on Naval Weapons Station Seal Beach and the National Wildlife Refuge, November 2004 - December 2005 (Bloom 2006).

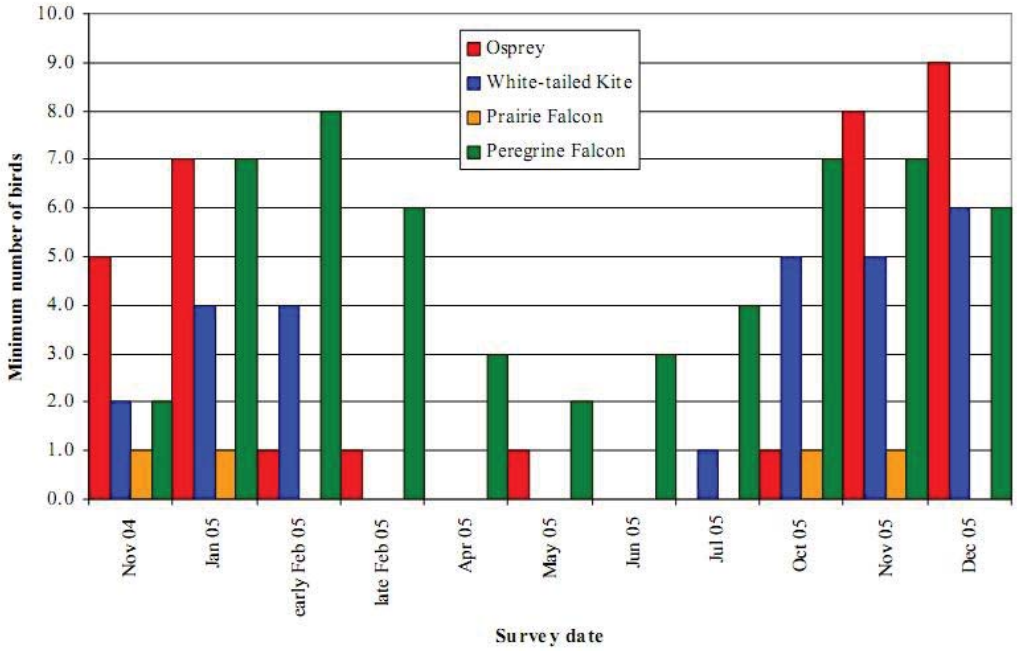


Figure 3-11. Numbers of osprey, white-tailed kite, prairie falcon and Peregrine falcon determined from raptor activity surveys at 3-week intervals on Naval Weapons Station Seal Beach and the National Wildlife Refuge, November 2004 - December 2005 (Bloom 2006).

3.5.5.6 Current Management of Birds

- Department of Defense policy states that neotropical migratory bird programs shall be established in support of and consistent with the military mission. The DoD's strategy focuses on inventory, on-the-ground management practices, education, and long-term monitoring (DoDINST 4715.03 2011). A means of achieving these strategies is offered through the PIF cooperative program. Partners-in-Flight is an international effort involving partnerships among federal, state, and local government agencies, professional organizations, conservation groups, and all other interested parties to improve monitoring, research, management, and education programs involving birds and their habitats. Partners-in-Flight offers DoD the opportunity to participate in an international program to enhance stewardship of natural resources and implement conservation objectives on a landscape level.
- The DoD is an active participant in the national PIF program and maintains and funds a separate DoD PIF program. The DoD's PIF policy is to promote and support a partnership role in the protection and conservation of migratory birds and their habitat by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems consistent with the military mission (DoD n.d.).
- Various towers at Shipboard Electronics Systems Evaluation Facility (SESEF) area were slated for demolition, including a tower that supports heron nests. When the tower was torn down, the heron population moved to the drop tower and into an adjacent eucalyptus coppice utilized by red-tailed hawks and great horned owls as well. While drop test tower 436 accommodates heron nesting, the herons are thought to be predatory on the federally endangered light-footed clapper rail. The drop test tower will eventually be removed to discourage heron nesting, thus reducing predation on the light-footed clapper rail.

3.5.6 Mammals

Nineteen species of mammals are listed as presently or potentially occurring on NAVWPNSTA Seal Beach. Most are native, while others, such as the red fox and feral cat, have been introduced. The majority of mammal species are primarily associated with the uplands of the Station and the upper salt marsh elevations of SBNWR. They forage in the salt marsh during low and moderate tides.

The small mammals of the marsh are mostly herbivores and granivores. House mice (*Mus musculus*) are omnivorous and western harvest mice (*Reithrodontomys megalotis*) eat primarily seeds and fruits; these are the two most numerous species (Ingles 1965). The California ground squirrel (*Spermophilus beecheyi*) is a primarily upland species that enters the marsh fringe and forages along the interface between the marsh and uplands. This squirrel feeds on annual forbs and grasses, seeds, and small amounts of invertebrates (Schitoskey and Woodmansee 1978). See Appendix I for profiles of focus management mammal species.

3.5.6.1 Mammalian Predators

With the rapid and extensive urbanization of the area surrounding NAVWPNSTA Seal Beach, many habitat areas and corridors on which mammals depend for migration, food and shelter have disappeared or been degraded. In the early 1970s, coyotes were the dominant predators on NAVWPNSTA Seal Beach. The coyote population disappeared on the Station in the early 1990s, and in its absence other predators, such as the non-native red fox and the feral cat, now occupy a dominant predator niche. Fish and Wildlife Service biologists and managers have intended to control red foxes (See Section 5.4.4 Preator Management and Special Status Wildlife Populations).

The Station currently supports approximately one dozen resident coyotes (HDR 2013, in progress). The population may swell considerably due to transient coyotes that pass through. Educational materials are provided to Navy Housing and the RV Park to ensure that residents are aware of the coyotes and include a hazing program to discourage interactions between humans and their pets.

Raccoons are occasionally noted on NAVWPNSTA Seal Beach; however, they are found frequently in adjacent communities, likely as a result of unsecured garbage containers (Schallmann, *pers comm.*).

Other mammalian predators identified at NAVWPNSTA Seal Beach are the Virginia opossum (*Didelphis virginiana*), long-tailed weasel (*Mustela frenata*), and striped skunk (*Mephitis mephitis*), the only abundant native terrestrial predator. The North American badger (*Taxidea taxus*) and the gray fox (*Urocyon cinereoargenteus*) have historically occurred on NAVWPNSTA Seal Beach, but are now extirpated. Profiles of other predators are presented in Appendix I.

3.5.6.2 Rodents and Lagomorphs

The upland portions of NAVWPNSTA Seal Beach provide the main habitat for small mammals, such as rabbits and rodents, although some extend their foraging into the upper reaches of the salt marsh. Common species include Botta pocket gopher (*Thomomys bottae*), black-tailed jackrabbits (*Lepus californicus*), Audubon's cottontail (*Sylvilagus audubonii*), California vole (*Microtus californicus*), house mouse, western harvest mouse, and California ground squirrel.

One of these species, the San Diego black-tailed jackrabbit is the only mammal considered sensitive, and is a California Species of Special Concern. They prefer open habitats with some shrub cover for concealing themselves and their young; they have a strictly herbaceous diet, feeding on forbs and grasses (CDFW 1999). The San Diego black-tailed jackrabbit is known to inhabit the barren area near the wharf at NAVWPNSTA Seal Beach, which is maintained by mowing.

3.6 Sensitive Plants and Animals

Four federally listed species and one candidate for federal listing are known to occur at NAVWPNSTA Seal Beach, and many other sensitive species including CDFW state-listed species, California Native Plant Society (CNPS) rare species, or federal species of special concern also inhabit the installation (Table 3-9). Protection of state-listed rare and endangered species on U.S. Navy land is not required by legal mandate; however, the U.S. Navy encourages cooperation with the state to protect such species (OPNAVINST 5090.1C CH-1). State listed species also must be considered during the NEPA process. It is mandatory to fully consider plant species on the California Native Plant Society's List 1B in environmental documents related to CEQA. Profiles of endangered or threatened species under the federal ESA or the California ESA as well as information on other sensitive species are provided in Appendix I.

Approval from the U.S. Navy chain of command must be obtained for certain endangered species issues (OPNAVINST 5090.1C CH-1 [18 July 2011]):

> "To ensure that proper budgeting and planning is conducted to support ongoing and new natural resources efforts (consistent with Section 7(a)(1) of the Endangered Species Act) for the conservation of endangered and threatened species on Navy Lands, and to ensure that Navy lands will remain available to support the military mission, review and approval by the chain of command, including the major claimant and CNO N45 is required prior to introducing or committing to introduce species that are by federal or state law or regulation endangered, threatened, proposed, or candidate for listing on a Navy installation. Approval is also required by the chain of command, including the major claimant and CNO N45 prior to commencing or committing to commence habitat enhancement designed to actively promote introduction of federally or state listed endangered, threatened, proposed, or candidate species to a Navy installation or any Navy lands. Availability of funds, ongoing and planned stewardship efforts, and consistency with Navy mission will be key considerations in evaluating requests from field commands. Requests must also identify the need for and extent to which documentation is required pursuant to the National Environmental Policy Act. The approval process described above in no way alters the Navy commitment to use its authority to enhance the recovery of listed endangered and threatened species and their habitats."

The following sensitive plants were searched for and *not* found during 1996 surveys by RECON (DoN SWDIV 1997): salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*), small spikerush (*Eleocharis parvula*), southwestern spiny rush *(Juncus acutus* ssp. *leopoldii)*, California spineflower (*Mucronea californica*), coast woolly-heads (*Nemacaulis denudata* var. *denudata*), and woolly seablite (*Sueda taxifolia*).

3.6.1 Current Management of Sensitive Species

- Current management of endangered species on NAVWPNSTA Seal Beach is focused on habitat management, enhancement and restoration, and predator control (See Section 5.4.4 Preator Management and Special Status Wildlife Populations).
- Monitoring of population levels of endangered species on SBNWR and NWS is conducted on a regular basis by the Navy and USFWS. Adult populations and breeding success of SBNWR's endangered species are monitored and the data filed.

- Raptors, water-associated birds, and predatory mammals are generally monitored once a month for abundance and population trends.
- USFWS biologists conduct nocturnal surveys once a month by driving Station roads to identify and count nocturnal animals using the roadside count method (Allen *et al* 1975; Frederickson 1979).Two observers in a vehicle look for animals while driving at about 15 miles per hour. A high intensity light is shone from each side of the vehicle to find each animal, and identification is aided by binoculars and spotting scopes. Identification and recording of each observation is done while the vehicle is stopped. These surveys are able to track population trends of red foxes and other nocturnal species.

Table 3-9. Sensitive species recorded on Naval Weapons Station Seal Beach.

Common name	Species name	Status	Source
Plants			
coast woolly-heads	*Nemacaulis denudata var. denudata*	CNPS List 2	
Coulter's goldfields	*Lasthenia glabrata ssp. coulteri*	CNPS 1B	DoN SWDIV 1997
estuary seablite	*Suaeda esteroa*	CNPS List 1B	DoN SWDIV 1997
Lewis's evening primrose	*Cammisonia lewisii*	CNPS List 3	DoN SWDIV 1997
red sand verbena	*Abronia maritima*	CNPS List 4	DoN SWDIV 1997
salt marsh bird's beak	*Cordylanthus maritimus ssp. maritimus*	FE (no recent sightings)	DoN SWDIV 1997
seaside calandrinia	*Calandrinia maritima*	CNPS List 4	DoN SWDIV 1997
southern tarplant	*Hemizonia parryi var. australis*	CNPS List 1	
Birds			
Aleutian Canada goose	*Branta canadensis leucopareia*	FE (delisted), FSC	2,4,6,9,10,12
Allen's hummingbird	*Selasphorus sasin*	FSC	7,2
American white pelican	*Pelecanus erythrorhynchos*	CSC	2,6,10,11,12
bank swallow	*Riparia riparia*	ST	12
Bald eagle	*Haliaeetus leucocephalus*	FE (Delisted)	1
Belding's savannah sparrow	*Passerculus sandwichensis beldingi*	SE	4,5,6,2,10,11,12
black oystercatcher	*Haematopus bachmani*	FSC	2
black skimmer	*Rynchops niger niger*	FSC, CSC	6,2,10,12
black storm-petrel	*Oceanodroma melania*	CSC	2*
black tern	*Chlidonias niger surinamensis*	FSC, CSC	6,2,10
black-vented shearwater	*Puffinus opisthomelas*	FSC	2
brant	*Branta bernicla*	CSC	5,6,9,2*,10,11,12
Brewer's sparrow	*Spizella breweri*	FSC	12
burrowing owl	*Athene cunicularia hypugea*	FSC, CSC	3,4,5,6,2,10,11
California brown pelican	*Pelicanus occidentalis californicus*	FE (delisted) SE (delisted), CFP	4,5,6,9,2,10,11,12
California least tern	*Sterna antillarum browni*	FE, CE	5,6,2,10,11,12
Cassin's auklet	*Ptychoramphus aleuticus*	FSC, CSC	2*
common loon	*Gavia immer*	FSC, CSC	6,2,10,11,12
Costa's hummingbird	*Calypte costae*	FSC	2
golden eagle	*Aquila chrysaetos canadensis*	CFP	2,3,6,10
large-billed savannah sparrow	*Passerculus sandwichensis rostratus*	CSC	6,2,10
Lawrence's goldfinch	*Carduelis lawrencei*	FSC	5,2*
light-footed clapper rail	*Rallus longirostris levipes*	FE, CE	6,2,10,11,12
loggerhead shrike	*Lanius ludovicianus*	FSC, CSC	4,5,6,9,2,10,11,12
long-billed curlew	*Numenius americanus*	FSC, CSC	4,5,6,9,2,10,11,12
marbled godwit	*Limosa fedoa*	FSC	4,5,6,9,2,10,11,12
mountain plover	*Charadrius montanus*	FC, CSC	4,6,2,10,11

Table 3-9. Sensitive species recorded on Naval Weapons Station Seal Beach.

Common name	Species name	Status	Source
northern harrier	*Circus cyaneus hudsonius*	CSC	2,3,4,6,9,10,12
peregrine falcon	*Falco peregrinus anatum*	FE (delisted), FSC	2,3,6,12
pink-footed shearwater	*Puffinus creatopus*	FSC	2*
redhead	*Aythya americana*	CSC	2
red knot	*Calidris canutus*	FSC	5,6,2,10,11,12
sage thrasher	*Oreoscoptes montanus*	FSC	7,2
short-billed dowitcher	*Limnodromus griseus*	FSC	5,6,9,2,10,11
short-eared owl	*Asio flammeus flammeus*	CSC	3,6,2,10,11
Swainson's hawk	*Buteo swainsoni*	CT	2,3
tricolored blackbird	*Agelaius tricolor*	FSC, CSC	6,2,10
Vaux's swift	*Chaetura vauxi*	CSC	12
western snowy plover	*Charadrius alexandrinus nivosus*	FT, CSC	6,2,10,11,12
whimbrel	*Numenius phaeopus hudsonicus*	FSC	6,2,10,11,12
white-tailed kite	*Elanus leucurus*	FSC, CFP	3,4,5,6,7,9,10,11,2, 12
yellow warbler	*Dendroica petechia*	FSC, CSC	6,2,10,11
Reptiles			
green sea turtle	*Chelonia mydas*	FT/FE	14
San Diego horned lizard	*Phrynosoma coronatum blainvillii*	CSC	6,10
silvery legless lizard	*Anniella pulchra pulchra*	CSC	13
Mammals			
San Diego black-tailed jackrabbit	*Lepus californicus bennettii*	CSC	5

Status Codes: FE = Federal Endangered FT= Federal Threatened FC= Federal Candidate for listing FSC= Federal Species of Concern CE = California Endangered CSC = California Species of Concern CFP= California Fully Protected CNPS 1B = Rare or Endangered in California and elsewhere CNPS List 2= Rare or Endangered in California but not elsewhere CNPS List 3= Plants for which more information is needed - Review list CNPS List 4= Plants of limited distribution - Watch list

Sources 1= 50 CFR Part 17, Federal Register July 9, 2007 2=USGS Bird Checklists of the United States (2*accidental) 3=Bloom 1995cited in RECON 1997 4=1995 Christmas Bird Count cited in RECON 1997 5= RECON 1996 cit4edin in RECON 1997 6=USFWS and DoN 1990 9=Census Summary 1994 10= Environmental Impact Statement 1990 11=A Thesis 1976 12=MEC 1995 (Volume I & II) 13=Tierra Data Inc. 2008 14=Field observations by Cory Davis, TDI biologist on 2/13/03

3.6.2 Federally Protected Species

Four federally listed species and one candidate species (FC) are known to occur on the Installation (Table 3-9). Listed species include three federally endangered (FE) species, one federally threatened (FT) species. The light-footed clapper rail (FE) and western snowy plover (FT) are potentially present year-round at NAVWPNSTA Seal Beach. The California least tern (FE) is a migrant that is present during the spring and summer for breeding, and the mountain plover (FC) is a migrant present in the winter. The green sea turtle is also listed as federally endangered. The salt marsh bird's beak has not been confirmed in recent years, and has potentially been extirpated. Critical habitat has only been designated for one of these species, the western snowy plover, and NAVWPNSTA Seal Beach was not included in this designation.

3.6.2.1 Light-footed Clapper Rail: Federal and State Endangered

The light-footed clapper rail is a federal and state endangered species, and a California (CDFW) Fully Protected Species under California Fish and Wildlife Code, section 3511. It is currently found from Santa Barbara County to San Quentin, Baja California. It is a brown marsh bird with long legs, a short, upturned tail, a long bill, and barred flanks (Photo 3-12).

Photo 3-12. Light-footed clapper rail. Photo courtesy of the U.S. Navy.

Life History

The light-footed clapper rail lives, nests, and forages entirely within its preferred habitat of large estuaries with salt marsh dominated by cordgrass and pickleweed (Jorgensen 1975). It is not a strong flyer and does not seasonally migrate. Clapper rails require cordgrass of the lower marsh habitat for nesting, and an abundance of intertidal marine invertebrates for their food supply (Massey *et al.* 1984; Zedler 1993b). The light-footed clapper rail is an opportunistic omnivore that eats a variety of foods within marsh ecosystems, including small fish, crabs, snails, insects and other marsh invertebrates; their primary method for capturing prey is by gleaning and shallow probing (Zembal and Fancher 1988). Light-footed clapper rails tether their nests with cordgrass so that they do not wash away or become inundated during high tide (Massey and Zembal 1979). Clapper rails have also been documented utilizing cattails for nesting habitat. Cordgrass also is used to form a canopy over the nest to hide it (Massey *et al.* 1984; Zedler 1993b). A second nest is constructed after the eggs have hatched for brooding. These nests are almost identical to incubation nests except for their lack of a canopy. Adjacent middle and upper marsh and upland transition habitat is important as a safe area during very high tides, large storms, or as a temporary refuge if lower marsh habitats become degraded (Zembal 1993).

Cordgrass provides preferred nesting habitat for light-footed clapper rails (Massey *et al.* 1984). Nests in cordgrass are constructed of dried cordgrass and measure about 14 inches across. The nest is intertwined at its edges with upright stems of living cordgrass so that it floats up and down on the tides. It is held in place by the living stems. The grass blades above the nest are intertwined by the rail to form a canopy over the nest and there is nearly always a ramp of dried cordgrass leading from the ground to the nest rim.

Light-footed clapper rails typically lay six eggs from March through May, and the chicks hatch from April to June (Unitt 1984). Nesting begins in March and usually extends into August. The late nests are usually re-nesting attempts after initial failures. There has been at least one instance of the sighting of chicks in October (USFWS 1985b). Egg incubation lasts about 23 days and begins with the laying of the last egg in the clutch. Parents share incubation duties, and hatchling clapper rails are able to follow their parents in the marsh within a few hours after hatching.

A second nest (and occasionally a third), which is used for brooding the young, is built after the young have hatched. Brood nests are invariably in cordgrass or on low marsh debris and are identical to the incubation nest except without the canopy or ramp. Incubation nests are usually converted to brood nests as well. Incubation nests built in other species of plants often include dried material from the nearby plants as well as cordgrass. Berm nests are sometimes quite small and sparsely constructed, particularly where cordgrass wrack is unavailable. The young rails are dependent on their parents for several weeks and are still being fed occasionally at six weeks of age.

There is little evidence suggesting intermarsh movements by light-footed clapper rails. This endangered bird tends to remain in its home marsh except under unusual circumstances (Zembal *et al.* 1985). Within-marsh movements are confined to small areas. For 54 uniquely color-banded rails, each of their locations generally remained within a 400-meter diameter area (Zembal and Massey 1983b; Zembal *et al*. 1989). Minimum home range sized for nine clapper rails that were radio-tracked by telemetry at Upper Newport Bay ranged from approximately 0.8 to 4.1 acres. The largest areas and largest daily movements were by first-year birds attempting to claim their first breeding territories. The light-footed clapper rails studied at Upper Newport Bay were most active during daylight hours, particularly in the morning and evening (Zembal *et al.* 1989).

Population Declines

Light-footed clapper rails have declined dramatically in recent decades due to destruction of salt marsh habitat (Garrett and Dunn 1981; Macdonald *et al.* 1990). All but a few of the current subpopulations depend on a marginal habitat base and are too small to anticipate them successfully maintaining themselves without intervention. In the late 1970s the U.S. population was estimated at approximately 300 individuals. In 1985, the southern California population crashed from an estimate of 277 pairs in 1984 to 142 pairs, partly due to tidal closure of the Tijuana Estuary (Zedler 1992b). In 1988, 65 percent (116 pairs) of all pairs detected (177 pairs) during spring call counts throughout the state were counted in nearby Upper Newport Bay Marsh. In 1996, there was an estimated 325 light-footed clapper rail pairs statewide, nesting in fifteen wetlands. This was the largest breeding pair number detected since annual surveys began in 1980 (USFWS data). A total of 360 pairs of light-footed clapper rails exhibited breeding behavior in 16 marshes in 2005. This total is the highest breeding population on record in the last 26 years (Zembal *et al.* 2005). The Seal Beach subpopulation has had the advantage of genetic augmentation through translocations of adults and eggs, but losses still occur due to predation and other factors.

Threats to the Light Clapper Rail

The salt marsh at NAVWPNSTA Seal Beach is the only marsh currently occupied by light-footed clapper rail that becomes fully inundated during a high tide of about 6.5 feet MLLW, or higher. Tides of this height occur regularly in the late summer, usually in darkness, and in the fall or winter in the early morning. This tidal inundation can carry off or drown eggs, and increases predation by raptors and mammals (Macdonald *et al.* 1990). Large storm events may destroy nests and make the habitat unsuitable for clapper rail use (Zedler 1993b).

Potential predators include the red-tailed hawks, the northern harrier (*Circus cyaneus*), peregrine falcon (*Falco peregrinus*), and short-eared owl (*Asio flammeus*) (Zembal *et al.* 2005). Continued upgrading and maintenance of the artificial rafts on SBNWR is crucial to the protection of the wintering rails and success of the breeding rails.

There are other factors that may be affecting the decline of the clapper rail. Many of the remaining marshes that rails utilize in foraging and breeding are highly fragmented. Discontinuity of habitat restricts genetic exchange of the light-footed clapper rail when breeding. Inadequate tidal flushing can also result in the loss of both salt marsh

cordgrass habitat, and the invertebrates upon which rails feed. Adequate tidal flow also prevents stagnation of the salt marsh and maintains salinity levels of the soil and water.

Status of Light-footed Clapper Rails at NAVWPNSTA Seal Beach

Seal Beach is important to the maintenance of the federally listed light-footed clapper rail population in southern California. A study funded by the CDFW conducted in 1996 determined that, at that time, the 52 nesting pairs inhabiting SBNWR represented the third largest population of light-footed clapper rails throughout its range (Zembal *et al.* 1996) (Figure 3-12). While intensive management efforts to shield the population from predation by the non-native red fox was accompanied by a dramatic increase in the numbers of clapper rails until the mid-1990s, the reason for the population declines of the late 1990s remains unclear. Presently, a more intensive monitoring program outside of breeding season is being employed by SBNWR staff in hopes of determining the cause of a recent depletion in population numbers.

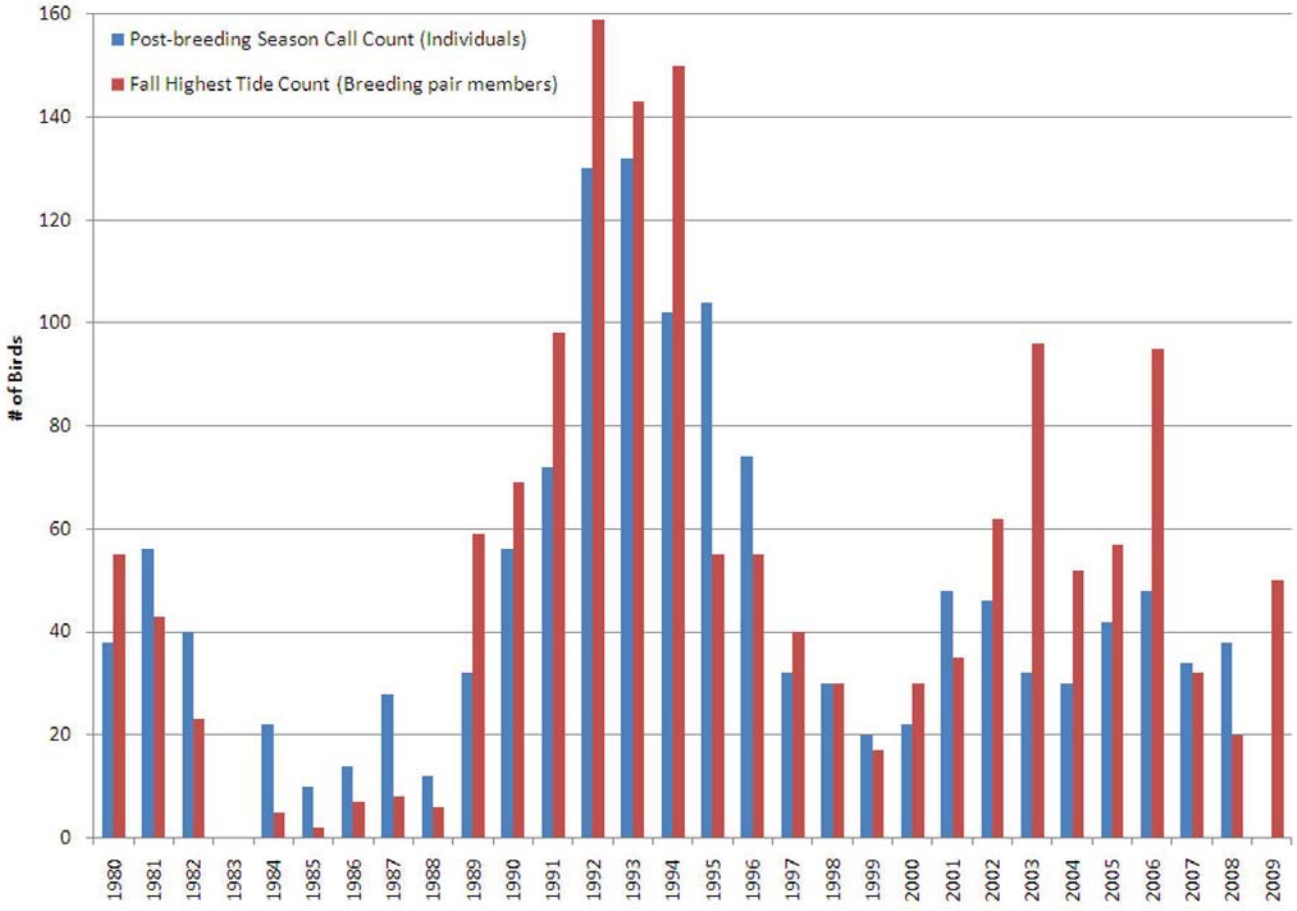


Figure 3-12. Light-footed clapper rail counts, 1980-2006 (Zembal et al 2006).

Enhancement Efforts and Current Management of Light-Footed Clapper Rails

A USFWS Recovery Plan for the light-footed clapper rail was published in 1985. Specific recommendations for the Anaheim Bay population were described in that document and are listed in Table 3-10.

Table 3-10. Management recommendations for Anaheim Bay in the U.S. Fish and Wildlife Service Recovery Plan for the Light-footed Clapper Rail (adapted from USFWS 1985b).

1. Restore tidal action to surrounding uplands. Possible actions (developed for all locations): opening the mouths of lagoons and maintaining openings; widening mouths.
2. Determine causes of elevation differences between Anaheim Bay and Upper Newport Bay, investigate feasibility of corrective actions, and initiate corrective actions. Currently, *Spartina* stands potentially used for nesting are inundated by moderate tides. Determine if reinjection is sufficient to compensate for subsidence.
3. Develop fringing freshwater marsh which can be used for nesting and foraging. Consider directing local freshwater sources intermittently into marsh habitats.
4. Create earthen nest hummocks above high tide line for nesting.
5. Enhance *Spartina* vigor by introducing more freshwater or transplanting *Spartina* to new locations.
6. Control pollutants through monitoring and preventive measures.
7. Remove debris that often arrives in marshes through local watersheds or tidal action.
8. Identify and resolve water quality problems that could affect marsh vegetation, invertebrates, or rails.
9. Coordinate with vector control personnel to ensure pesticides that could impact rails or their food resources are not used.

- In 1982 the USFWS constructed five nesting hummocks for light-footed clapper rails. These were built by carrying five-gallon buckets of soil to hummock sites and building them to an elevation above extreme high tide level. Natural erosion later reduced the heights of the hummocks to lower than optimal elevation.
- In 1985 additional light-footed clapper rail nesting mounds were constructed. Eleven nesting mounds in three separate locations on SBNWR were created by cutting existing berms extending from upland habitat into the marsh. The mounds were isolated from the uplands with the intent of deterring or preventing mammalian predators, primarily red foxes. Light-footed clapper rails nested on the berms in past years, but when the disappearance of eggs from nests became common, rails stopped nesting on them.
- In 1987 another project was initiated to create safe nesting sites for light-footed clapper rails. Before the clapper rail breeding season that year, the USFWS installed 28 floating rafts in the salt marsh portion of the Refuge. Each raft consisted of a wooden platform anchored with two wooden dowels. The dowels keep the raft from drifting away, yet allow it to float up and down with the tide. This protects the nest from flooding during extreme high tides. Rafts also provide rail nesting sites in isolated locations away from mammalian predators. A dense tumbleweed secured on top of each raft helps provide nesting cover and concealment for the rails. Light-footed clapper rails began nesting on the rafts the first year they were in place. Rafting continues to be a productive intervention for rail conservation. In 1988, an additional 18 floating rafts of the same design were placed in the marsh. For the 1988 light-footed clapper rail breeding season, 46 floating rafts were available for clapper rail nesting. More recently, in 2005, 81 floating platforms were available for nesting. During that year, a total of 51 nests were found on 43 platforms; 23 incubation nests were found on 19 rafts, and 28 brood nests were found on 25 rafts. While the percent of hatching success has remained relatively constant through the years of the raft placement efforts, these efforts are nonetheless correlated with higher overall numbers of nests.
- Ongoing studies examine breeding biology and use of floating nesting rafts on SBNWR.

- High tide counts have been performed at least once annually during daytime +6.7 feet or higher tides since 1975. High tides force the clapper rails to the pickleweed in the marsh where they are easily visible to observers. These surveys provide minimum population estimates for the clapper rails.
- Call count surveys are performed annually to estimate the composition and breeding status of the clapper rail population. Fish and Wildlife Service biologists conduct these surveys over several evenings during the breeding season and throughout the marsh to estimate the ratio of males to females and of paired to unpaired rails.
- Nests are located and monitored for breeding success, predations and predators.

3.6.2.2 California Least Tern: Federal and State Endangered

The California least tern (Photo 3-13) has been a federal and state endangered species since 1970. It is also a California (CDFW) Fully Protected Species under California Fish and Wildlife Code Section 3511 and is on the United States Bird Conservation Watch List. It is the smallest tern found in the U.S., approximately nine inches long with a 20-inch wingspan. Its coloring is primarily gray and white with black wingtips, a black cap, a white forehead, and a yellow beak tipped with black. Immature birds have darker plumage and a dark bill, with a distinctive white head and a dark eye stripe.

Photo 3-13. Adult California least tern. Photo courtesy of Tony Mercica. California least tern eggs. Photo courtesy of Tim Burr.

Life History

California least terns prefer to nest on open sandy or gravelly shores with light-colored substrates, little vegetation, and nearby fishing waters (Minsky 1987) (see Photo 3-14). California least tern nests are simple depressions in the substrate either lined or unlined with shell debris or pebbles and sometimes wood. One to four eggs, but usually two, are laid and incubated for about 20-25 days, with an average incubation of about 21 to 28 days (Massey and Atwood 1981). This is followed by about three weeks of the parents tending the flightless, but quite mobile, chicks. The young begin to fly at approximately three weeks of age.

Photo 3-14. California least tern nest, and one-day old California least tern chicks. Photos courtesy of Tim Burr.

Most initial nesting attempts are completed by mid-June. A second wave of nesting often occurs from mid-June to early August. These re-nests follow initial failures during a given season, but may also represent second year birds nesting for the first time (Massey and Atwood 1981). California least terns will generally return each year to breeding sites that have been used successfully in the past (Atwood and Massey 1988). Least terns over-winter in Central America and breed mainly in Baja California and southern California, but a few colonies exist in the San Francisco Bay area (Caffrey 1993).

During the nesting season adult terns and their young feed almost entirely on small marine fish in the surface waters (top six feet) of the Bay, river mouths, and near-shore ocean waters (Massey 1974; Collins *et al*. 1979; Massey and Atwood 1981, 1984; Atwood and Minsky 1983; Atwood and Kelly 1984; Bailey 1984; Minsky 1984). The parents continue to feed and teach their young how to forage for some time after fledging. The peak of the topsmelt spawning season (April and May) occurs at the same time the least terns return from their southern wintering grounds (April) and begin nesting at Seal Beach (May). The large numbers of topsmelt (*Atherinops affinis*) overall and the seasonal abundance (May-November) of the deepbody anchovy (*Ancho compressa*) provide a timely and adequate forage base for the California least tern.

Reproductive success is closely related to the availability of undisturbed nest sites and nearby waters with adequate supplies of appropriately sized fishes. Terns typically employ a shallow plunge dive to capture fish immediately below the water's surface. Adults usually dive from a hover but occasionally dive directly from flight. Most foraging activity is conducted within two miles of the colony (Atwood and Minsky 1983). Once their eggs hatch, adult terns must feed their young as well as themselves. They begin foraging nearer the colony than before, especially in estuarine shallows where there is an abundance of small, elongated fish for the nestlings (Collins *et al.* 1979; Massey 1986a).

The presence of eelgrass is important as habitat for several prey species of the least terns, such as northern anchovy (*Engraulis mordax*), topsmelt, and jacksmelt (*Atherinopsis californiensis*). However, California least terns do not demonstrate any preference for feeding in eelgrass areas (Baird 1997).

California least terns migrate yearly between California and Central and South America. They usually arrive in California by late April and complete their breeding cycle by the end of August. Their discontinuous breeding range in the U.S. extends from the Mexican border to San Francisco Bay. The majority of these terns nest in southern California. Unfrequented sandy beaches close to estuaries and coastal embayments have traditionally served as nesting sites for California least terns.

Population Declines and Federal Listing

In the late 1800s California least terns were widespread and common along the central and southern California coast, and were abundant on the beaches of Los Angeles County (McCormick 1899, as cited in Bent 1921). By 1973, the population had declined to its lowest known level of 623-763 breeding pairs (Bender 1974). The decline was attributed mainly to the loss of breeding habitats due to human activities. Known predators of least tern adults at all life stages include red foxes, skunks, opossums, house cats, dogs, American kestrels, northern harriers, American crows, burrowing owls, loggerhead shrikes, common ravens, and coyotes.

Since their listing as endangered in 1970, California least tern numbers have increased but there are still large fluctuations in numbers from year to year. Conditions such as El Ni–o can cause major impact to populations due to effects on anchovy abundance, flooding, or other disruption of nesting sites (Fancher 1992). Successive declines in the breeding population in 1983 and 1984 led to an estimated breeding population in California of 966 pairs in 1984, following a former high of 1,025 pairs in 1982.

Threats to the California Least Tern

Because of conflicting uses of southern California beaches during the nesting season, California least terns are now mostly restricted to nesting in small colonies at isolated sites. Tern colonies are thus highly concentrated in small areas, rendering them highly vulnerable to predation. Protection from predators is crucial to the success of the California least tern. Predators of least tern adults, young, or eggs include red foxes, skunks, opossums, house cats, dogs, American kestrels, northern harriers, American crows, burrowing owls, loggerhead shrikes, common ravens, and coyotes.

California least terns also are susceptible to episodic losses due to cold, wet weather, extreme heat, dehydration and starvation, unusually high surf or tides, and human disturbance. Warm sea currents, known as El Niño, have occurred in 1982-1983, and have been blamed for diminished fish populations throughout the SCB. This phenomenon apparently contributed to drastic reductions in least tern breeding success. In 1982, the lowest annual production of fledged young on record occurred. Young that were fledged probably had poor survival, as evidenced by no second-wave nesting in1984 by two-year olds. It took five years for the terns to recover from the effects of El Ni–o (Massey 1988).

Status at NAVWPNSTA Seal Beach of California Least Terns

Currently, California least terns nest on NASA Island within SBNWR. The nesting site is about three acres in size and was prepared for the terns between 1977 and 1979 by the USFWS. Terns began nesting on NASA Island in 1979. Since then, their population on the Refuge has fluctuated (Refer to Figure 3-13). Survival has increased in the last two years since the previous significant loss in 2007 when non-predation mortality was high.

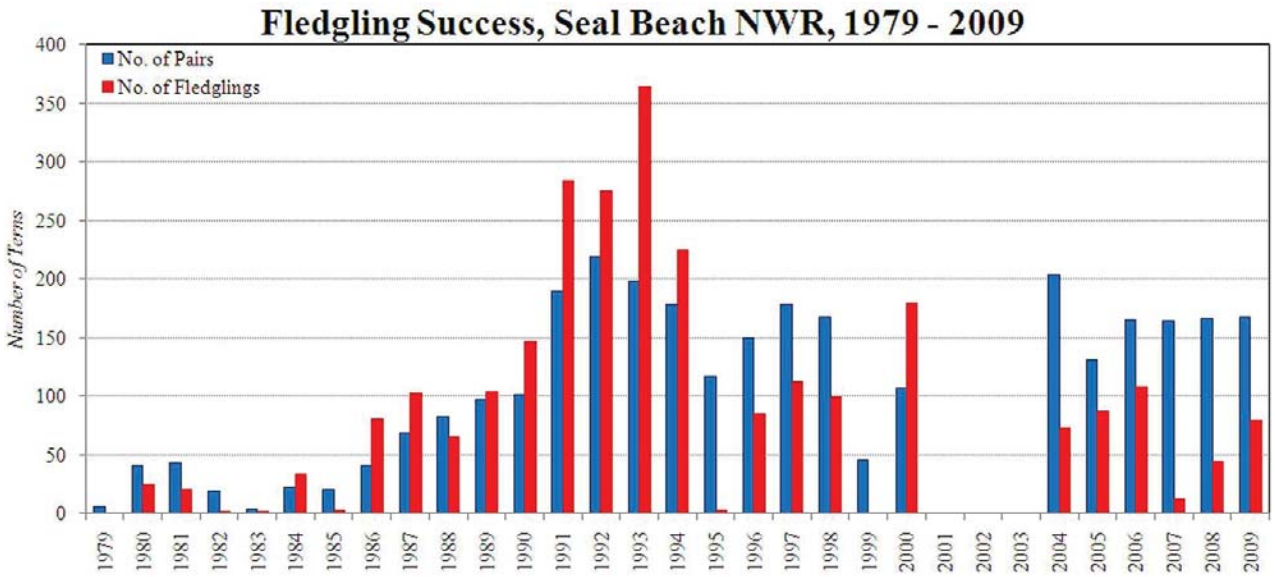


Figure 3-13. California least tern colony size and fledging success at Seal Beach National Wildlife Refuge from 1979-2009.

Current Management of California Least Terns

A pilot study was performed at the three acre NASA Island nesting site during 2005 to test a variety of control methods for undesirable vegetation. Five treatment methods were tested at the tern nesting site (AC&S 2006):

- Mechanical Removal (Control): Non-native plants were removed by scraping the surface using a tractor.
- Herbicide Application: Glyphosate herbicide (5% Aquamaster® solution) was sprayed on non-native plants using a power sprayer.
- Saltwater Irrigation: The saltwater test section was watered for six-hour periods three days in a row, and then the sprinkler system was removed.
- Plastic, Salt and Sand Layering: Approximately 10 inches of soil was removed, a 4-millimeter thick plastic sheeting was installed followed by a 3-inch layer of salt, and a 6- to 7-inch layer of beach sand.
- Salt and Rototilling: A 6" layer of salt was spread on the plot and then rototilled approximately 12" into the soil.

The most successful treatments in controlling non-native plant growth were the plastic/salt/sand, salt/rototill and saltwater irrigation treatments. These three management strategies produced less than 10 percent plant cover. The herbicide and control treatments had fairly high plant cover with 50 percent and 60 to 75 percent cove within their respective control treatment districts. However, in terms of subsequent use by terns for nesting, the plastic/salt/sand and salt/rototill methods were the least attractive to birds (AC&S 2006). The highest percentage of nest occurrence was documented on the control plot, followed by the herbicide and saltwater irrigation treatment zones.

The effects of heron predation on terns and rails is of concern and additional study is needed to determine to what extent, if any, herons are contributing to the existing predation problem within SBNWR.

3.6.2.3 Western Snowy Plover: Federal Threatened

The western snowy plover (Photo 3-15) is a federally threatened bird species that nests in colonies on sandy beaches along the west coast of the U.S. and into southern Baja California (Page *et al.* 1995). The snowy plover is also a California Species of Special Concern and it is on the United States Bird Conservation and Audubon Watch List. Adults and chicks feed on terrestrial and aquatic invertebrates such as amphipods, sand hoppers, and flies (Cramp and Simmons 1983). Kelp wrack provides an abundant food source of the invertebrates that frequent these kelp piles. Mudflats are also used for foraging (Powell, *pers. comm.*).

Photo 3-15. Western snowy plover. Photo courtesy of George Robinson.

Population Declines

The western snowy plover's preference for nesting on sandy beaches has led to its decline along the west coast, where much of its habitat has been developed or is subject to moderate-to-heavy human use (Copper 1997b; Powell, *pers. comm.*). Their condition is often made worse because plover nests and chicks can be difficult to detect (Powell *et al.* 1996). Foraging areas have also been compromised by development and human recreational use. Intrusion of salt marsh vegetation or of non-native vegetation on plover nesting grounds may pose problems for plover chicks, possibly preventing them from moving freely to forage or escape incoming tides (Copper 1997a,b).

Predation by birds and mammals (especially ravens, crows, and red fox) is one of the primary causes of reproductive failure for plovers in some areas (Copper 1997a, b). Indeed, there are few if any sites that support plover nesting without some form of predator management. Areas where predators have been excluded from plover nesting sites have had dramatically higher nesting success than unprotected sites (Neuman *et. al* 2004). Trash accumulation on the beaches can also act as an attractant to certain predators, such as ravens and crows (USFWS 1997).

Status at NAVWPNSTA Seal Beach of Western Snowy Plovers

Critical habitat was designated for this species in December 1999. Though data is unavailable for the 2006 fledging season, the western snowy plover has used the beach areas outside the Refuge on the NAVWPNSTA Seal Beach for nesting and foraging in the past. This species and suitable nesting habitat is uncommon on SBNWR, but it is represented (USFWS and DoN 1990). Currently, the western snowy plover has not been observed breeding on Navy property and only a handful of wintering birds are observed annually.

Current Management of Western Snowy Plovers

Western snowy plover nesting sites often overlaps that of the California least tern, it has benefitted from intensive management for terns in some locations.

3.6.2.4 Mountain Plover: Federal Candidate for Listing as Threatened Species

The mountain plover is a California Species of Special Concern. It was proposed for Federal Threatened species status in 1999 and in September 2003, with the proposal being withdrawn each time. However, in 2010, it was once again proposed for listing as a threatened species. The mountain plover is a large member of the shorebird family (21-23.5 cm). It is drab colored in the non-breeding season, lacking black breast bands that mark other species of plover. The mountain plover utilizes agricultural fields, foraging for large insects on the ground. It has been declining due to disturbance at nesting sites by farming equipment, pesticide contamination, and degradation of habitat through the removal of primary native grazers such as bison, prairie dogs, and pronghorns (Knopf 1996).

Status at NAVWPNSTA Seal Beach of Mountain Plovers

At NAVWPNSTA Seal Beach the mountain plover is a transient, non-nesting species present during the winter months. Local declines have been reported for wintering populations in southern California (Garrett and Dunn 1981). Mountain plovers historically wintered on dry plains between Los Angeles and the Pacific Ocean (Coues 1874).

Current Management of Mountain Plovers

Mountain plovers on NAVWPNSTA Seal Beach are found in the agriculturally leased area of the property (2,153 acres). Farming of this area is managed by two leases that contain the following conservation and maintenance work:

1. Agricultural management compatible with a NWR
2. Efficient water conservation irrigation practices
3. Minimum or low tillage combined with incorporating crop residues
4. Pest management with minimal effects on wildlife
5. Fire prevention and control

II. Hazardous waste management

3.6.2.5 Eastern Pacific Green Sea Turtle: Federally Threatened

The eastern Pacific green sea turtle (*Chelonia mydas*) is a federally threatened species, listed in 1998. The population that occurs at NAVWPNSTA Seal Beach is distinguished from the federally endangered green sea turtle population that breeds in Mexico and Florida. Green sea turtles display philopatry, returning to their natal beaches to nest. They are also known to forage for long periods, also returning to the same foraging areas. The green sea turtle often grow to one meter in carapace length and weigh 150 kilograms, making them among the largest of sea turtles. These turtles possess a smooth carapace, a single pair of elongated prefrontal scales between the eyes, and four pairs of lateral scutes (USFWS 2007).

Status at NAVWPNSTA Seal Beach of Green Sea Turtles

Approximately 5,000 green sea turtles nest on continental U.S. beaches (NMFS 2007); however, no green sea turtles have been documented to nest on the west coast (NMFS 2007; DoN 2010). Occasionally, green sea turtles have been sighted offshore of Orange and Los Angeles Counties, north of their more common southerly range limit, likely during El Niño periods when warmer waters spread into this range. They have also been sighted in Alamitos Bay and in the San Gabriel River (LSA Associates, Inc. 2009). The number of turtles using Anaheim Bay is uncertain, and there is limited information about their movements or behavior (DoN 2010).

Current Management of Green Sea Turtles

Green sea turtles spend the majority of their lives foraging in coastal areas, including both open coastline and protected areas and lagoons. Green turtles rely on marine algae and seagrass as their primary diet constituents while foraging in these areas; and some populations also forage heavily on invertebrates (NMFS 2007). While there is no specific management for green sea turtles on NAVWPNSTA Seal Beach because none have been sighted there, enhancing and maintaining eelgrass beds in SBNWR would protect potential habitat for the turtle.

3.6.3 State Listed Species

3.6.3.1 Belding's Savannah Sparrow: State Endangered

The Belding's savannah sparrow is listed as endangered by the CDFW. This nonmigratory subspecies is endemic to coastal salt marshes in southern California (Powell and Collier 1998). This species is strictly associated with salt marsh habitats and is a state-listed endangered species. The rarity of this salt marsh resident has been attributed to loss and degradation of habitat. The Belding's subspecies of savannah sparrows ranges from Goleta Slough in Santa Barbara County, California, south to El Rosario in Baja California, Mexico (Grinnel and Miller 1944; Van Rossen 1947; American Ornithologist's Union 1983).

Belding's savannah sparrows defend nesting territories of small patches of pickleweed, in areas reached only by higher tides. They feed primarily on invertebrates, for which they forage throughout the marsh. Their nests are small cups positioned on or near the ground, usually in pickleweed. The breeding cycle may begin with territory selection and defense in December and may continue through the late summer. First clutches of two to four eggs are laid in March or April and incubated for 10 to 13 days. Several clutches may be raised in a single season.

In 2006, a statewide total of 3,135 pairs were detected in 29 marshes (Zembal *et al.* 2006), including 289 pairs (8.8% of the statewide total) at NAVWPNSTA Seal Beach. Only one other marsh had appreciably higher numbers. Previously, the highest number of pairs recorded at NAVWPNSTA Seal Beach was 293 pairs in 2001. The 2001 total was 25.2 percent higher than in 1996. This increase in breeding pairs is most likely attributable to restoration and management efforts, including predator control during the breeding season (Zembal and Hoffman 2002).

Status at NAVWPNSTA Seal Beach of Belding's Savannah Sparrows

Belding's savannah sparrow is a resident breeder occurring on NAVWPNSTA Seal Beach in SBNWR. Surveys over the last 30 years have revealed that the Refuge contains the third largest subpopulation in southern California. This subpopulation numbers roughly 10 percent of the entire population of Belding's savannah sparrow.

Current Management of Belding's Savannah Sparrows

All Belding's savannah sparrow present on NAVWPNSTA Seal Beach are fully protected under the California ESA of 1984 (Fish and Wildlife Code Section 2050-2116). This species is surveyed for, but there are no site enhancements of the salt marsh implemented specifically for the benefit of the sparrow.

3.6.3.2 Swainson's Hawk: State Threatened

Swainson's hawks are a medium-sized, transient hawk that breeds on the NAVWPNSTA Seal Beach in SBNWR. Those birds occurring in California spend the winter in Mexico and South America. Swainson's hawks often nest peripherally to riparian systems of the valley as well as utilizing lone trees or groves of trees in agricultural fields.

Swainson's hawks require large, open grasslands with abundant prey in association with suitable nest trees. The diet of the Swainson's hawk is varied with the California vole being the staple in the Central Valley. A variety of bird and insect species are also taken.

Swainson's hawks were once found throughout lowland California and were absent only from the Sierra Nevada, north Coast Ranges and Klamath Mountains, and portions of the desert regions of the state. Today, Swainson's hawks are restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is still available. Historically, Swainson's hawks may have maintained a population in excess of 17,000 pairs. Based on a study conducted in 1994, the statewide population is now estimated to be approximately 800 pairs (CDFW 2006).

Threats to the Swainson's hawk include the loss of suitable agricultural habitat, riverbank protection projects, illegal hunting, pesticide poisoning of prey animals within wintering grounds, competition from other raptors, and human disturbance at nest sites.

Status at NAVWPNSTA Seal Beach of Swainson's Hawks

England *et al.* (1997) observed Swainson's hawks on NAVWPNSTA Seal Beach during the breeding season, however breeding pairs have never been observed at the Station. Individuals are most likely transient, migrating to larger riparian habitats. Swainson's hawk are currently infrequent migrants through NAVWPNSTA Seal Beach, with a few individuals noted each year. On occasion, larger groups will forage in fallow fields. In 2010/2011, a single immature bird overwintered at NAVWPNSTA Seal Beach. In April of 2011, a small kettle of over 25 birds was observed foraging in fallow fields for several days.

Current Management of Swainson's Hawks

The Station only passively manages for this species. The croplands on NAVWPNSTA Seal Beach represent potential hunting grounds for this species, and are managed according to the two leases for the farming of this area (2,153 acres) that contain the following conservation and maintenance work:

1. Agricultural management compatible with a NWR
2. Efficient water conservation irrigation practices
3. Minimum or low tillage combined with incorporating crop residues
4. Pest management with minimal effects on wildlife
5. Fire prevention and control

II. Hazardous waste management

3.6.4 Additional Priority Species

3.6.4.1 California Brown Pelican

The migratory California brown pelican was delisted as both a federal and state endangered species in 2009. Up to 85 percent of California's brown pelican breeding population of about 7,000 pairs (Small 1994) nests on the Coronado Islands (Schoenherr 1992). Others breed and nest in Mexico. Brown pelicans roost primarily on tire dikes and other artificial structures, seldom roosting on natural structures (USFWS 1995). As many as 20,000 brown pelicans migrate from Mexico northward, following food associated with migrating ocean currents from about mid-May to November (Small 1994).

Population Declines

The species underwent a considerable decline in the 1960s, mostly due to use of organochlorine pesticides such as DDT (Garrett and Dunn 1981). Pesticide residues in its prey are now drastically reduced, and the species has rebounded (Patton, *pers. comm.*; Small 1994). The El Ni–o event of 1981–1983 also contributed significantly to their more recent decline as the brown pelican population is highly sensitive to fluctuations in anchovy abundance (Baird 1993).

Status at NAVWPNSTA Seal Beach of Brown Pelicans

Brown pelicans use the outer harbor, nearshore water, and rock jetties of NAVWPNSTA Seal Beach more often than SBNWR. They are most abundant at the Refuge in late summer and fall when they can be observed fishing the open water, or roosting on mud flats, fence posts, or in the marsh. The highest count of brown pelicans at the Refuge and adjacent waters was 112 individuals observed in September 1970 (Romero 1976).

Current Management of California Brown Pelican

Under the ESA, turbidity plumes created during dredging operations in the upper water layers of subtidal habitats (to about 18 inches [46 cm]) (M. Kenney 2002 *pers. comm.*) must be contained by silt curtains or otherwise mitigated due to interference with foraging by the least tern and brown pelican. In addition, noise created during construction or maintenance activities such as pile driving must also be mitigated during periods when these species are foraging due to the potentially significant effect of noise on fish forage (DoN SWDIV and SDUPD 2000). As part of the delisting process, brown pelican populations should continue to be monitored until 2020.

3.6.4.2 Burrowing Owl

The burrowing owl is a Federal and California Species of Special Concern that is declining throughout its range, especially the coastal populations. The burrowing owl's population collapse is well documented (Unitt 2004). It is a year-round resident of southern California (Haug *et. al* 1993).Throughout their range, burrowing owls are threatened by habitat loss, predation, vehicle impacts, and control programs for ground squirrels (Kaufman 1996). Burrowing owls form loose colonies, with both resident and migratory components (E. Copper, *pers. comm.*). Eggs

are produced from late March to mid-June (Unitt 2004), and fledglings are active through August (Unitt 1984). A state-wide census in 1991-1993 estimated that there are 9,266 pairs of burrowing owls in California.

The species enlarges and inhabits burrows created by ground squirrels or other mammals. Consequently, burrowing owls are vulnerable to predation by a wide variety of predators. Evidence suggests that the decline of burrowing owls on NAVWPNSTA Seal Beach may have been due to predation by the non-native red fox (M. Silbernagle, USFWS, unpublished data as described in USFWS and DoN 1990). Burrowing owls feed primarily on invertebrates, but also take rodents, reptiles, amphibians, and small birds (Snyder and Wiley 1976). They have been known to occasionally prey on California least terns chicks at certain colonies (B. Massey and E. Copper *pers. comm.*; USFWS and DoN 1990).

Status at NAVWPNSTA Seal Beach of Burrowing Owls

As of 2013, a maximum of three pairs of burrowing owls are resident on NAVWPNSTA Seal Beach. This is the only known nesting population left in Orange County. Ample open space on the Station could house more breeding pairs with management (Bloom 1996).

Current Management of Burrowing Owls

A Burrowing Owl Management and Conservation Plan was developed in 2010. The plan provides a brief history of burrowing owls at NAVWPNSTA Seal Beach and outlines management strategies for increasing the population of burrowing owls without impacting other listed species.

3.7 Invasive Species

If conditions are hospitable, introduced exotic (invasive) species can become established and out-compete natives in the new environment. Non-native plants alter native plant communities and can affect the way wildlife uses the area. Targeting control efforts on the most noxious, potentially damaging species on NAVWPNSTA Seal Beach should be a priority.

"To be effective, management actions need to understand invasions in the context of the existing and historical natural systems" (L. Levin, *pers. comm.)*. Some species have taken decades since introduction to become a "pest", showing that it is potentially dangerous to predict future status of an invader from its current status (Crooks 1998). Timing is of the essence, since delays in implementing appropriate control or extirpation measures can cause the measures to be ineffective if the invading population grows too large (L. Levin, *pers. comm.*).

Maintaining high quality habitat should help prevent or minimize invasive species. The way living things organize themselves can be an indicator of whether a system is healthy or degraded. A measure of this organization might be the percent of species in a system that is sensitive to toxics, or other stressors, percent exotic introductions, relative species dominance, relative abundance, biodiversity within a taxonomic group, total biomass of a taxonomic group in an area, size class and diversity of functional feeding strategies. External pressure on community organization may be exercised by introduction of exotics and many other means.

Altered hydrologic, soil, and fire regimes can contribute to invasive plant germination and establishment. Disturbed sites, even when disturbed temporarily for restoration purposes, show an increased number of invasive species (Crooks 1998). The distribution of exotic coastal plants has been studied in areas like the Sweetwater Marsh NWR and other surveys of Navy properties in support of INRMPs. We know that projects that alter hydrologic regimes or

create disturbed sites may increase the probability of exotic coastal plant establishment in the salt marsh. Restored wetlands appear particularly vulnerable to invasions. Human-induced changes in ecosystems, such as disturbance or removal of grazers (even if exotic) can create a sudden population explosion of an invasive species.

There has been no survey targeted specifically to document the distribution and abundance of exotic marine species and coastal species at NAVWPNSTA Seal Beach. With inadequate taxonomy impeding the consistent separation of native from nonindigenous marine invertebrates, establishing the trend in abundance and location of exotic species is important in detecting population explosions of invasives before they become too extensive. Invasion of a community can completely change the relative dominance of species. Sometimes, physical and biological factors alternate in controlling residents in an area, such as before and after storms (Nybakken 1997). Infrequent sampling prevents detection of an invasive as it arrives. The evaluation of native species in the ecosystem may help evaluate the effect of invasives.

The most effective assault on invasives is the reduction and ultimate prevention of introductions. The establishment of EO 13112 requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems. Executive Order 13112 states federal agency responsibilities for the identification and management of invasive species.

National management of invasive species is focusing on those species presently having obvious negative effects. Once exotic species are established, at least five types of management controls can be used: (1) mechanical (physical removal), (2) chemical (through conventional pesticides, (3) biological (introduction of known natural predator or parasite), (4) harvest management (promotion of a sport or commercial fishery, and (5) fire. Through adaptive management experience, administrators can learn to identify the best tools for invasive species control.

3.7.1 Invasive Terrestrial Plants

Introduced invasive plant species can change ecosystem dynamics by changing soil nitrogen cycling, out-competing natives for water, changing the structure of vegetation and altering the way animals use the plant community. In addition, some weeds that occur in very low numbers or seem innocuous for years may expand their range dramatically and become a difficult pest under the right environmental conditions. These conditions might include a year with very late rains, or a flood that results in heavy sedimentation of drainages in the case of riparian weeds.

Invasive weeds can pose a serious long-term threat to many habitats found on NAVWPNSTA Seal Beach. Several species, such as ice plant, possess an ability to change the vegetation structure, rendering it unsuitable for most native wildlife (Photo 3-16). Sensitive and declining wildlife and plant species are particularly at risk from these weeds.

Photo 3-16. Invasive species (ice plant) on Naval Weapons Station Seal Beach.

The establishment of the Noxious Weed Control Act requires that federal land managers cooperate with state and federal agencies to manage undesirable plants. The Noxious Weed Control Act mandates that a program and a person be assigned to work with invasive plants, funding, cooperative agreements and the use of integrated pest management systems. The military point of contact for the Noxious Weed Control Act is the Armed Forces Pest Management Board established by OPNAVINST 6250.4A. The U.S. Navy's pest management policy is included in this Instruction (OPNAVISNT 6250.4A), which also requires a comprehensive pest management plan, the contents of which are stipulated. It does not state coordination requirements.

Invasive weeds that infest and degrade sensitive habitats or directly impact endangered and other sensitive species should receive the highest priority for control measures. Table 3-11 describes useful criteria to prioritize pest plant problems. In addition to this guidance, weeds of California are assigned a priority level by the California Invasive Plant Council (Cal-IPC) and these may be obtained from their website.

See Section 3.8 for weed control with pesticide use.

Table 3-11. Prioritization of pest plant problems.

Set priorities in order to tackle the fastest growing and most disruptive problems first; in this way hoping to minimize the total long-term workload. First act to prevent new pest species from becoming established, then attack incipient problems and outliers of larger infestations. Next prevent the expansion of larger infestations and then work to reduce their size or, if possible, eliminate them, and finally, learn to 'live with' pests/infestations that cannot reasonably be controlled but keep our eyes out for innovations that might allow us to control them.
■ Prioritize particular species or infestations as follows:

Table 3-11. Prioritization of pest plant problems.

1	Pest species with the ability to alter ecosystem functions.
2	Pest species that move into and dominate undisturbed native communities.
3	Pest species that overtake and exclude natives following natural disturbances.
4	Pest species that prevent or depress regeneration by natives. This includes understory species that suppress seedling establishment and growth of overstory species thereby causing long-term changes in species composition.
5	Small or otherwise easily eliminated pest populations. Avoid major problems by nipping them in the bud.
6	Pest species that are increasing in number or extending their ranges, unless these changes are thought to be part of a well-known cycle or, temporary and due to unusual conditions.
7	Pest species for which long-term control or elimination can be accomplished at reasonable expense.
8	Pest species that are problems in nearby natural areas but are not thus far problematic [on the present site].
■	The following factors recommend against control:
1	Species whose numbers are stable or decreasing.
2	Non-natives that colonize only disturbed areas and do not move into undisturbed habitats.
3	Pest species that will be pushed out by natives with succession or with the re-establishment of natural processes, e.g. fires, flooding.
4	Pest species for which long-term control or elimination cannot be accomplished at reasonable expense.

3.7.2 Marine Invasives

Effective controls should be placed on ships coming into Anaheim Bay. Ballast water is the most prevalent means of dissemination of marine invasive species. Ballast water can convey larval forms of benthic species, but not the natural predator associated with the adult form; plankton and their resting stages are also transported. Invasives attach to hulls of ships and pleasure boats, and to intended introduced species, such as oysters for commercial harvesting, or species for commercial, sport fishery, or maricultures. Invasives arrive from the release of unwanted organisms by aquarists or bait fishermen and naturally spread from original point of introduction.

Ballast water controls for vessels using ballast water are regulated under the CWA and invasive species laws. The NISA of 1996 (16 U.S.C. 4701) mandates a ballast water management program for U.S. Armed Forces vessels to demonstrate technologies and practices to prevent introduction of aquatic non-indigenous species into waters of the U.S. OPNAVINST 5090.1C CH-1 describes U.S. Navy policy for ship ballast water and anchor system sediment control. The Marine Environmental Protection Committee of the International Maritime Organization (IMO) has developed guidelines for the control of ship ballast water to prevent the introduction of unwanted aquatic organisms and pathogens. The USCG published these guidelines for adoption as voluntary standards. Since U.S. Navy ships operate worldwide, the U.S. Navy has chosen to adopt the intent of the USCG standards.

When the CWA was amended in 1996, new requirements were enacted at the national level. In response, DoD (with the U.S. Navy as lead), the EPA, and the USCG are leading an effort to develop national standards for controlling discharges from U.S. Armed Forces vessels. Uniform National Discharge Standards are being developed with the purpose of providing a comprehensive system for regulating discharges incidental to the normal operation of an Armed Forces' vessel.

Using a marine pollution control device (MPCD), a determination was made and published in 1999 (Table 4-13 in CFR 40, Chapter VII) as to which discharges will need to be controlled, and which will not require controls. The present ballast water management exchange program of the U.S. Navy should be continued and evaluated for its effectiveness. And, at a minimum, the boating community needs to be aware of their role in the possible transfer of exotic invasive species from port to port, while effective preventative measures are being developed.

The California Fish and Wildlife Code (Section 2271 and Section 6400) makes it illegal to release exotic organisms into California waters via ballast dumping or any other means, with penalties up to $5,000 and one year in jail for each violation. California Environmental Quality Act (CEQA) and NEPA assessments of U.S. Navy projects involving marine ports or terminals should identify, discuss, and adopt mitigations for ballast water impacts (Cohen 1998).

3.7.2.1 *Littorina littorea*

Littorina littorea is a persistent invertebrate (mollusk) that has been shown to impact intertidal ecosystems strongly. It has been suggested as a highly suitable bio-indicator species for contamination of the marine environment (Jackson 2002). This stems mainly from its ability to accumulate trace elements and compounds and consequential behavior changes (Global Invasive Species Database 2005). *L.littorea* fundamentally alters the circulation and abundance of algae on rocky shoreline and converts soft-sediment to hard substrate (Lubchenco 1978; Bertness 1984).

Littorina littorea is native to the northeastern Atlantic. There has been no evidence of any reproducing population of *L. littorea* on the West Coast to date. The presence of vast rocky substrate, consistently cool temperatures and a full range of salinity conditions suggest that physical environmental factors would not thwart the establishment or range expansion of *L. littorea* on the Pacific Coast.

In October 2002, a copious number of *Littorina littorea* mollusk shells were found along the base of a chain-link fence in Anaheim Bay, just north of U.S. Highway 1 within the NWR at NAVWPNSTA Seal Beach (Chang *et al.* 2007[draft]). Recreational fishermen frequented this location until the U.S. Navy and USFWS erected a fence in 2003 with the intent to detour trespassers. In June 2004, a large population of *L. littorea* was discovered on the opposite side of the channel, also located within SBNWR. This site is still used by recreational fishermen. During surveys of suitable substrate in the Anaheim Bay and surrounding embayments for *L. littorea* conducted in 2004, *L. littorea* was not found elsewhere (Chang *et al.* 2007 [draft]).

The population of *L. littorea* found within SBNWR is the largest population presently documented on the Pacific Coast of North America (Chang *et al.* 2007 [draft]). Efforts to remove this population of *L. littorea* from Anaheim Bay were initiated in August 2004 with permission from CDFW, USFWS, and the U.S. Navy for collections of marine life, and for work at SBNWR. Continued monitoring of the NAVWPNSTA Seal Beach/Anaheim Bay sites will determine whether actions have been successful in preventing the establishment of *L. littorea* populations here.

Littorina littorea may have been introduced to Anaheim Bay with an algal filling substance from New England, or as an element of seafood or aquarium acquisitions discarded at the location site. The Northern Atlantic algae *Ascophyllum nodosum* is frequently used as packing material in live bait worm and lobster consignments originating in Maine; these are likely vectors for the transportation of related nonindigenous species (Miller 1969; Miller *et al*. 2004). Associated organisms are expectedly discarded on the shoreline with *A. nodosum* on a common basis, principally at high traffic fishing sites.

Perhaps possible vector invasions need to be mitigated to prevent reintroduction. Posting *"No Dumping"* signs as well as erecting an additional barrier to prevent clammers and fisherman from accessing the *L. littorea* areas of detection could aid in this. These measures could be in augmentation to the ratification and enforcement of legislation prohibiting the discarding of live seafood materials or baitbox contents in the region. See Section 3.5.3 for the NAVWPNSTA Seal Beach saltwater fishing policy.

3.7.2.2 *Caulerpa taxifolia*

A very invasive species which has not been found at Anaheim Bay, but that deserves special attention, is the marine algae called "killer algae" (*Caulerpa taxifolia*). It was discovered in a coastal lagoon in Carlsbad in June of 2000, and more recently in Huntington Harbor. The species does not pose any human health threat, but it grows very rapidly (approximately one inch per day) and can form a dense mat on any surface including, rock, sand, or mud. This dense smothering blanket chokes out all native aquatic vegetation in its path when introduced in a non-native marine habitat. Consequently, fish, invertebrates, marine mammals, and sea birds that are dependent on native marine vegetation are displaced or die off from the areas where they once thrived. *C. taxifolia* can grow in shallow lagoons as well as to depths of 300 feet and will eliminate native seaweeds, sea grasses, reefs and other communities (CWQCB 2001). This algae is also toxic to some invertebrates. In 1998, *C. taxifolia* was designated a prohibited species under the federal Noxious Weed Act and the importation, sale, transport, and interstate trade of the species is a federal offense.

Introductions of *C. taxifolia* into California waters were probably from aquarium water illegally emptied into or near a storm drain, creek, lagoon, bay, or the ocean. *C. taxifolia* spreads mainly by fragmentation and can be transported by boats and fishing gear. Tourism, pleasure boating, recreational diving, as well as navigation could be affected through quarantine restrictions intended to prevent the spread of the species. Prevention of new introductions from aquaria and detection of existing infestations are critical. Divers, Sailors, and fishermen should become familiar with its appearance. If located, it should not be disturbed and the Southern California Caulerpa Action Team (SCCAT) should be contacted immediately. This group, consisting of representatives from state, federal, local and private entities, has been organized to respond quickly and effectively to discovered patches. Treatment and monitoring of impacted areas is long-term and costly.

3.8 Pest Management

In conformance with the requirements of DoD Instruction 4150.07, OPNAVINST 6250.4B, and OPNAVINST 5090.1C, NAVWPNSTA Seal Beach performs Integrated Pest Management as directed by an Integrated Pest Management Plan (IPMP). The IPMP (July 2011) is a comprehensive, long-range document that captures all the pest management and pesticide-related activities conducted at Naval Weapons Station Seal Beach.

The IPMP describes pest management activities and requirements at NAVWPNSTA Seal Beach to provide Force Health Protection, maintain facilities, protect environmental resources, and improve personnel quality of life. The pest management program includes pest control and grounds maintenance for administrative and industrial facilities, MWR facilities, private leased military family housing, agricultural outlease crop protection, and natural resources protection. The plan adds value by developing compliance systems and streamlining operations involving the use of pesticides, including applications, storage, and the archiving records, all of which are tightly regulated by FIFRA, state and local laws, and DoD and Navy regulations. As a planning document, the IPMP is also a vital component of effective integrated pest management (IPM) and the installation Environmental Management System (EMS).

The Naval Facilities Engineering Command Southwest (NAVFAC Southwest) Applied Biology (AB) Program, San Diego, California, prepared this plan as a rewrite of the Pest Management Plan that was written in 2003. Significant changes to the installation include the privatization of military family housing, changes in agricultural

lessees and new farming practices, new program administrative procedures, new regulatory requirements, and changes to the pest control and grounds maintenance contracts. The plan provides comprehensive information on the installation's pest and pesticide management program for installation staff and internal and external compliance auditors. It incorporates specific pest management practices and local, State, Federal and Department of Defense regulations.

Mosquito Control

To control mosquitoes, the Orange County Vector Control District (OCVCD) has used *Bacillus thuringensis* var. *israelensis* (a biological control that is specific for mosquitoes, black flies, and midges, and not known to harm other invertebrates or vertebrates).Application focuses on pickleweed-surrounded depressions left filled with water after high tides. Treated areas are outside the main body of cordgrass habitat.

In the administration and housing areas, a licensed pest control company is employed to control pest insects, including mosquitoes. A list of pesticides approved for use is shown in Appendix F.

3.9 Animal Damage Control: Predator Management, Feral Animal Removal, Urban Wildlife

If wildlife finds food, water, or shelter in areas populated by humans, they may adapt to and possibly thrive in the environment. This may result in transmission of disease, damage to buildings, and a threat to native plants and wildlife. In particular, coyotes, rats, pigeons, sparrows, feral dogs and cats tend to become nuisances and occasionally a health hazard.

Sections of CFR Title 14 and the Fish and Wildlife Code address animal damage control. Under the law, game species and fur-bearing mammals may be hunted and killed, or trapped. Although hunting and trapping are prohibited on NAVWPNSTA Seal Beach, the control of predatory animals, including wild cats and wild dogs and/or the reduction of excessive wildlife as requested by the USFWS is permitted (NAVWPNSTASB 5800.1C [28 January 1966]). According to CFR Title14, trapped animals may be euthanized or released on-site; however, they may not be relocated off-site without written authorization of CDFW (See Section 5.4.4 Predator Management of Special Status Wildlife Populations

The following non-game species, which make up the majority of depredation, damage, or nuisance situations may be removed under CFR Title 14: coyotes, weasels, skunks, opossums, moles and rodents (with the exception of tree and flying squirrels or threatened and endangered species), non-native birds, and those birds listed under a Depredation Order in CFR Title 50, section 21.43. Permits may be obtained for the removal of additional species with the approval of CDFW and USFWS if federally-listed species are involved.

Feral dogs and cats present a more sensitive problem for land managers. Feral animals, including dogs and cats, can be a serious threat to human health and native wildlife populations, including threatened and endangered species. Consequently, U.S. Navy policy prohibits free-roaming pets, including cats, and the feeding of feral animals on NAVWPNSTA Seal Beach. U.S. Navy policy also requires all dogs to be licensed, registered, and confined to a leash on military installations. In addition, Trap-Neuter-Release (TNR) programs are to be discontinued.

Techniques for controlling avian predators include live-capture and release off-site, live capture and euthanization, shooting and toxicant application. See Section 2.4.1.3 Migratory Bird Treaty Act for a discussion of when and

which birds can be taken. A copy of an MOU developed between USFWS and DoD to define protected bird species can be found in Appendix D.

3.9.1 Predator Management

The Navy currently supports management of mammalian predators on NAVWPNSTA Seal Beach and SBNWR through an agreement with USFWS, primarily for the protection of threatened and/or endangered species. Although habitat management is preferred, shooting, trapping, biological control by natural predators, chemical control by deterring animals with repellent, and physical control using scare devices or exclusion fencing are approaches prescribed in the 1990/1991 final EIS and ROD for endangered species management and protection at NAVWPNSTA Seal Beach and SBNWR. Management emphasis for SBNWR has been on conservation of endangered species especially the California least tern and light-footed clapper rail.

NAVWPNSTA Seal Beach and SBNWR contain one of the largest coastal salt water marshes in southern California, a remnant of the natural salt marsh of historic Anaheim Bay. This salt marsh, adjacent uplands and open water are essential habitats for birds and other wildlife and plants native to the estuarine marsh ecosystem. Concentration of wildlife, including the light-footed clapper rail and the endangered California least tern, into smaller, more isolated habitat patches, such as the remnant salt marsh at NAVWPNSTA Seal Beach makes them more vulnerable to predators. Both the California least tern and the light-footed clapper rail face extinction from extensive loss and fragmentation of the native coastal salt marsh habitat.

California least terns typically use SBNWR during their breeding and brood-rearing seasons from April-August and clapper rails reside on the Refuge year-round. Of particular concern as a predator to these birds is the non-native red fox that appeared on SBNWR when coyotes disappeared in the mid-1970s. The red fox is considered a surplus hunter, and will commonly kill and cache prey of water birds and eggs in excess of their immediate food needs. See following *Red Fox* for additional information on this predator.

Changes in the predator community, such as that of the red fox, has caused reduction in available prey for native predators and incurred major impacts to sensitive and endangered species at NAVWPNSTA Seal Beach. These impacts have necessitated intervention by USFWS and managers to control the level of damage caused by red foxes and other predators. Other predators or threats to terns, rails, and their eggs on SBNWR are striped skunks, Virginia opossums, domestic cats and dogs, raccoons, long-tailed weasels, Norway rats (*Rattus norvegicus*), black rats (*Rattus rattus*), various raptors, great blue herons, common ravens, European starlings and American crows. Information summaries on some of these predators follows, and mammal and bird predator numbers are presented in Figure 3-6 through 3-11 (previously) and in Figure 3-14, Figure 3-15, Figure 3-16, Figure 3-17, and Figure 3-18 (following in Predator Summaries).

The 1990/1991 EIS and ROD chose an environmentally-preferred alternative for maximum flexibility in management of mammalian avian predators to "remain responsive to improvements and changes in technology and control techniques, operations and management of participating agencies, and situations that could suddenly and seriously threaten the endangered species." An active predator management program was combined with population monitoring, population and habitat studies and restoration of native salt marsh and upland coastal sage scrub habitats. Also prescribed was an evaluation of the feasibility of reintroducing coyotes to NAVWPNSTA Seal Beach and SBNWR. Overall the objective was to implement population and habitat monitoring and management activities aimed at restoring a balance to the estuarine salt marsh ecosystem at NAVWPNSTA Seal Beach and SBNWR. See Section 2.2.2 Seal Beach National Wildlife Refuge.

The EIS and ROD articulated a step-down plan of action for full implementation of the selected alternative over a 10-year period, consisting of three phases, seven major categories of action within each phase (e.g. predator management vs. public education), and several specific tasks within each action category. The timing and implementation of specific components of the plan across that ten-year implementation period would be based on appropriation of funding and availability of personnel or other resources. Predator management activities were identified for each phase, but specifics on who would be responsible for supporting which tasks and personnel were not identified. The ROD stated that the types of predator control activities conducted would be by mutual concurrence of Navy, USFWS, and Animal Damage Control (ADC) and coordinated with CDFW. Funding at full implementation of the Plan was expected to be $250,000 annually (1989 dollars), including 5.5 USFWS and Navy staff positions. Also, establishment of a permanent full-time ADC agent in Orange County would be pursued, with responsibilities to include implementation of measures to protect endangered species on NAVWPNSTA Seal Beach and SBNWR.

In 1983, a 4.5-foot high electric fence was installed around the whole perimeter of NASA Island. Commercially available anti-perching material was installed along the top of fence to deter predatory perching birds. In 1989 the electric fence around NASA Island was improved; it provides both a physical and electric barrier so no intrusion by mammalian predator is possible.

The USFWS contracts with a local private contractor to conduct predator management directly on SBNWR. Direct control activities could include monitoring, surveillance, rapping and shooting of potential predators. In 2000, predator management services were contracted for approximately 40 days between the period 01 March - 31 December, primarily to protect the NASA Island tern nesting colony, but was also expected to benefit the clapper rail. The contractor was authorized to conduct lethal and non-lethal, preventive and corrective control of mammalian and avian predators. The contract called for early coordination with the SBNWR manager and NAVWPNSTA Seal Beach natural resources staff.

Current guidelines for predator management contracted to USFWS are focused on protection of the California least tern and:

- Pre-nesting coordination will occur between USFWS and U.S. Navy, which will include a Station Security Brief. Rapid communication between USFWS and the contractor is facilitated through the use of pagers and emergency contact phone numbers.
- Live trapping shall be the principal method of control for all least tern predators. Live trapping will begin immediately upon discovery of the predation problem.

  - Documented predation by either mammalian or avian predators necessitates prompt action.

  - Trapping will begin one month before first nest initiation by least terns.

  - Various live-trap types may be used for specific animals on an as-needed basis. However, live-traps and soft-catch padded leghold traps shall be set to capture predatory mammalian species (EIS 1990). To check the traps two to three times daily and quickly respond by euthanizing target animals is considered most humane (EIS 1990).

  - All predatory mammalian species trapped on or near the least tern breeding colony shall be euthanized by standard humane methods and disposed off-site from SBNWR.

  - Avian least tern predators shall be live-trapped and released off-site. If individual raptors are deemed untrappable and are a documented threat to nesting least terns, other means (including lethal means) may be used.

-American kestrels and loggerhead shrikes shall be live-trapped using standard live-trapping techniques.

-The gull-billed tern shall not be trapped or shot.

- Live-trapped raptors shall be banded by USWFWS and released off-site within 24 hours of capture.

- All pet species trapped shall be taken to the Orange County Animal Shelter.

- Lethal removal will occur after trapping attempts have failed and will be the discretionary decision of the Refuge manager upon recommendation and discussion with the contractor.

  -Shooting of avian predators will be used as an option only after problem birds cannot be trapped or returns after release off-site and continues to hunt the least tern colony. American crows are an exception to this policy.[3] The contractor's 1996 report has indicated that the large crow population at NAVWPNSTA Seal Beach has learned to hunt the least tern colony at NASA Island; and "re-training" of the crow population is achieved by removing a relatively few individuals by lethal means found in the vicinity of the least tern colony at NASA Island and leaving these individuals out for other crows to see.

- Every effort shall be made to avoid and minimize losses to non-target native wildlife. Animals trapped that are not considered a threat to endangered species because of time of year trapped, total estimated numbers on the Station, or other factors may be released at the trap site or to an area away from the marsh based on criteria and guidelines described in, *Predator Control Action Index*. Seriously injured animals will be humanely euthanized and disposed off-site.

- Currently, injured wildlife are taken to:

  - Pacific Wildlife Project (Irvine), which will handle marine mammal strandings and pelican, among other wildlife.

  - Wetlands and Wildlife Care Center (Huntington Beach) (usually handles hawks).

  - International Bird Rescue and Research Center (San Pedro) for -brown and white pelicans

  - Friends of Sea Lion Recovery.

- Weekly summaries are made available to USFWS, U.S. Navy, and tern monitors and natural resource managers.

Feral Animal Removal

Exotic nonmarine predators, such as the feral cat and the red fox, have caused heavy losses of light footed clapper rails and other birds breeding in southern California coastal wetlands (Zembal 1993). Feral cat numbers are increasing on NAVWPNSTA Seal Beach. The U.S. Navy policy for feral animal control can be found in SECNAVINST 6401-1A, Veterinary Health Services, AFPMB TIM#37, Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the U.S., and OPNAVISNT 6250.4B, dated 27 August 1998, Pest Management Programs.

The above guidelines for predator management also pertain to feral animal removal.

[3]Note: There is an opinion that resident ravens have a tendency to chase away other ravens, crows, raptors when the resident raven pair is nesting in the area. Care should be taken to differentiate between crows and ravens.

Predator Monitoring - California least tern

Current predator management efforts for the California least tern colony are augmented by a monitoring group called "Eyes on the Colony." The Eyes on the Colony program, which is managed by SBNWR, was developed because of a predation event in 1999 when a number of crows invaded the least tern colony and decimated a large number of nests within approximately 30 minutes. Prior to this watch, there was a year of zero fledging. This number has increased to 100-150 fledges per year. In the past, the observers were all volunteers; however, more stringent guidelines for non-military personnel to be present on the Installation has resulted in paid observers. The program now consists of community volunteers and paid observers posted on the perimeter to watch for California least tern predators such as ravens, crows, and mammals. When one is sighted, the observer shakes a can of rocks to create a noise that will scare away the predator. If the predator does not vacate, the observers utilize radios and cell phones to contact predator control personnel and the range. The next step is to trap and then remove predators if simple scare tactics do not chase off predators.

The Eyes on the Colony observers were situated within the danger arc for a nearby firing range; however, in 2002 this location was moved to remove observers from danger. When a potential predator approaches the colony, observers are unable to enter this hot zone and are obliged to wait until the range goes cold prior to approaching the tern colony. Such a time lapse makes this solution unpopular with Eyes on the Colony program due to the potential of losses during this delay. An animal rights lawsuit on predator control in relation to the red fox, which the USFWS won in the early 1990s, also affected predator management protocols.

Since the Eyes on the Colony began with volunteers watching over the site, predation events have been minimal. Standard operating procedures were developed for coordination between Eyes on the Colony and the shooting range. Now there is close communication between the observers and the range so that danger is avoided during a predation event.

Predator Summaries

Gray Fox

This native species is found primarily in the chaparral-covered foothills of California (Ingles 1965); however, its presence has not been confirmed on NAVWPNSTA Seal Beach or SBNWR. The food of the gray fox consists of gophers, rabbits, white-footed mice, wood rats, and probably several bird species. Considerable amounts of vegetable material, including manzanita (*Arctostaphylos*) and toyon (*Heteromeles*) berries are eaten by the gray fox. Dens are usually under large rocks or in crevices of cliffs. In areas of favored habitat, it has been estimated that as many as four gray foxes occur per square mile. This species, unlike other canids, readily climbs trees. The gray fox is susceptible to many diseases and parasitic worms, which also affect domestic dogs (Ingles 1965).

Striped Skunk

The striped skunk occurs over most of the continental U.S. and is a common resident on NAVWPNSTA Seal Beach. It is omnivorous, eating fruits, berries, insects, small reptiles, small rodents, carrion, and eggs (Seymour 1968). Egg predation by striped skunks is usually distinguishable from that of other mammals (Rearden 1951). Striped skunks display different egg predation patterns than red foxes. Skunks do not cache eggs, but eat them at nests, leaving the eggshell (Rearden 1951; A. Sargeant, USFWS, *pers. comm.*). The importance of the striped skunk as a predator on healthy adult birds is probably minimal, although the potential for predation on flightless young of ground nesting birds is high (Johnson *et al.* 1989).

Based on night surveys, striped skunks ranked third in abundance of the four mammalian predators counted on NAVWPNSTA Seal Beach during the period 1986-1988. In 1989, striped skunks ranked first among the four predators observed on the Station. See Figure 3-14 for striped skunk observations during night surveys 1992–2000. Enemies of the striped skunk include humans, large dogs, coyotes, and great horned owls.

Based on their food preferences and foraging patterns, striped skunks are capable of predating ground nesting endangered species of SBNWR. Before an electrified fence was installed around the perimeter of NASA Island in 1983, striped skunk tracks were found there during the California least tern breeding season. In 1982, 16 of 17 California least tern nests were destroyed during the egg laying and incubation period. Evidence indicated the predator was a skunk. Because striped skunks had previously been responsible for the loss of California least tern eggs on NASA Island, and at other least tern colonies in southern California, they are currently being controlled to reduce their significant threat to endangered species and their eggs.

Virginia Opossum

The Virginia opossum is the only native marsupial in the United States (Ingles 1965). It was introduced to California near San Jose about 1900 (Seymour 1968) and rapidly spread south to northern Baja California, Mexico (Hall 1981). The Virginia opossum is a resident on NAVWPNSTA Seal Beach and SBNWR.

The Virginia opossum is nocturnal, preferring river bottoms and creeks with dense cover. Except during the breeding season, the opossum is solitary (Seymour 1968). It commonly dens in hollow trees, rock piles, under buildings and in burrows excavated by other species. Studies have found that birds constitute less than 7 percent of their total diet (Hopkins and Forbes 1980). They also consume carrion.

Virginia opossums were seen during 7 of 22 night surveys conducted on NAVWPNSTA Seal Beach from January 1986 to July 1989. Only one individual was seen during each survey. Of the nocturnal mammalian predators observed during these night surveys, opossums were least often sighted. See Figure 3-15 for observations of the opossum during 1992–2000 night surveys on NAVWPNSTA Seal Beach and SBNWR.

Due to their opportunistic lifestyle, the potential exists for opossums to be significant predators of eggs and young of ground nesting birds, including endangered species. Opossums are known predators of eggs of California least terns at nesting colonies in southern California (D. Zembal, USFWS, *pers. comm.*). While their numbers on the Station remain low, opossums are not considered a significant threat to predate eggs or young of the Refuge's endangered birds so they are controlled on NAVWPNSTA Seal Beach to maintain their population at a low level.

Raccoon

The raccoon is one of the most widely distributed carnivores throughout California and the U.S. It is found primarily along lake shores, streams, and other riparian areas. Its presence is easily detected by its tracks. This mainly nocturnal, native mammal is an efficient and opportunistic hunter, displaying omnivorous feeding habits. The raccoon's diverse diet includes crayfish, fish, small mammals, birds, bird eggs, insects, fruit, nuts, and berries (Jameson and Peeters 1988).

Raccoon tracks have been reported only once in SBNWR since its establishment, but there has recently been a reoccurrence of the mammal in the area. During the latest night mammal survey a raccoon was spotted near the wharf and tracks have been seen on the Refuge. A scarcity of suitable habitat, such as riparian and similar freshwater areas on the Station, is probably the reason for their minimal presence. Local wildlife rehabilitators occasionally release raccoons illegally in Orange County (E. Burkett, CDFW, *pers.comm.*). If raccoons ever become common on the Refuge, they would be considered predators of concern.

Feral/Domestic Cats

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAX
1992	5	7	10	4	7	7	11	8	4	6	3	4	11
1993	---	3	3	2	4	4	5	7	0	1	1	4	7
1994	---	---	---	---	---	---	---	---	---	---	---	---	---
1995	6	2	8	1	4	0	2	2	0	---	1	1	8
1996	---	2	8	5	1	3	3	3	6	---	9	4	9
1997	---	---	---	---	---	---	0	2	---	---	---	---	2
1998	---	---	---	---	7	---	---	6	---	---	---	---	7
1999	---	---	---	---	---	7	1	1	2	---	---	1	7
2000	1	---	3	5	3	4	---	5	---	---	---	---	5
MAX	6	7	10	5	7	7	11	8	6	6	9	4	

Striped Skunk

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAX
1992	13	9	6	2	7	31	36	14	24	11	2	7	36
1993	---	10	3	16	11	8	16	21	18	25	22	8	25
1994	---	---	---	---	---	---	---	---	---	---	---	---	---
1995	4	36	4	30	8	29	19	24	17	---	21	10	36
1996	---	24	13	15	35	19	10	4	5	---	5	3	35
1997	---	---	---	---	---	---	13	3	---	---	---	---	13
1998	---	---	---	---	14	---	---	15	---	---	---	---	15
1999	---	---	---	---	---	9	13	16	4	---	---	1	16
2000	9	---	10	8	5	4	---	3	---	---	---	---	10
MAX	13	36	13	30	35	31	36	24	24	25	22	10	

Opossum

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAX
1992	3	7	3	1	1	0	3	1	0	1	0	0	7
1993	---	0	0	1	1	0	1	1	1	0	0	0	1
1994	---	---	---	---	---	---	---	---	---	---	---	---	---
1995	1	0	1	3	0	1	0	1	0	---	2	1	3
1996	---	2	1	2	0	1	0	1	1	---	3	2	3
1997	---	---	---	---	---	---	0	5	---	---	---	---	5
1998	---	---	---	---	1	---	---	2	---	---	---	---	2
1999	---	---	---	---	---	7	0	3	3	---	---	0	7
2000	1	---	1	1	1	2	---	1	---	---	---	---	2
MAX	3	7	3	3	1	7	3	5	3	1	3	2	

Figure 3-14. Summary of observations of domestic cats, striped skunks, and opossums during monthly night surveys on Seal Beach National Wildlife Refuge and the Naval Weapons Station Seal Beach, 1992- 2000.

Feral Cat

Feral cats include domestic cats that have reverted to living in the wild and descendants of domestic cats that breed and live in the wild. Feral cats are predators of small mammals, birds, reptiles, and insects (McMurry and Sperry 1941). Mammals usually constitute the most important category of prey while birds contribute as much as 19 percent (Hubbs 1951) of the stomach contents of feral cats. Most domestic cats appear to be opportunistic hunters. Churcher and Lawton (1989) found that the diets of foraging feral cats consisted of 65 percent small mammals and 35 percent birds. They calculated that at least 20 million birds are killed annually by cats in Britain, and concluded that domestic cats may be a major killer of small birds and mammals in urban and suburban environments. Cats are also reported to regularly prey on larger animals including rabbits, pheasants and ducks (Hubbs 1951; Liberg 1984).

George (1974) estimates over 10 million cats in the U.S. have access to rural hunting areas and concludes that rural cats probably rival in abundance all other large predators combined west of the Sierra Nevada and in various other localities. Hubbs (1951) reports densities of one vagrant cat per 20 acres in the Sacramento Valley. Most researchers studying the diets of vagrant or free-roaming cats report their samples include a mix of data for feral and house-based cats. Separating these groups is difficult, due to the continuum of cats ranging from house-based pets and partially-subsidized strays to truly feral (free-living) individuals.

Predation by cats may affect endangered and other bird populations in at least two ways: (1) by direct predation on bird and their eggs and (2) by reducing available alternative prey. Birds generally make up from three to 25 percent of the diet (by volume) of free-roaming cats (Eberhard 1954; Errington 1936; Hubbs 1951; Liberg 1984), and bird eggs are also included in their diets (Hubbs 1951). The importance of birds to the diets of cats has been found to vary with the season of the year. Hubbs (1951) found birds constituted 25 percent of the annual diet of cats on his Sacramento Valley study area. However, during June, predation on birds provided 70 percent of the food volume in the diets of these cats.

Cats can affect populations of endangered and other birds by reducing the availability of alternative prey. Many, if not most cats, derive some of their food from people. Even strays are often fed by well-meaning people. However, the effect on this food subsidy is to maintain an artificially high level of these predators in the ecosystem. During times of shortage, other wild predators may be forced to move or suffer starvation. while subsidized cats can rely on human-provided food and continue to depress the local populations of their prey species. George (1974) concluded free-roaming cats adversely affect wintering raptors by reducing the prey base of small mammals to low levels. Under such conditions, the scarcity of alternative prey may cause predators to shift their hunting efforts to other species including endangered birds.

Feral cats have been observed maintaining their territories throughout NAVWPNSTA Seal Beach. In systematic night surveys, during 1986-1988, feral cats were second only to red foxes as the most commonly observed predatory mammal. In 1989 night surveys, they ranked a close third behind striped skunks. Feral cats are found in and around almost all structures, storage areas, open space on the Station, and the wetlands of the Refuge. They are present because of the proximity of urban areas to the station. The impact of feral cats on native wildlife on the Station is mostly unknown. Feral cats have been known to kill adult light-footed clapper rails (Zembal and Massey 1988; Zembal *et al* 1989; M. Wietzel, USFWS, *pers. comm.*). See Figure 3-15 for observations of feral cats during 1992-2000 night surveys on NAVWPNSTA Seal Beach and SBNWR.

Badger

The North American badger is listed as a Priority 3 Species of Special Concern by the CDFW (Williams 1986). Grinnell *et al.* (1937) noted that by 1937, badgers were reduced in numbers over most of their range in California. Agriculture and urban development have been the primary cause of decline and extirpation of the badger in California.

No current data exist on the status of badger populations in California, but they have declined or disappeared in coastal basins of southern California and other places, particularly west of the Sierra Nevada. There are no specimens from Orange County listed in the distribution records of Mammalian Species of Special Concern in California, although there are recent records from the Santa Ana Mountains.

Although the badger is listed as having occurred on NAVWPNSTA Seal Beach in the 1960s (USFWS and CDFW 1976), no observations or signs have been reported since then. This species is found throughout most of California,

but it is localized and most abundant on sandy flats where there are numerous burrowing rodents. Although mostly nocturnal, the badger also is active during the day.

In California, badgers occupy a diversity of habitats. Requirements seem to be sufficient food, friable soils, and relatively open, uncultivated ground. Grasslands, savannahs, and mountain meadows near timberline are preferred. They prey on burrowing animals such as gophers, ground squirrels, marmots, and kangaroo rats. They also will eat several other foods including mice, reptiles, birds and their eggs, and bees and other insects.

Sargeant and Warner (1972) documented a home range of 2,091 acres (8.5 square kilometers) for a female badger. In Idaho, Messick and Hornocker (1981) found home ranges averaged 2.4 and 1.6 square kilometers for adult males and females, respectively. Densities and home ranges on the Station for the period when badgers were present is unknown.

Long-tailed Weasel

This small native carnivore is commonly observed hunting during the daytime and also is active at night (Ingles 1965). The long-tailed weasel's quickness and slender body make it well suited to climbing trees and moving through rock piles, brush, and thick growth in search of food. Its diet consists mostly of small rodents, although it sometimes feeds on rabbits and birds (Ingles 1965).

Long-tailed weasels prey on duck eggs and can be important nest predators (Fleskes 1988). Fleskes (1988) found all eggs predated by captive weasels had one entry hole in the end of the egg, ringed with small fragments and "bite-outs." Eggs consumed by wild weasels exhibited traits observed during captive feeding trials.

Fish and Wildlife Service personnel have not observed weasels on SBNWR during daylight hours or night surveys, although one was captured on the Station. Apparently, only a small population of this species exists on NAVWPNSTA Seal Beach and currently there is no evidence which suggests that long-tailed weasels are a major predator of endangered species on their eggs.

Coyote

Coyotes often locate their rearing dens in vegetated slopes, banks, rock ledges, natural crevices, and caves, but sometimes they enlarge burrows dug by California ground squirrels, badgers (Ingles 1965) or other mammals (Bekoff 1977). In open plains, deserts, and other locales, coyotes dig their own dens (Seymour 1968).

In California, coyotes mate in February (Jameson and Peeters 1988). Birth occurs following a gestation period of 58-65 days. Coyote density and prey availability (including rodents) affect litter size with litter size averaging about four young per pair at high densities and seven young per pair at low densities (Bekoff 1977). Pups reach adult weight in about nine months.

Between six and nine months of age some young coyotes disperse. Dispersal can occur randomly in any direction for distances upwards of 80-160 km. This dispersal occurs between October and February (Bekoff 1977). Density of coyotes in a given area is influenced by local conditions. In many areas where studies have been accomplished, typical densities are 0.5 to 1.0 coyote per square mile. Coyotes generally live six to eight years in the wild (Bekoff 1977).

In California, coyote diets include mammals, birds, reptiles, invertebrates, and plant material (Ferrel *et al*. 1953). Striped skunk, spotted skunk, opossum, and weasel are also eaten by coyotes. A wide variety of rodents are consumed, including pocket gophers, ground squirrels, harvest mice, and wood rats. In southern California, the important food items of this species are rabbits (26.4% by volume) and rodents (24.4% by volume). Birds contribute

less than five percent of the total diet of coyotes throughout California (Ferrel *et al.*1953), though they are known predators of least tern colonies and could potentially be problematic if not excluded from the site.

Coyotes may carry a wide variety of parasites, with fleas the most common ectoparasite. Diseases such as distemper, rabies, and bubonic plague are known in this species (Beknoff 1977). Coyotes appear to tolerate other carnivores except red foxes and bobcats (Bekoff 1977). Sargeant *et al.* (1987 Harrison *et al.* 1989) and others that have studied spatial relationships between coyotes and red foxes have found that spatial segregation exists between the two species, with the coyote the dominant species.

Summary of observations of Coyotes during monthly night surveys on Seal Beach NWR & NWS, 1992-2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAX
1992	0	0	0	0	0	0	3	2	2	0	0	0	3
1993	---	0	0	1	0	4	0	1	0	1	0	0	4
1994	---	---	---	---	---	---	---	---	---	---	---	---	---
1995	0	1	3	0	1	0	1	2	1	---	0	0	3
1996	---	0	0	1	1	0	0	0	0	---	0	1	1
1997	---	---	---	---	---	---	0	0	---	---	---	---	0
1998	---	---	---	---	0	---	---	4	---	---	---	---	4
1999	---	---	---	---	---	0	2	1	0	---	---	1	2
2000	1	---	0	0	1	1	---	2	---	---	---	---	2
MAX	1	1	3	1	1	4	3	4	2	1	0	1	

*MAX= Peak number of animals observed monthly or annually

** A cell with a zero indicates a survey was conducted on that date but no animals were observed; a cell withour a numerical value indicates either no surveys were conducted on that date or survey results were unavailable to include here.

***Two surveys were conducted in each of August & September 1999 and August 2000. The maximum number of animals recorded each month was used in this table.

Figure 3-15. Summary of coyote observations during monthly night surveys on Naval Weapons Station Seal Beach and the National Wildlife Refuge, 1992-2000

.

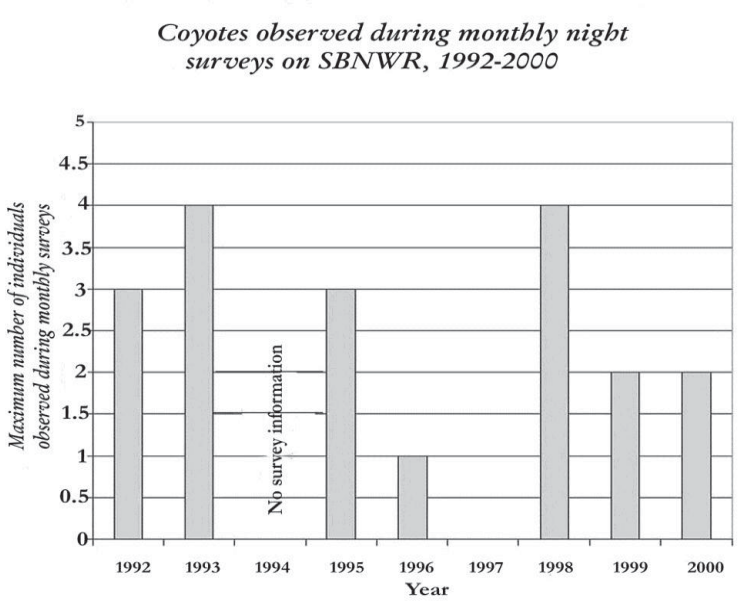


Figure 3-16. Coyotes observed during monthly night surveys on Naval Weapons Station Seal Beach and Seal Beach National Wildlife Refuge, 1992- 2000.

Red Fox

Red foxes are the most widely distributed carnivore in the world (Voigt 1987). This is partly because they adapt well to living in close association with man, tolerating disturbance and altered conditions in various habitats. Aside from NAVWPNSTA Seal Beach and SBNWR, red fox habitat in Orange and Los Angeles counties includes golf courses, city and county parklands (open, short, grassland with scattered trimmed trees), recovering gravel pits, highly disturbed riparian areas, cemeteries, oil fields, airports, flood control channels, nurseries, and scattered ruderal fields in suburban areas. Red foxes generally are displaced or don't occur in areas where coyotes are present (Schmidt 1986).

Two distinct populations of the red fox, one native and the other introduced, occur in California (Gould 1980). The Sierra Nevada red fox (*Vulpes vulpes necator*) is native to California (Gray 1977; Hall 1981), occurring from Siskiyou County south to Tulare County, generally at elevations between 5,000 and 8,400 feet. The lowest reported elevation at which this species occurs is 3,900 feet in Yosemite Valley (Gould 1980). Schempf and White (1977) consider the Sierra Nevada red fox rare and possibly declining throughout its range and is listed as threatened by the State of California.

An introduced population of the red fox occurs in the Sacramento Valley where they appear to be expanding their range (Gray 1975, 1977). These differ from the native Sierra Nevada red foxes and are most like those from the northern Great Plains (*V. v. regalis*). Additionally, an introduced red fox population of unknown origin and size is centered in southern Los Angeles County and Orange County, north of NAVWPNSTA Seal Beach (Roest 1977). A.I. Roest (*pers. comm.*) determined that a red fox skull found at the Bolsa Chica State Ecological Reserve in 1980 was neither that of a native Sierra Nevada red fox, nor that of the introduced population of Sacramento Valley red foxes. He suggested it was most closely related to red foxes in the Midwest of the Rocky Mountain region (*V. v. regalis* or *V. v. macroura*). Red foxes on NAVWPNSTA Seal Beach are believed to be of the same origin because of the close proximity of the Naval Weapons Station to the Bolsa Chica State Ecological Reserve.

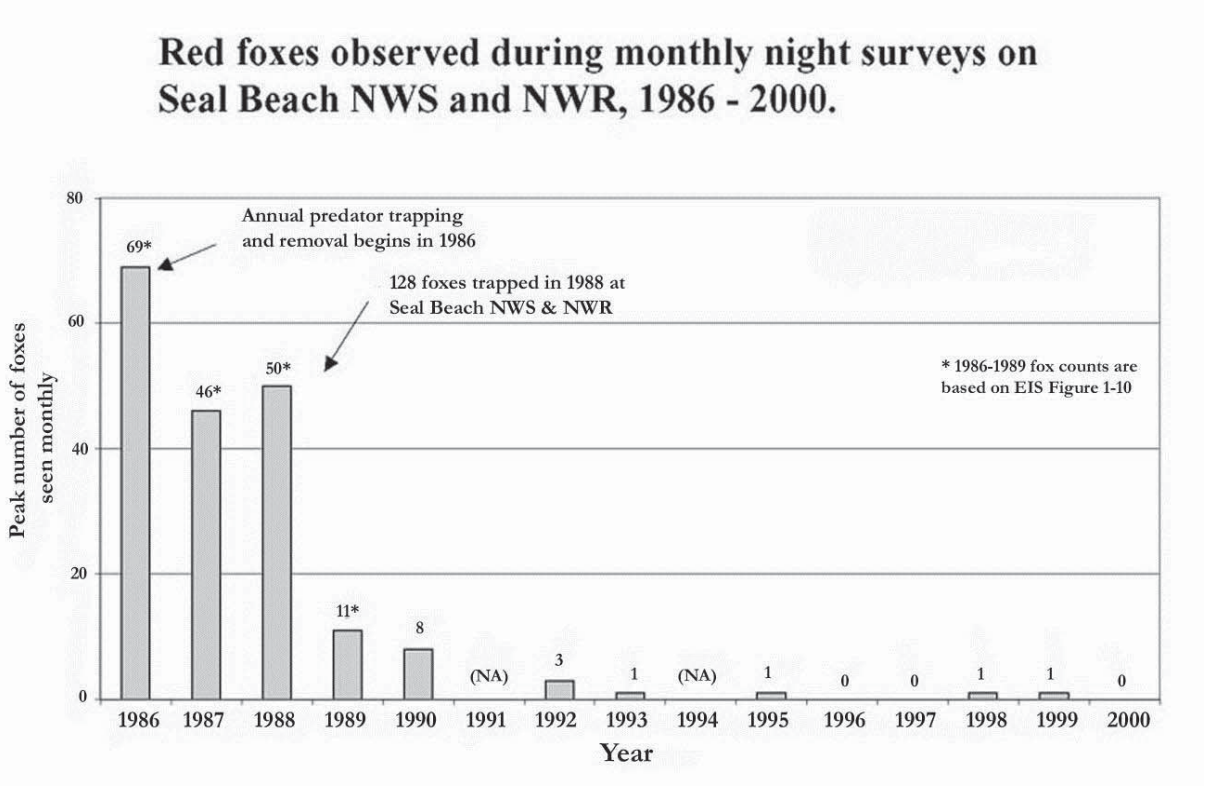


Figure 3-17. Red foxes observed during monthly night surveys on Naval Weapons Station Seal Beach and the Seal Beach National Wildlife Refuge, 1986-2000.

Attempts have been made to determine where the Seal Beach red fox population may have first been established. Red foxes were breeding on the Refuge from the 1960s through 1989 (P. Peterson, *pers. comm.*). The Bolsa Chica is located about 2.3 miles northwest of NAVWPNSTA Seal Beach and red foxes are known to still occur there. Red foxes from this location could have provided the nucleus for the red fox population at NAVWPNSTA Seal Beach.

Indications are that a growing, breeding population of red foxes became established on NAVWPNSTA Seal Beach during the early 1980s. The number of daytime sightings of red foxes, red fox scat, and tracks on SBNWR and NAVWPNSTA Seal Beach then became numerous. Dens were found, and young red foxes were observed.

The first red fox den found on the Station by USFWS personnel was in 1980, adjacent to the east boundary of SBNWR. From 1980 through 1989, 18 dens were found in, or immediately adjacent to, the Refuge. Red foxes denned in, or immediately adjacent to the Refuge each year from 1980 through 1989. From 1986 to 1988 red fox denning also occurred on NAVWPNSTA Seal Beach outside SBNWR. In 1988, 11 active red fox dens were discovered on the Station outside the Refuge.

Red foxes are known carriers of a variety of imported diseases, presenting a significant public health concern. These consist of viral diseases such as rabies, canine distemper, and infectious canine hepatitis. These diseases can be transmitted from the red fox to native canines (e.g. coyote, kit fox, gray fox) and domestic dogs. Of the viral diseases, rabies is a significant threat to human health. Red foxes may host bacterial diseases, such as leptospirosis, which can infect dogs and humans. Parasites, such as *Echinococeus multilocularis*, canine heartworm, and sarcoptic scabies, may be transmitted to other canids by red foxes.

Summary of observations of Red fox during monthly night surveys on Seal Beach NWR &NWS, 1992-2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAX
1992	3	1	0	1	0	0	0	0	0	0	0	1	3
1993	---	0	0	0	0	0	0	0	1	0	0	0	1
1994	---	---	---	---	---	---	---	---	---	---	---	---	---
1995	1	0	1	0	0	0	0	0	0	---	0	0	1
1996	---	0	0	0	0	0	0	0	0	---	0	0	0
1997	---	---	---	---	---	---	0	0	---	---	---	---	0
1998	---	---	---	---	1	---	---	1	---	---	---	---	1
1999	---	---	---	---	---	1	0	0	0	---	---	0	1
2000	0	---	0	0	0	0	---	0	---	---	---	---	0
MAX	3	1	1	1	1	1	0	1	1	0	0	1	

*MAX= Peak number of red foxes observed monthly or annually
** A cell with a zero indicates a survey was conducted on that date but no foxes were observed; a cell withour a numerical value indicates either no surveys were conducted on that date or survey resurlts were unavailable to include here.
***Two surveys were conducted in each of August & September 1999 and August 2000. The maximum number of animals recorded each month was used in this table.

Figure 3-18. Summary of observations of red fox during monthly night surveys on Naval Weapons Station Seal Beach and Seal Beach National Wildlife Refuge 1992- 2000 .

3.10 Grounds Maintenance in the Built Environment

3.10.1 Landscaping

Photo 3-17 provides an example of architecture on NAVWPNSTA Seal Beach. Interspersed throughout the structures and parking lots at NAVWPNSTA Seal Beach are islands of landscaped herbs, shrubs, and trees. Most landscaping companies tend to make use of non-native ornamentals due to their commercial availability, appearance and ease of care. The majority of these species are not invasive and even provide a secondary habitat for use by some wildlife. However, some species may cause problems in native habitats if not controlled. For example, iceplant should not be used when other landscape or native species can provide an area with sufficient cover and stability. Iceplant is listed in Appendix J, Table J-2, as a plant that is not permitted.

The President has directed that federal agencies shall implement the following landscaping policies where cost-effective and to the extent practicable:

- Use regionally native plants for landscaping. EO 11987 restricts the use of exotic plant species in landscape and erosion control measures;
- Design, use, or promote construction practices that minimize adverse effects on the natural habitat;
- Seek to prevent pollution by among other things, reducing fertilizer and pesticide use, using integrated pest management techniques, recycling green waste, and minimizing runoff. Landscaping practices that reduce the use of toxic chemicals provide one approach for agencies to reach reduction goals established in EO 12856 “Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements.”

- Implement water-efficient practices, such as the use of mulches, efficient irrigation systems, recycled or reclaimed water, audits to determine exact landscaping water-use needs, and the selecting and siting of plants in a manner that conserves water and controls soil erosion. Landscaping practices, such as planting regionally native shade trees around buildings to reduce air conditioning demands, can also provide innovative measures to meet the energy consumption reduction goals established in EO 12902, "Energy Efficiency and Water Conservation at Federal Facilities;"
- Create outdoor demonstrations incorporating native plants, as well as pollution prevention and water conservation techniques, to promote awareness of the environmental and economic benefits of implementing this directive. Agencies are encouraged to develop other methods for sharing information on landscaping advances with interested non-federal parties.

Naval commanders approved these directives and issued guidelines for landscaping on U.S. Navy lands (DoN 1994). In keeping with these federal standards, U.S. Navy policy requires minimizing disturbance to native habitats and using integrated pest management practices, xeriscape landscaping, and recycled water in arid environments. To the extent practical, NAVWPNSTA Seal Beach must use regionally native plants for landscaping and erosion control measures, as indicated by EO 11987.

With the above federal guidelines in mind, a well-designed landscaping plan has several advantages. In southern California's arid environment, utilizing native and other drought tolerant plants, coupled with improved irrigation design, will result in significant water cost savings. Landscaping can also reduce glare, buffer noise, improve visual aesthetics, create wind buffers, and provide for heat control in recreation areas and around buildings, reducing energy costs.

Comprehensive landscape planning for NAVWPNSTA Seal Beach must consider both landscape design quality and appropriateness for the local site, including consistency with the landscape design of local communities and any historical elements of the landscape. Design quality includes both aesthetic and functional aspects. Functional purposes include security (Anti-Terrorism Force Protection), screening, directing views and/or traffic, highlighting areas of importance, controlling erosion, and creating a sense of scale for buildings and open spaces. Design appropriateness is based on two factors: ease of maintenance and water consumption.

Because water is an increasingly precious and expensive commodity in southern California, landscapes must be analyzed based on their water use. The only ground covers that can survive from one rainy season to another without water are those that contain well-established drought-tolerant plants. All others need water in the dry season. Faced with the prospect of water shortages and increasing water costs, landscapes that consume large quantities of water and do not serve any function or meet any specific design criteria should be eliminated or redesigned.

The cultivated areas of maintained landscape generally near buildings are typical of southern California landscaping. Cultivated species that edge the landscaped areas or have rarely invaded the other habitats on NAVWPNSTA Seal Beach include eucalyptus trees, myoporum (*Myoporum laetum*), palms (mostly *Washingtonia* spp. and *Phoenix* spp.), and coral tree (*Erythrina* spp.). The myoporum, in particular, is conspicuously scattered along road edges.

Trees and shrubs (Photo 3-18 and Photo 3-19) have been planted for dust mitigation in an agreement between NAVWPNSTA Seal Beach, the neighboring community, and a local Congressman. Funds generated from farming operations fund the planting of these trees, which should be completed in the next two years (J. Johnson, *pers. comm.* 2002).

With projection of a positive and unified image, developed areas should include easy maintenance protection for natural resources, human comfort and the enhancement of morale. The visual environmental theme for NAVWPNSTA Seal Beach is of a "small coastal city" because of its seaside location, large area, districts of contrasting image, function, and scale (DoN WESTDIV 1985). There are five main districts:

Wharf – collection of small Georgian/Colonial style office buildings and metal or masonry storage structures (no architectural significance). These are the most positive examples of NAVWPNSTA Seal Beach buildings.

Public Works – random assemblage of medium to large scale industrial type concrete, metal, and transit buildings and warehouses.

Housing – pleasant grouping of Post War stucco and asphalt shingled homes.

Administration and Personnel Support – random collection of attractive Georgian/Colonial and non-descript 1950s-1960s small to medium stucco boxes (functioning as offices or houses).

NASA Landmark (RT&E) – very large metal buildings and structures of a decided industrial 'high-tech' look.

Photo 3-17. Example of architecture on Naval Weapons Station Seal Beach.

Photo 3-18. Perimeter fence plantings.

Photo 3-19. Irrigated landscaping near, but not visible from, the Pacific Coast Highway.

The Grounds Maintenance Contract identifies several maintenance levels to consider when executing landscape maintenance. Each level contains a different set of maintenance standards as described below.

- **Maintenance Level I (Improved)** - Grounds on which intensive development and maintenance measures are performed. This category applies to lawns, landscaped plants in and around all buildings, main access routes and gates, athletic fields, and recreation areas.

  Grass areas shall be cut to a uniform height between 1-1.5 to 2-2.5 inches maintained year-round. Renovations shall consist of thatch removal. Grass clippings shall be disposed of by Contractor. A deck mower shall be used for finished results. All sidewalks, driveways, street edges, curbs, and other paved areas shall be edged with a 1/2" wide and 1" deep clear zone immediately adjacent to the paved surface. Remove vegetation on paved areas. Trees shall not be trimmed or removed when breeding/nesting birds are present. Shrubs, hedges and flower beds shall be cultivated and mulched no less than 18 inches and a cultivation depth of two inches and mulching depth of three inches, care being taken that the roots are not damaged. All extraneous vegetation and debris shall be removed. All timber, brick, concrete, aluminum, or plastic bed edging shall be realigned as needed. Fertilizer shall be in accordance with product's EPA and State registered labeling. It shall be granular, contain specified amounts of nutrient elements, conform to Federal Specification O-F-241, Type 1, Class 2, and be applied only when grass blades are free from moisture. Trees/shrubs in lawn areas will not require additional fertilization. Trees located outside of lawn areas will receive annual fertilization in February or early March. Collect and dispose of trash and litter off-station before 11 AM. Weed control is done 12 times per year, once monthly using EPA approved chemicals. Irrigation will be done in morning hours. The irrigation system averages out to be about 1/3 automatic with timers, 1/3 manual, and about 1/3 of pulling hoses.

- **Maintenance Level II (Routine)** - Grounds on which intensive development and maintenance measures are performed. This category applies to lawns, landscaped plants in and around all buildings, main access routes and gates, athletic fields, and recreation areas.

  Fertilizer shall not be applied within or adjacent to SBNWR without prior approval by the Environmental Department. All vegetation shall be cut and maintained to a uniform height between three and four inches. All other requirements for grass cutting and trimming are the same as for Maintenance Level I. Grass cutting and weeding shall not occur in areas where breeding/nesting birds are present.

- **Maintenance Level III (Periodic Semi-Improved)** - Grounds on which periodic, recurring maintenance is performed by to a lesser degree than on improved grounds.

  Maintain grass/weed height of six inches or less. All other requirements are the same as Maintenance Level I. Specified road shoulders will be cut six feet from the edge of the road. Collect and dispose of trash and litter off-station before 11 AM.

- **Unimproved & Fence Line/Grounds Clean-up** - Grounds on which periodic recurring maintenance is performed but to a lesser degree than on Semi-Improved grounds. This category applies to the following:

  Railroad Right-of-Way

  The railroad right-of-way shall be kept clean and free of all loose trash and debris at all times. All debris is to be disposed of from the area every Friday. Contractor shall cut all brush, weeds, grasses and small trees one inch or less in diameter. All such vegetation will be cut to within six inches of ground level on road shoulders and two inches or less on railroad shoulders. Cuts on railroad right-of-ways shall extend from the edge of the ballast area to 12 feet on each side of the railroad centerline, or whichever is less.

  Perimeter Fence Line

Remove all debris less than two inches in diameter at ground level, and other vegetative growth to ground or pavement level in a five-foot wide band on each side of Station perimeter fence line every Friday.

Magazines Weed Control

Grass will be kept at 14 inches height or less. Equipment that causes gouging, plowing, or rutting of the soil is not permitted. Weed control includes 121 acres, 40 cell - 127 magazines.

Surface Draining

Remove obstructions to water flow in open drainage channels, water channels, ditches, gutters, catch basins, storm drain, curb inlets and gratings. Storm drainage maintenance shall consist of mechanical methods (dredging, chaining, and/or manual cutting) when possible to remove vegetation from drainage ditches and other aquatic sites. If a chemical herbicide must be used, it must be approved by the Environmental Office and the product must be labeled for aquatic use and must be used in strict accordance with the manufacturer's label.

Railroad Vegetation Control

No herbicide will be used in areas adjacent or close by the Designated Wildlife Area. Vegetation will be removed by hand or mechanical means.

Ballast and Switch Stand Areas

Shall be maintained 24 feet wide (12 feet each side of center line), free of vegetation, and include an eight foot radius around the switch stand. All vegetation in ballast area shall be eliminated for the entire contract period. Non-selective soil residual herbicide shall not be used.

Field Areas

Grass is to be maintained at 12 inches high or less. Grass cutting and weeding shall not occur in areas where breeding/nesting birds are present. The environmental Department shall be notified of suspected breeding/nesting activity before cutting/weeding occurs.

- Soil fill material must be suitable for planting and seeding purposes, free of boulders and cobblestones of 1-1.2 inch or greater, free of debris, roots, wood, scrap material and other foreign substances, and compacted to a density equal to surrounding undisturbed soil of 90 percent or maximum density (whichever is greater).
- Seed with drills rather than broadcasting (when practical) and report seasonal seeding and watering times. Hydroseed with a mixture of 50 percent blando brome, 50 percent zorro fescue mixed with a non-toxic fertilizer and commercial mulch, applied at a rate of 40 percent per acre.
- Accepted mulches include wood chips, jute fabric, barley, and wheat straw (or crushed rock or gravel where vegetation is difficult to establish or permanent erosion control is required) and shall not contain an excessive quantity of mature seed of noxious weed species. Barley, wheat straw or wood fiber mulch can be substituted at a minimum of two tons per acre. Wood chips and bark shavings should be no less than 80 percent ground cover. Gravel and crushed rock should be 100 percent ground cover.

3.10.2 Fire Management

The NAVWPNSTA Seal Beach Fire Department supports one engine company with 16 personnel. The Fire Department operates under DoDINST 6055 (DoD Fire and Emergency Services [F&ES] Program 10 October 2000). This Instruction provides policy and criteria for the allocation, assignment, operations, and administration of the DoD Fire and Emergency Services and Emergency Medical Service programs. Related are DoDINST 6055.6-M (DoD Firefighting Certification Program December 1995, National Fire Protection Association "National Fire Codes") and DoD 8910.1-M (DoD Procedures for Management of Information Requirements, June 1998). OPNAVINST 11320.23F provides more specific guidance. Naval Sea Systems Command Operational Procedures 5, Volume 1 "Ammunition and Explosives Ashore–Safety Regulations for Handling, Storing, Production, Renovation and Shipping" guide much of the Station's day-to-day management with regard to pre-suppression fuels management.

Federal wildland fire policy comes under the umbrella of a broader, national fire planning framework that mandates that all federal lands with burnable vegetation have a fire plan and resources to safely mitigate any resource losses. This INRMP is intended to be consistent with federal wildland firefighting policy as it was adopted by the DoD Wildland Fire Policy Working Group in 1996, and signed by DoD. Most of this framework is based on firefighting in which human life and values such as structures are threatened.

Since fire was never a natural part of the marsh ecosystem (except in the watershed above it and perhaps the nearby uplands), it is not used as a management tool there. Chances of a fire on the Refuge are considered remote, in that ignition sources are low, fuels are not conducive to carrying fire, and there are many already-established physical features that act as fuel breaks.

The Refuge maintains an Interdepartmental Service Support Agreement (ISSA) with the Navy that says that fire suppression services will be provided on a non-reimbursable basis. In turn, NAVWPNSTA Seal Beach Fire Department has mutual aid agreements with the city of Westminster, city of Huntington Beach, and County of Orange.

The SBNWR has a fire management plan (1983) that identifies fire damage potential of Refuge habitats, and a fire dispatch plan (1994) that identifies and prioritizes who is called, suppression resources available, and reporting requirements in the event of fire. There are many natural fire breaks on the Station and Refuge, including the marsh itself, roads and the perimeter flood control channel.

The agricultural lessees are required to take a number of fire prevention measures, and are liable for costs of any necessary fire suppression. All the engine driven equipment used by the lessee shall be equipped with properly operating spark arresters, mufflers and tailpipes assemblies. In addition, any vehicle having a catalytic converter shall not be driven through areas of dry, combustible material. Equipment, fuel and oil may be stored only in the designated storage area. A 20-foot firebreak of bare disked soil shall surround all flammable materials. Arc, gas, TIG ("Heli-Arc") welders shall be used only with an adequate fire extinguisher readily accessible and only in the designated Storage Area or for repairs on a specific piece of equipment parked on and surrounded by at least 50 feet of bare soil in all directions. Crop stubble or residue shall be disked into the soil within two months after harvest. Grazing or fire shall not be used to eliminate residue.

3.11 Cultural Resources Summary

Cultural resources include prehistoric, historic, and architectural resources. (Paleontology resources are not cultural resources. They are more appropriately classified as geological resources.) The resources may be sites, structures, buildings, or objects. Places that have been important in maintaining the identity of a community for more than 50 years are called traditional cultural places or properties (TCPs), and they fall under the heading of cultural resources. A site, structure, building, or object (or a group of them) or a TCP may be in or eligible for listing in the National Register of Historic Places if it meets one of the National Register criteria for evaluation (36 CFR Part 63). A listed or eligible cultural resource is a "historic property."

At times, the mandate to manage cultural resources comes in conflict with the mandate to manage natural resources. Currently on NWWSSB, several such conflicts are apparent: First, archaeological sites in the north and south agricultural fields may necessitate modifications to farming practices. Second, natural resource management in the Refuge may conflict with the preservation of an archaeological site on Hog Island. Finally, bird nesting in and outside of buildings within the historic district has required the modification of the buildings to make them less vulnerable to birds.

If a federal undertaking may affect a historic property, including natural resource management activities, then the federal agency must give the Advisory Council on Historic Preservation an opportunity to comment on the effects that the project is likely to have on the historic property (Section 106 of the NHPA). The process whereby the federal agency obtains the Council's comments is outlined in 36 CFR Part 800. The procedure by which natural resources projects are reviewed for cultural resources implications through the NEPA process is summarized in Chapter 4.

This Page Intentionally Blank

Naval Weapons Station Seal Beach

4.0 Natural Resource Management Approach and Process

4.1 Natural Resources Management Overview

The Sikes Act defines the purpose of natural resources management on military lands as "the conservation and rehabilitation of natural resources on military installations; the sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and non-consumptive uses; and subject to safety requirements and military security, public access to military installations to facilitate the use [of these resources]."

The NAVWPNSTA Seal Beach command's approach to natural resources management takes a long-term view of ecosystem processes and human activities and integrating conservation and management of biological resources with the military mission of the installation. The installation's natural resources conservation and management programs are to be directed toward achieving the overarching natural resource management goals.

INRMP Goals are:

Vision Goal: This INRMP will provide the guidelines, means, and mechanism for assuring long-term sustainability and vitality of both the military mission and ecological health of NAVWPNSTA Seal Beach's natural resources. This will be accomplished such that natural resources protection, restoration, and enhancement can proceed consistent with and unhindered toward internal, National Wildlife Refuge, and regional ecosystem management goals for these lands and waters, without current or future compromise or loss to the military mission. All available Navy and non-Navy resources, the consensus of resource agencies and the public, and effective communication will be employed to secure seamless management across jurisdictions for the benefit of healthy and sustainable land use, habitats, wetlands, and populations of endangered, threatened, and management focus species.

Goal 1: Protect the high-value, scarce, and at-risk coastal habitats through appropriate ecosystem- based management and enhancement. Emphasis will be placed on at-risk and endangered species, the wetland and upland habitat interface, and sustainable agricultural practices.

Goal 2: Sustain the current and future military mission by providing stewardship of open space and natural resources that include land, water, and wildlife.

Goal 3: Provide the organizational capacity, support, funding, and communication linkages necessary for effective strategic planning and administration of this Plan and NAVWPNSTA Seal Beach's natural resources.

These goals will ensure the success of the military mission and the conservation of natural resources. The general philosophies and methodologies used throughout the NAVWPNSTA Seal Beach natural resources management program are focused on conducting required military mission activities while maintaining ecosystem viability. The intent is to move closer to the goal of the DoD Instruction on ecosystem management, where ecosystem management principles become not just special projects isolated from the rest of an installation's environmental program, but rather where they form the basis of decision-making at the installation level.

4.2 Ecosystem Management Approach

Ecosystem management, through habitat protection, maintenance, and enhancement, is the central focus of this INRMP. The DoD defines ecosystem management goals as follows:

"Ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations" (DoD 1994).

Development of this INRMP is based on the concept of adaptive management of ecosystems. Adaptive management is founded on the idea that management of renewable natural resources involves continual learning process (Walters 1986). This approach recognizes that there is incomplete data when dealing with natural resources and that, through continued research and monitoring of the effects of management practices, new information will be developed. In addition, an adaptive management approach recognizes that protection and management actions are often implemented, by necessity, with imperfect knowledge. Recognition of this uncertainty allows development of monitoring and research approaches to progressively improve knowledge, and thus enhance decision-making and management capabilities. The adaptive management process is illustrated in Figure 4-1.

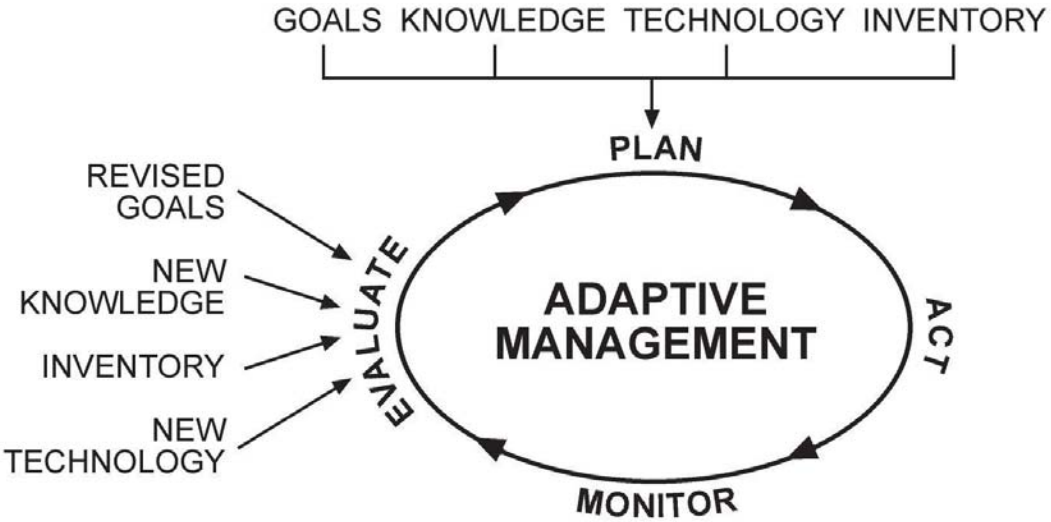


Figure 4-1 Adaptive Management Strategy

4.2.1 Soil and Water Resource Protection

Soil and water resource protection ensures that NAVWPNSTA Seal Beach natural resources do not permanently lose the ability to recover from disturbance or maintain its carrying capacity for use. Protection of soil and water resources will protect the capacity of the ecosystem to recover from disturbance, and sustain its natural carrying capacity to support plants and animals and provide as natural a landscape as possible. Soil surface stabilization is needed to minimize erosion, and maximize opportunities for soils to self-stabilize after disturbance. Water supply, natural hydrologic processes, and water quality are essential to most ecological functions including recoverability from disturbance. Managing for sustainability means preventing damage that will eliminate an area from use for the foreseeable future, or for which restoration or mitigation is excessively costly. The threshold beyond which an area loses its capability to sustain military use and its stable natural condition is loosely termed the carrying capacity.

4.2.2 Ecological Integrity

Compliance under the SAIA for mission sustainability ("no net loss") is also defined in this INRMP to include the ecological integrity of NAVWPNSTA Seal Beach lands. Ecological integrity entails retaining all components (habitats and species) to enable a highly functional ecosystem. Use of management focus (indicator) species, when combined with physical or biological disturbance indicators are a means to track whether management is keeping all the key ecosystem pieces and relationships intact. A long-term monitoring program which tracks ecological integrity, soil and water status, and military use sustainability will allow the Navy to be responsive and adaptive in management approach and to respond to management and regulatory challenges in a timely and science-based manner (Section 5.10 Restoration and Enhancement Long-term Visionary Objectives).

4.3 Military Mission

4.3.1 No Net Loss to the Military Mission

Under the SAIA, NAVWPNSTA Seal Beach must see that there is no net loss to the military mission due to implementation of this INRMP. This is Goal #2

Strategy: Achieve no net loss of military value by aligning current and future land use with natural resource protection over the next five years and into the future.

Strategy: *Proactively manage natural resources so as to enhance mission sustainability and contribute to the further restoration of a viable regional ecosystem.*

Many security concerns are compatible with the natural resource part of the Navy mission, such as the need to establish barrier distances from Navy assets and the ability to do this with landscaping. Also, enhancement of natural resources that are protected by law can be used to help "anchor the Station down" with respect to outside pressures and encroachment (Photo 4-1).

In order to accomplish the mission of national security, the public has endowed the U.S. Navy with an investment in public lands. The common denominator between national security and public land stewardship is the concept of sustainability. Sustainability is a relative condition of the ecosystem and the military mission that can be measured.

The most widely used definition of sustainability was developed by the World Commission on Environment and Development (also known as the Brundtland Commission) (1987): "[Sustainable resource management is]...the capacity to meet the needs of the present without compromising the ability of future generations to meet their own needs." Measures of sustainability are scale-dependent.

DoD policies provide further guidance established in an MOU between USFWS and DoD regarding the INRMP, the Sikes Act, and maintaining no net lost.

Photo 4-1. Encroachment. Photo courtesy Naval Weapons Station Seal Beach.

Military activity at NAVWPNSTA Seal Beach is benign compared to other installations on a day-to-day basis. The large requirement for uninhabited open space has allowed for sustainability, and precluded many potential conflicts between operational requirements and sensitive natural resources. Guidance regarding these requirements is cited in Chapter 1 (Section 1.7 "Land Use Planning and Decision Making Context").

Sustainability of NAVWPNSTA Seal Beach lands may be considered as having five components: access to land as a military asset for use, soil and water resource protection, ecological integrity, cultural resource protection, and security and safety for current and future use. These five components are explained in more detail below.

4.3.2 Land as a Military Use Asset

Military use keeps the long-term carrying capacity of the NAVWPNSTA Seal Beach intact. Naval Weapons Station Seal Beach lands support the mission by their:

- Proximity to the coast and other military installations including major U.S. Navy and U.S. Marine Corps commands and testing ranges, and its open space. It is located in a strategic military zone that allows for the

combined use of deep water, shallow water, littoral and near-inland (to 50 miles) and deep-inland (to 300–400 miles and more) operations.

- Availability of *multiple media* (land, air, sea) to coordinate ordnance delivery.
- Availability of *sufficient space* to handle, store, and deliver ordnance.
- Capability of supporting *sufficient instrumentation* to support safe and secure ordnance handling functions.
- Availability of *effective infrastructure* to support safe and secure ordnance handling and storage.
- Capability to support *essential activity tempo and intensity* to attain sufficient readiness to deploy under surge (high tempo) conditions.
- Capability to *coordinate and environmental compliance* and ordnance handling requirements in a way that minimizes conflict.

4.3.3 Security and Safety

Ability to keep the range clean of hazardous material and unexploded ordnance aids in assuring the safety of the range not just for current training purposes, but potentially for an alternate future use.

The main concerns of the mission are safety and security. This requires:

- Facilities (magazines) for handling and storing ordnance safely.
- Large amount of restricted use open space to maintain **Explosive Safety Quantity Distance (ESQD) Arcs**, or safety buffers, which encompass the installation. ESQD Arcs are essential to both operational and public safety and are regulated by the Department of Defense Explosives Safety Board (DDESB). Any change to land use or loss of property represents a loss of military use of that land.
- Facilities, space, and access to airspace and sea to support mission requirements.
- Ensure compliance with the most current **Anti-Terrorism Force Protection (ATFP)** standards for facilities and operations.
- Security clear zones along fencelines and roads, including cooperation from neighboring landowners.
- Ability to drive on any installation roads at night.
- Ability to secure water supply in emergencies.
- Control of encroachment from outside the fenceline.

4.4 Program Compliance

4.4.1 Natural Resources Consultation Process

NAVWPNSTA Seal Beach consults with the USFWS and the CDFW to manage natural resources located within the installation. Cooperative management of the Detachment's natural resources is required under the Sikes Act and the Fish and Wildlife Coordination Act (FWCA) (16 USC 661-667e).

4.4.2 NEPA Compliance

NEPA is the basic national charter for the protection of the environment. It is a procedural planning tool which primarily requires a clear evaluation of all federal decisions potentially affecting the human and natural environment. NAVWPNSTA Seal Beach must consider the environmental consequences of its actions before a commitment is made to proceed. NEPA documentation for NAVWPNSTA Seal Beach is performed by NAVWPNSTA Seal Beach personnel.

In compliance with the NEPA process, the DoN prepared an EA for implementation of this INRMP and all projects associated with it. The EA is presented in Appendix A. Ongoing compliance with NEPA is achieved through the Environmental Management System as described in Section 4.8.1.

4.5 Beneficial Partnerships and Collaborative Resource Planning

The success of natural resources management and the implementation of this INRMP require a cooperative planning effort among the parties directly responsible for operating and maintaining NAVWPNSTA Seal Beach. The level of success can be enhanced by developing partnerships among other parties that have a vested interest in the responsible management of the natural resources within the installation. Cooperative planning groups often include representatives from federal, state, and local agencies, citizen groups, developers, and universities. The involvement of these agencies is based on their designation as cooperating agencies and on cooperative agreements, regulatory authority, and technical assistance, as required by federal legislation and regulation. These agencies and their roles and responsibilities are described below.

4.5.1 Fish and Wildlife Inter-Agency Coordination

Cooperative efforts with USFWS involve management of T&E species on NAVWPNSTA Seal Beach. USFWS is a cooperating and signatory agency for implementation of this Plan in accordance with the Sikes Act. NAVWPNSTA Seal Beach will consult informally and/or formally with the USFWS prior to implementation of any action included in this INRMP that may affect listed or proposed species. CDFW is the primary state agency responsible for managing fish and wildlife in California. CDFW is a designated cooperative agency for developing this INRMP. NAVWPNSTA Seal Beach coordinates with CDFW to manage state-listed species and state species of concern such as the Belding's savannah sparrow, burrowing owl, and black-tailed jackrabbit

NAVWPNSTA Seal Beach works with USFWS and CDFW to manage fish and wildlife on the Station. Cooperative management of the Detachment's fish and wildlife is required under the Sikes Act and the FWCA. The Sikes Act provides a mechanism whereby DoD, the DOI, and host states cooperate to plan, maintain, and manage fish and wildlife on military installations. Sikes Act provisions and cooperative agreements for outdoor recreation, such as for hunting and fishing, are implemented nationally by a MOU between DoD and DoI.

4.6 Seal Beach National Wildlife Refuge

In addition to coordinating with the USFWS at a regional level, the unique partnership with the Seal Beach National Wildlife Refuge creates opportunities to work closely with USFWS on a day-to-day basis. Coordination between this plan and the Refuge's Comprehensive Conservation Plan and a Memorandum of Understanding (in development) between the Refuge and the Station allow for better utilization of funding and manpower.

4.6.1 State Comprehensive Wildlife Action Plan

In 2000, Congress enacted the State Wildlife Grants Program to support state programs that broadly benefit wildlife and habitats but particularly "species of greatest conservation need." As a result the CDFW, working in partnership with the Wildlife Health Center, University of Davis, directed the development of the state's Wildlife Action Plan, *California Wildlife: Conservation Challenges* (CDFW 2000).

The state has been divided into nine wildlife regions: Mojave Desert, Colorado Desert, South Coast, Central Coast, Marine Region, North Coast-Klamath, Modoc Plateau, Sierra Nevada and Cascades, Central Valley and Bay-Delta. In each region of the state, there are multiple stressors to wildlife and habitats, operating alone and in combination. A number of these stressors are common to the entire state or to several different regions. NAVWPNSTA Seal Beach is located in the South Coast Region. Major wildlife stressors that have been identified through the SCWP are growth and development, water management conflicts and degradation of aquatic resources, invasive species, altered fire regimes, and recreational pressures (CDFW 2000).

4.7 Encroachment Partnering

OPNAVINST 11010.40 defines "encroachment" as "primarily any non-Navy action planned or executed which inhibits, curtails, or possesses the potential to impede the performance of Navy activities." Additionally, the lack of action by the Navy to work with local communities and to monitor development plans, or to adequately manage facilities and real property can also impact the Navy's ability to meet its mission requirements and result in encroachment. In response to potential encroachment, the Navy has developed an Encroachment Management Program. OPNAVINST 11010.40 defines encroachment management as a program that focuses on systematic encroachment identification, quantification, mitigation, and prevention.

Non-military encroachment pressures are a result of urbanization of lands surrounding NAVWPNSTA Seal Beach. Neighbors view the Station's natural resources setting as a valuable community asset. The Station works with neighboring cities and other interested groups to minimize impacts from military operations that include dust management, pest management, and temporary harbor closures. NAVWPNSTA Seal Beach's policy strategy for encroachment partnering is as follows:

- Incorporate NAVWPNSTA Seal Beach's Encroachment Action Plan into natural resource planning.
- Maintain good relations with neighbors by interacting with them regularly to ensure good cooperation.

4.8 Integrated Environmental Management

Preparation of the INRMP was coordinated with other existing plans and management procedures, including: facilities master plan, operational plans and procedures, Integrated Cultural Resources Management Plans (ICRMPs), Integrated Pest Management Plan, Installation Restoration Program plans that address contaminants covered by CERCLA and related provisions, and other appropriate plans and offices. Key interrelationships with other planning efforts and management procedures are summarized in this section and Section 4.7.

4.8.1 Environmental Management System (EMS) Framework for Natural Resources Integration

The NAVWPNSTA Seal Beach uses an Environmental Management System (EMS) as the primary framework to effectively manage all Environmental Programs, including the Natural Resources Program. The EMS formal management framework provides a systematic way to ensure natural resources management is fully integrated into all planning and mission functions. The EMS supports the command's fulfillment of both stewardship and environmental compliance and is founded upon the principles of continual improvement and is conformance to the ISO 14001 standard and OPNAVINST 5090.1C.

The implementation of the INRMP is therefore an integral component of the EMS. The EMS processes are the means by which natural resources management concerns are integrated into mission operations, facilities planning and maintenance, and across all Navy organizational components.

4.8.2 Planning and NEPA: Environmental Aspects and Requirements Review

The NEPA review process is a central component of the EMS. The organization continually reviews new and changes to operations/process and facilities through the EMS in order to identify relevant environmental aspects and regulatory requirements. The command's environmental policy is to utilize the EMS to integrate environmental considerations into all business practices from the earliest stages of planning, design and procurements in order to reduce the impact to environmental resources and maximize mission capabilities by reviewing Proposed Actions.

Procedures are set forth by NAVWPNSTA Seal Beach command Instruction 5090.5B – Environmental Aspects and Requirements Review (EARR) and NEPA Documentation Process. Proposed Actions for operational and facilities changes are reviewed and evaluated to identify potential impacts to natural resources, compliance with applicable law, regulations and DoD policies, and conformance to this INRMP.

The EARR/NEPA process is linked to other requirements review processes, most notably reviews performed by the Explosives Safety Officer, Facilities Planning & Asset Management ("Site Approval Process"), Security Officer and Public Affairs Officer.

4.8.3 Cultural Resources Program Coordination

The installation has issued an Integrated Cultural Resources Management Plan (ICRMP) which presents cultural resources management long rang goals, summary of resources and tasks for compliance to comply with requirements set forth in Sections 106 and 110 of the NHPA, DoDI 4715.03: *Environmental Conservation Program*, and OPNAVINST 5090.1C CH-1 CH-27: *Cultural Resources Management.*

Natural resources management activities that may require consultation under Section 106 of the NHPA include, but are not limited to, those activities that are ground disturbing or may have an adverse effect on archaeological resources such as all ground disturbing activities associated with land and facility management (landscaping and planting), habitat management, pond and wetland construction, and maintenance (terrain modification for erosion control and restoration).

Activities in this INRMP that have the potential to affect cultural resources will be reviewed by facilities planning and through the EMS / NEPA processes to ensure compliance with all applicable federal and state cultural resources requirements.

Cultural Resources Management Measures

- Continue to manage cultural resources in accordance with the priorities set forth by the ICRMP.
- Monitor for the presence of historic sites whenever projects involving ground disturbance are proposed in areas likely to contain cultural resources.

4.8.4 Pest Management

The NAVWPNSTA Seal Beach Integrated Pest Management Plan (IPMP) established pest management objectives sets forth organizational procedures, roles and responsibilities to ensure regulatory compliance and conformance with DoD and DoN policies. The program employs an approach to minimize the use of pesticides and herbicides in all areas of facilities management, including natural resources, landscape and agriculture. Long term pest management strategies are employed when feasible for managing pest problems, in contrast with the short term approach of relying on chemicals to abate pests. IPM relies on cultural, physical, mechanical and biological methods for controlling pests, with minimal dependence on chemical control.

The Pest Management Program Media Manager is also the Natural Resources Media Manager. Oversight and technical support is provided by Navy regional entomologist. Details of the pest management program can be found in the IPMP maintained in the PWD Seal Beach Environmental Office.

4.8.5 Fire Management

NAVWPNSTA Seal Beach does not currently have an adopted Wildland Fire Management Plan; however, Navy weapons storage regulations have strict standards on vegetation height which are met through grounds maintenance and agricultural management practices.

4.8.6 Conservation Law Enforcement

There are no law enforcement personnel dedicated to conservation law enforcement on the installation; however, CDFW has the ability to write citations

4.8.7 Training of Natural Resources Personnel

In order to support compliance with environmental laws, ensure environmental staff receive ongoing training and professional development through attendance at workshops, classes, training, and conferences.

4.8.8 Installation Restoration and Munitions Response Programs

Environmental staff will continue to work with Installation Restoration Program staff in order to minimize impacts during clean up and disposal activities and to collaborate on opportunities to benefit ecosystem health such as ecological restoration.

4.9 Facilities Interface and Compliance with INRMP

Department of Defense policy seeks to ensure that current and planned installation activities are effectively coordinated and consistent with INRMP requirements, goals and objectives.

Planning activities include: installation master plans, project and site development planning, construction requests, site approval requests, host-tenant agreements, and real estate actions (i.e. easements, licenses, leases, etc.). Land use and natural resource decisions are supported by existing DoD, SECNAV, DoN, and installation command instructions and procedures (Appendix C).

Facilities management and maintenance activities with specific relevance to natural resources management at NAVWPNSTA Seal Beach include: magazine maintenance, explosives safety, physical security, and ongoing management of facilities infrastructure in support of the military mission.

4.9.1 Planning for Compatible Use

The Sikes Act and DoD guidance require that INRMPs ensure that no net loss of available land and operational carrying capacity for military support occurs while pursuing environmental protection needs (DoD 4715.03 2011). Federal legislation and regulations, and DoD and Navy policy applicable to land use / natural resources management are provided in Appendix C. The Navy's Integrated Planning Process and Environmental Management System (EMS) provide the management framework and process for achieving the "not net loss" goal.

Important facilities planning decision need to consider alternative locations for competing uses and the relative impacts of each alternative. Executive Order 13112 directed federal agencies to design, use, or promote construction practices that minimize adverse effects on the natural habitat where cost effective and to the extent practicable. More importantly, numerous regulatory requirements apply and are driven by the CWA, CAA, ESA, NEPA and Soil Conservation Act. Economics and military needs shall be balanced with environmental impacts. Significant environmental impacts from land use can eventually inhibit military mission.

Strategy: *Integrate land use and natural resources decision making processes with facilities planning to ensure protection of the military mission while supporting INRMP objectives.*

Strategy: *Conduct facilities construction, repair and maintenance in a way that allows for protection of sensitive environmental resources while ensuring full accomplishment of the military mission.*

Requirement: *Project development and design must be reviewed through the EMS Environmental Aspects & Requirements Process and obtain a NEPA approval.*

Facilities, Planning, and Management Responsibilities

- Facilities, planning, and management actions will be consistent with INRMP requirements and objectives and targets.
- Align infrastructure to contribute to the military mission and concentrating it in operations areas.
- Begin the NEPA process at the earliest development and planning states as part of the decision making process and to develop specific guidance for projects.

- Work with neighbors and other agencies to plan for encroachment, including that based on environmental compliance.
- Maintain a healthy ecological environment, using principles of sustainability and ecosystem management to balance short-term projects with long-term goals.
- Work in conjunction with environmental personnel to establish protocols for emergency repair of infrastructure so that human life, health and safety are given precedence, but sensitive resources are also protected.

4.9.2 Site Approval Process

The PWD Facilities Management Division administers the installation Site Approval Process which ensures that all proposed site planning, project development and facilities use requests meet DoN facilities management requirements. These requirements include:

- *OPNAVINST 11010.20G - Facilities Project Instruction*
- *SECNAVINST 11011.47C – "Acquisition, Management, and Disposal of Real Property and Real Property Interests by the Department of the Navy"*
- NAVFAC P-73 - NAVFAC Real Estate Procedural Manual

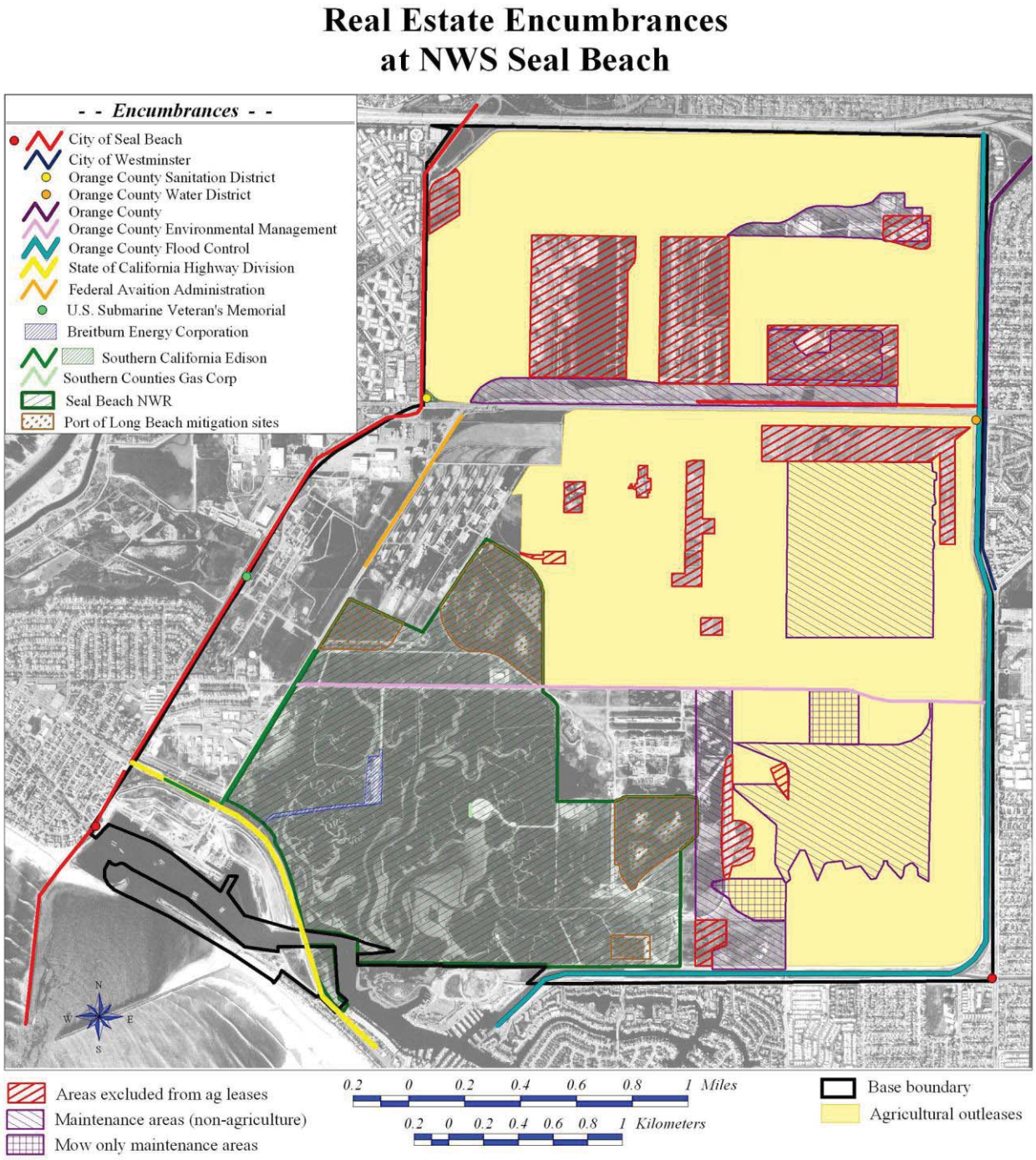
The Site Approval Process also considers explosives safety requirements and coordinates, when required, approval of proposed projects to Naval Ordnance Safety and Security Activity (NOSSA).

4.9.3 Real Estate Summary

The NAVFACSW PWD Facilities Asset Management Division is responsible for overseeing all real estate matters and has designated a Real Estate Accountability Officer to maintain all records and coordinating management

Real estate encumbrances and outgrants total 2,466.18 acres. Land leases (2,195.34 acres), easements (194.05 acres), outpermits (76.54 acres), and use agreements (0.25 acre) granted by the U.S. Navy to various state, local, and public agencies and private interests are listed in Appendix G, and are depicted on Map 4-1. A list of current tenants is provided in Section 2.2.1.

History - In 1944, the U.S. Navy acquired 5,000 acres of the Anaheim Bay wetlands and surrounding lands to fill the need for a shoreside ammunition storage and handling facility during World War II, in support of ships bound for war. Its secondary purpose was as a servicing facility for anti-submarine nets used to protect bases and anchorages around the world. This land was purchased from the Alamitos Land Company, a company that emanated from the 1833 Mexican government land grant called, *Los Alamitos Rancho,* which encompassed 28,027 acres. Mineral rights were retained by the former owner, and eventually the first oil well was established by Hancock Oil Company on Oil Island, which was built up from the marsh. The deed granted lands to the U.S. Navy only to the Ordinary High Water Mark, which now translates to the Mean High Water Mark, and these boundaries were surveyed out of the deed as a series of straight lines that roughly run along the main tidal channels (Map 1-2). The submerged lands below the surveyed lines are owned in public trust by the State Lands Commission. The jetties that extend seaward are built on lands similarly owned in trust by the State of California. The real estate title to the jetties themselves is presumed to be with the federal government; this is currently under review. General



Map 4-1. Real Estate Encumbrances at Naval Weapons Station Seal Beach facilities.

development of the ammunition depot after acquisition by the DoD has reclaimed about 600 acres of the original 2,300-acre wetlands.

4.9.3.1 Potential Encumbrances

- **Breitburn Oil Lease**. When the federal government condemned the land occupied by the weapons station in the 1940s, the former owner, Alamitos Land Company, retained the mineral rights. In 1954, the first oil well was drilled into Anaheim Bay by Hancock Oil Company from the 6.5-acre "oil island" that the company built in the wetlands. The current holder of the mineral rights (BreitBurn Energy Corporation) continues to extract from the site and are projected to continue for a period of decades into the future. In accordance with the current agreement between the oil operator and the Navy (Agreement NOY(R)-48519), when the resources within the oil field have been depleted, the oil operator will restore the site, including Oil Island and the associated roadways, to coastal salt marsh habitat

- **Orange County Flood Control Channel**. This area lies between Freeway 405 and the perimeter fence; it is maintained by CalTrans. There are two parallel fences along the 405, the inner one barbed wire. CalTrans has its own installation fence line that has been recently replaced.

- **Small Arms Range Safety Arc.** The safety arc for the firing range currently passes over the access road to NASA Island, and volunteer tern monitors have been stationed within this arc.

4.9.4 Magazine Area Maintenance

***Requirement**: Facilities will control erosion and weeds on magazines in order to meet explosives safety and operational requirements.*

- Magazine management is a critical mission requirement and facilities maintenance concern. Strict explosives safety and facilities maintenance requirement must be met to fully support the mission.
- Relative to the Natural Resources Program, erosion is the primary concern for magazine maintenance. Explosives safety regulations require a minimum of 24 inches of soil cover on top of magazines. Erosion is caused by weathering and burrowing animals (CNRSW 2002).
- Vegetation is needed to stabilize the soil on the magazines. Vegetation must be strictly managed to ensure compliance height restrictions specified by explosives and fire safety requirements. This results in an open, low condition on top of the magazines that attracts weeds, ground squirrels, and other early successional species. Some magazines are supporting more exotics (versus native species), including noxious weeds, than others due to unknown and perhaps multiple reasons. This could be related to the mowing protocol which is in place in order to avoid mowing during nesting season. The mix of species in some cases suggests that magazines are managed in a manner that fosters bare ground. This condition combined with late rains encourages growth of weedy species.
- Magazine areas should not be primarily managed for federally listed species due to mission-related concerns. However, they may be accommodated in these locations, and take shall be avoided, while placing management emphasis for their benefit in locations without ordnance-related activity.

4.9.5 Landscaping and Grounds Maintenance

***Requirement**: Facilities will maintain landscaping and grounds in a way that balances visual aesthetic with available funding. Special emphasis is placed on using plants and techniques that are in keeping with water conservation practices.*

- Weed management is a critical mission requirement and facilities maintenance concern. Strict explosives safety and facilities maintenance requirement must be met to fully support the mission.
- Relative to the Natural Resources Program, invasive species control is the primary concern for grounds maintenance. Recognition of invasive species and treating new infestations in a timely manner is critical to their control.
- Vegetation must be strictly managed to ensure compliance height restrictions specified by explosives and fire safety requirements. These actions results in open, sparsely-vegetated conditions that can attract weeds, ground squirrels, and other early successional species. Some maintenance areas are supporting more exotics (versus native species), including noxious weeds, than others due to unknown and perhaps multiple reasons. This could be related to the mowing protocol which is in place in order to avoid mowing during nesting season.
- Planted areas utilize drought-tolerant native species and are chosen from the plant pallete in Appendix J.

4.10 Mission Operations Interface and Compliance with INRMP

4.10.1 Security

Anti-Terrorism and Force Protection (ATFP) program requirements are managed by the command Security Office and affect land use planning, govern facilities design and construction requirements, and set procedures for controlling access to the installation.

4.10.2 Explosives Safety

Land use is controlled within the Explosive Safety Quantity Distance (ESQD) arcs by a site approval process in which the Explosives Safety Officer must approve all activities to ensure compliance with OP-5. A waiver is required for exceptions to OP-5. Permissible activities are examined through this process completely separately from site approvals under the National Environmental Policy Act (NEPA). All activities and actions described in this plan require coordination with explosives safety. All personnel (contractors, volunteers, etc.) are required to receive an annual Hazard Control Brief from explosives safety personnel or other personnel approved to provide these briefs.

4.10.3 Small Arms Range

The Station's Small Arms Range (SAR) is managed through the command Security Office. The Surface Danger Zone created by the SAR overlaps portions of the Seal Beach National Wildlife Refuge including salt marsh habitat and NASA Island, the breeding site for the California Least Tern. Careful coordination is required to balance range and natural resources requirements. Regular planning meetings and shared calendars provide the tools necessary to accomplish this coordination.

4.11 Public Access and Outreach

Natural resources staff work closely with the command Public Affairs Officer to determine the appropriate level of public access for recreation and outreach programs consistent with installation security, military mission and sustainable natural resources management objectives (OPNAVINST 5090.1C CH-1). Opportunities for public access include periodic tours offered by the Seal Beach National Wildlife Refuge, specialty tours for wildlife watching, and volunteer events such as National Public Lands Day. Periodic outreach programs at local schools and community events seek to showcase the balance of the military mission and natural resource stewardship at NAVWPNSTA Seal Beach.

4.12 Regional Planning Process

Strategy: Support, when beneficial, local, regional, and national planning processes as they are in the interest of NAVWPNSTA Seal Beach's mission.

The following planning processes can lend guidance to the management of wildlife found on NAVWPNSTA Seal Beach, and this INRMP should address consistency with their goals.

- The SBNWR (along with other Orange County wetlands) has been designated a Globally Important Bird Area by the Audubon Society.
- Endangered species recovery plans define federal recovery targets for downlisting or de-listing species. Specific plans exist for the light-footed clapper rail, California brown pelican, salt marsh's birds beak, western snowy plover and a draft plan exists for the California least tern.
- The North American Bird Conservation Initiative provides guidelines for managing birds, and seeks to integrate the:

    - The United States Shorebird Conservation Plan was developed by a partnership of federal, state, non-governmental organizations, international groups, and researchers with the commitment to conserve shorebirds that depend on wetland habitats through regional planning efforts and integrated management practices. The Plan identifies monitoring programs related to shorebird declines, and integrated management practices to protect shorebirds. Goals that cover the southern California coast are to (1) increase the area and quality of tidal wetlands along the coast, and (2) protect coastal wetlands from development.
    - The North American Waterfowl Conservation Plan aims to restore waterfowl populations through habitat protection, restoration, and enhancement, with the help of partnerships and "joint ventures." It is a joint plan of the U.S., Canadian, and Mexican governments. There are no specific areas of concern

mentioned in this plan for coastal southern California.

- Partners in Flight Bird Conservation Plans for Riparian, Oak Woodland, Grasslands, Coastal Scrub and Chaparral habitats.

- **California Ocean Resources Management Program.** The goal of this program is to ensure comprehensive management, conservation, and enhancement of California's ocean resources for the benefit of current and future generations. The program focuses on four areas: stewardship; economic sustainability; research, education and technology; and jurisdiction and ownership. California's Ocean Resources: An Agenda for the Future was prepared by the California Resources Agency and outlines an implementation strategy for the Ocean Resources Management Program. Some recommendations provided from the chapter on Habitats and Living Resources relevant to the regional Wetlands Recovery Project are: (1) complete resource inventories within bays, estuaries and coastal lagoons along the coast, as well as within the waters offshore the coastline making this data accessible through the California Environ- mental Resources Evaluation System, (2) establish additional comprehensive long-term approaches for sustainably managing California's ocean and coastal fishery stocks with an emphasis on re-building stocks in decline, and (3) support state, national, and international efforts to reduce the importation and establishment of non-native species and study the current effects of these species on California and other west coast states.
- **Natural Communities Conservation Program (NCCP) (State of California Resources Agency).** This regional habitat conservation planning program, administered by CDFW, has the purpose of protecting enough natural habitat to sustain natural communities, while allowing for compatible economic development. The goal is to protect multiple species and their habitats in place of the single species protection approaches of the past. By creating an interconnected pathway through a network of formal preserves, local governments and landowners can receive permission to incidentally "take" species listed under the state and federal endangered species acts, by having these plans qualify as Habitat Conservation Plans under section 10(a) of the federal ESA. The Orange County NCCP efforts have primarily focused on coastal sage scrub habitat, of which NAVWPNSTA Seal Beach contains only minor components. Few grassland, riparian, or wetland species are identified. There is currently no SAMP to integrate wetlands and endangered species planning for coastal Orange County. While the Navy is not signatory to any NCCP agreement, management strategies for species that may occur at NAVWPNSTA Seal Beach and are covered in neighboring NCCP programs are available within this INRMP.
- **Orange County Sanitation District planning.** This group has plans to construct and expand its road maintenance site, including the use of bright lighting which could affect plants and animals in the Refuge.
- **Shoreline Erosion Processes: USACE Beach Nourishment program; City of Seal Beach, Beach Nourishment Program; Anaheim Harbor Dredging Program.** The California Resources Agency is spearheading a program to develop a comprehensive coastal sediment management program for the state. As part of this, the Agency's Draft Policy on Coastal Erosion advocates the need to restore sediment transport functions to coastal watersheds, including the use of sediment removed from coastal wetlands as part of restoration activities as a source of sand for southern California beaches.

- **Close Out Oil Island.** Develop a plan for close-out including educational outreach, managing spill risks, future opportunities partnering, and conversion to a USFWS Visitor's Center.
- **California Nonpoint Source Pollution Control Plan.**. This Plan provides a single, coordinated approach to deal with NPS pollution. Management measures serve as general goals for the control and prevention of polluted runoff. Site-specific management practices are then used to achieve the goals of each management measure.

Management measures for the control and prevention of polluted runoff directly relate to the Wetland Recovery Project efforts previously mentioned. This plan specifically recommends that agencies coordinate with the Wetland Recovery Project for management measures related to hydromodification or wetlands.

- **Regional Water Quality Control Board Policies and Plans.** Naval Weapons Station Seal Beach is under the jurisdiction of the Santa Ana RWQCB for state and federal water quality regulations. Both a Basin Plan and a Watershed Management Initiative chapter for the region encompassing the Seal Beach area have been prepared. The Basin Plan designates Anaheim Bay-Huntington Harbor as a medium priority impaired water body under Section 303(d) of the federal CWA.
- **Southern California Wetlands Recovery Project.** The SCWRP is a partnership of public agencies working cooperatively to acquire, restore, and enhance coastal wetlands and watersheds between Point Conception and the border with Mexico. The SCWRP has identified two ecological objectives for Anaheim Bay and its watershed: (1) Address impacts of watershed inputs, including sediment, nutrients, and contaminants, and (2) Pursue additional restoration and enhancement opportunities with the Navy. SCWRP's goal is to accelerate the pace, extent, and effectiveness of coastal wetland restoration in southern California by implementing a regional prioritization plan for the acquisition, restoration, and enhancement of southern California's coastal wet- lands and watersheds.

Sixteen public agencies with responsibilities for coastal wetlands and watersheds in southern California participate in the Wetlands Project.

This Page Intentionally Blank

Naval Weapons Station Seal Beach

5.0 Goals, Objectives, and Tasks

The following section includes the INRMP's Vision Goal as well as three specific goals that discuss ecosystem-based management, sustaining the military mission, and the need for planning and communication to achieve them. A summary of management objectives is also provided below. The standards of success provide guidance principles for which each task will be measured by. Management objectives and tasks are found throughout Chapter 5.

Goals

Vision Goal: *This INRMP will provide the guidelines, means, and mechanism for assuring long-term sustainability and vitality of both the military mission and ecological health of NAVWPNSTA Seal Beach's natural resources. This will be accomplished such that natural resource protection, restoration, and enhancement can proceed consistent with and unhindered toward internal, National Wildlife Refuge, and regional ecosystem management goals for these lands and waters, without current or future compromise or loss to the military mission. All available Navy and non-Navy resources, the consensus of resource agencies and the public, and effective communication will be employed to secure seamless management across jurisdictions for the benefit of healthy and sustainable land use, habitats, wetlands, and populations of endangered, threatened, and management focus species.*

Goal 1: Protect the high-value, scarce, and at-risk coastal habitats through appropriate ecosystem- based management and enhancement. Emphasis will be placed on at-risk and endangered species, the wetland and upland habitat interface, and sustainable agricultural practices.

Goal 2: Sustain the current and future military mission by providing stewardship of open space and natural resources that include land, water, and wildlife.

Goal 3: Provide the organizational capacity, support, funding, and communication linkages necessary for effective strategic planning and administration of this Plan and NAVWPNSTA Seal Beach's natural resources.

Objectives

Objective 1: Maintain and restore the natural structure, function, and disturbance processes of NAVWPNSTA Seal Beach lands such that ecological values and biodiversity are protected, and exotic

disturbances are minimized, while providing for full achievement of the military mission. Facilitate the shift from single species to multiple species conservation.

Objective 2: Create a diverse, integrated system that provides habitat for native coastal wetland-dependent fish and wildlife, to provide a mix of habitat types for sensitive, rare, and endangered species, and to allow for the brackish water ecotone between the salt marsh and the freshwater wetland, and the upland transition to coastal grassland and scrub, within the context of vegetation height restrictions for military security needs.

Objective 3: Protect the natural and beneficial functions of the NAVWPNSTA Seal Beach's waters and wetland vegetation. Preserve and enhance wetlands as directed under Executive Order 11990.

Objective 4: Conserve the native plant communities on NAVWPNSTA Seal Beach to support biodiversity and ecosystem health.

Objective 5: Establish a stronghold of native coastal grassland habitat in locations where it is compatible with security and safety requirements, in balance with the need for wetlands and wetland transition habitats, to support raptors, and to increase populations of sensitive or declining species native to these grasslands, with a focus on mountain plover.

Objective 6: Maintain a windbreak/dustbreak around perimeter of Station.

Objective 7: Maintain current acreage and function of limited freshwater wetland/riparian and transition habitat.

Objective 8: Ensure no net loss of existing structure and function of beach and dune habitat, with a focus on sensitive or declining native species and elimination of exotics.

Objective 9: Ensure no net loss of existing structure and function of the high marsh-salt panne complex, with a focus on sensitive or declining native species and elimination of exotics.

Objective 10: Ensure no net loss of existing structure and function of the salt marsh/freshwater brackish marsh interface.

Objective 11: Ensure no net loss of existing structure and function of marsh plain habitat, and achieve a long-term net gain in its quantity, quality, permanence, and connectedness to lower-elevation habitats with a focus on sensitive or extirpated species such as salt marsh bird's beak and Belding's savannah sparrow.

Objective 12: Improve the functional value of low marsh for support of light-footed clapper rail nesting populations and achieve a long term net gain in its quantity, quality, permanence, and connectedness to wetland habitats.

Objective 13: Achieve a long-term net gain in the area, function, value, and permanence of intertidal flats, the physical conditions that support this habitat, and populations of associated target species: ghost shrimp, dowitchers as a group, spotted sand bass, mudflat tiger beetle, and long-billed curlew.

Objective 14: Improve the function and value of unvegetated shallows, the physical conditions that support this habitat, and populations of associated target species.

Objective 15: Achieve a long-term net gain in the area, function, value, and permanence of vegetated shallows, the physical conditions that support this habitat, and populations of associated target species.

Objective 16: Ensure that all elements of the ecosystem and biodiversity are healthy by focusing management attention on a set of species that represent a full set of ecological niches, and that operate at a full range of spatial and temporal scales.

Objective 17: Identify and then protect the abundance, biomass, and diversity of plankton that reflect the Seal Beach bay and wetland ecosystem's health.

Objective 18: Identify and then protect the abundance, biomass, and diversity of algal functional groups that reflect the Seal Beach bay and wetland ecosystem's health.

Objective 19: Identify and then protect the abundance, biomass, and diversity of invertebrate functional groups that reflect health in each habitat and the ecosystem as a whole.

Objective 20: Protect and enhance the attributes of intertidal and subtidal sites that sustain a diverse and abundant invertebrate community, promote fish and wildlife foraging, serve as a nursery for numerous fishes, as well as an ecological role in detritus-based food web support.

Objective 21: Maintain an inventory and determine the health and trend of invertebrate populations in the context of ecosystem health and management, with a focus on sensitive or at-risk species.

Objective 22: Conserve fish population abundance and diversity, with priority to those using the NAVWPNSTA Seal Beach as a nursery or refuge, and to indigenous species, focusing on habitat conservation as a first priority.

Objective 23: Protect and enhance the attributes of intertidal and subtidal sites that sustain a diverse and abundant invertebrate community, promote fish and wildlife foraging, serve as a nursery for numerous fishes, as well as an ecological role in detritus-based food web support.

Objective 24: Inventory and determine the health and trend of amphibian and reptile populations, emphasizing those that may indicate ecosystem trends or may become federally listed, and control exotics that threaten this health.

Objective 25: Maintain, enhance, and restore habitats that provide for the health of resident and migratory populations of birds that rely on NAVWPNSTA Seal Beach to complete their life cycles. Foster broader public knowledge and appreciation of the functional, aesthetic, recreational, and economic values.

Objective 26: Conserve viable habitat for migratory and resident birds that use NAVWPNSTA Seal Beach for stopover resting, feeding, and nesting, while removing species which may detrimentally affect declining native birds.

Objective 27: Promote and support the DoD's partnership role in protection and conservation of neotropical migratory birds and their habitat.

Objective 28: Protect the golden eagle and bald eagle. Determine the status, health, and habitat use of other raptors, and avoid, minimize, or compensate for any negative effects of human activity.

Objective 29: Provide for healthy populations of native mammals by managing for a diversity of native habitats and habitat conditions and ensuring that trade-offs of all military and biological projects to native mammals are considered in planning.

Objective 30: Provide for healthy populations of native marine mammals by avoiding harassment or other "take," and monitor any strandings.

Objective 31: Protect and enhance sensitive plant populations while ensuring compatible land use and flexibility to fulfill mission requirements.

Objective 32: Manage California least tern to maximize colony success at NAVWPNSTA Seal Beach as measured by fledgling productivity and pair numbers.

Objective 33: Protect the listed light-footed clapper rail population at NAVWPNSTA Seal Beach and seek to contribute to its recovery.

Objective 34: Protect the listed western snowy plover population at NAVWPNSTA Seal Beach and seek to contribute to its recovery.

Objective 35: Protect the listed green sea turtle population at NAVWPNSTA Seal Beach and seek to contribute to its recovery.

Objective 36: Protect the burrowing owls population at NAVWPNSTA Seal Beach and seek to contribute to its recovery.

Objective 37: Monitor population of potential predators to contribute to the recovery of special status wildlife populations.

Objective 38*:* Control species that pose a nuisance or potential health hazard.

Objective 39: Control the spread and introduction of invasive and noxious species with priority on those with the greatest potential for sensitive species population or habitat degradation, and restore to native habitat when feasible.

Objective 40: Prevent infestation, monitor, and aggressively control any infestation of marine invasive species in the harbor and wetland areas including *Caulerpa taxifolia* and *Littorina littorea*.

Objective 41: Ensure the long-term viability, land use compatibility, and fair-market value of all leases and outgrants, in conjunction with the military mission, and natural resource compliance and best practices.

Objective 42: Adopt wildlife-compatible agricultural practices where economically feasible, while complying with regulatory requirements, and support the back-tailed jackrabbit, burrowing owl, and mountain plover as management focus species.

Objective 43: Promote compatible, sustainable outdoor recreation opportunities which enhance quality of life for military personnel, while conserving natural resources, and without compromising Fleet readiness.

Objective 44: Establish a culture of conservation for the NAVWPNSTA Seal Beach lands as an ecosystem, including the relationship to its watershed.

Objective 45: Enhance the opportunities for observation and appreciation of coastal and biological resources by providing public access and viewing areas, and creating recreational and interpretive facilities.

Objective 46: Develop programs for public education on wetland values.

Objective 47: Objective: Ensure the technically sound, practical and appropriate use of library and computer technology to manage, analyze, and communicate natural resource information in support of management decisions.

Objective 48: Improve the success of mitigation and enhancement projects based on regulatory, functional, and ecosystem criteria.

Standards of Success

- Mission accomplishment is unimpeded (including security, explosive safety, etc.).
- Contribute to sustainment and long term needs of military land use.
- A net gain in ecological productivity, biodiversity, and sensitive species recovery.
- Work toward a resilient system that is self-recoverable with minimum human intervention.

- Navy projects will not be delayed and will contribute to no net loss.
- Full integration with NAVWPNSTA Seal Beach programs for cost-efficiency and mutual benefit towards EPSO vision and goals.
- A growing internal and external conservation ethic as measured by volunteerism, public interest, and participation.
- Funding strategies that allow progressive implementation of restoration goals and a program that is increasingly self-supporting.
- Actions are aligned with regional ecosystem management.
- Comply with federal, state, and local laws and regulations, executive orders, and DoD policies.
- Facilities management must be consistent with INRMP requirements, objectives, and tasks.

An abundance of natural resources, military values, and human socio-economic values juxtapose in sharp focus at NAVWPNSTA Seal Beach. These values overlie each other and underpin each other's viability. There is a great need to plan so that NAVWPNSTA Seal Beach can sustain and enhance these values, to understand the ecosystem which supports them, and make the most strategic investment possible in NAVWPNSTA Seal Beach's future.

The following processes and guiding principles are established for effective natural resource management.

1. **Develop a Vision of Ecosystem Health and make this the INRMP goal.** The integrity of every piece of land depends on landscape-level factors, and many species require areas well outside protected boundaries. In accordance with DoD guidance (DoDINST 4715.03 18 March 2011), a landscape-level vision for ecosystem health is arrived at through a process of science-based collaboration during which opportunities are identified, and various means of accommodating sustainable human use (i.e. multiple use) are assessed, while considering and integrating ecological, social, and economic issues (DoDINST 4715.03). "All interested parties (federal, state, tribal, and local governments, nongovernmental organizations, private organizations, and the public) should collaborate in developing a shared vision of what constitutes desirable future ecosystem conditions for the region of concern. Existing social and economic conditions should be factored into the vision, as well as methods by which all parties may contribute to the achievement of desirable ecosystem goals." See Chapter 1 for a list of the Ten Guiding Principles of Ecosystem Management.
2. **Develop a map of natural resource Management Emphasis Areas on NAVWPNSTA Seal Beach which will underlie a Conceptual Restoration Plan.** Land use priorities for sustaining the military mission are assessed and mapped. Alternatives for the resource's highest and best use are considered through a process of analysis, prioritization, and stakeholder consensus. Restoration concepts are then overlaid on this map, which are developed through a collaborative, science-based process of evaluating historical reference conditions, applying principles of habitat conservation planning (such as providing core areas, buffers, corridors, hard versus soft boundaries, etc.), and the need to provide special management of regulated and at-risk, sensitive species.
3. **Develop Desired Future Condition Objectives for each natural resource and essential ecological process.** These constitute the objective and standard we want to achieve for each natural resource, and they lead each subsection of this and subsequent chapters. Forming the basis of management guidelines, best practices, and annual project lists, they are developed based on the ecosystem

framework described above, maps of the resource, key issues identified in Chapter 1.0, and conceptual models of how the ecosystem functions. To completely articulate an objective for a habitat, a defensible habitat valuation model or reference site for each habitat is needed. The reference site can be the historical condition. Recovering what is missing from the historical natural resource setting is a first approximation to recovering healthy natural resource functions and values. The objectives also address any observed or modeled threats to sensitive or legally protected resources at risk. Sustainability principles guide how we assess the viability of various natural resources as they are protected or as they provide "beneficial uses in the public interest" (DoDINST 4715.03). By incorporating land use sustainability principles into objectives we can accommodate multiple uses without diminishing natural resource values. These principles take into account the baseline condition of the resource, carrying capacity, incompatibilities, trends, and constraints (mission-related, regulatory, and environmental), as described in the previous chapters of this INRMP.

4. **Establish a foundation of sound risk management by systematically assessing threats to mission and natural resource sustainability, and conducting effects analysis.** Risks and threats are weighed as objectives are developed, and this is documented as part of the NEPA process. Risk assessment, at the least, assesses the risk of doing nothing versus taking action. By identifying threats or areas of maximum value at risk of loss (to both the Navy mission and natural resources), we begin to provide a buffer against catastrophic losses of value. Examples of risk could be: encroachment vulnerability, resource decline, ordnance safety, public safety, or public scrutiny. Natural resources enhancement can be used to help "anchor the Station down" with respect to outside pressures.
5. **Perform adaptive management** (DoDINST 4715.03). Adaptive management is a component of ecosystem management that requires baseline inventories and a monitoring program designed to detect change and separate natural from human-caused effects. This lays a foundation for better intervention decisions. Tailoring a monitoring program for adaptive management requires a conceptual model of how the ecosystem and land use interplay, and the identification and use of indicators of ecosystem health (because it is not affordable to measure everything). A strong science base is necessary for technical success, public credibility, and legal defensibility.

II. **Establish a business plan and accountability for INRMP implementation.** Seek the economic viability of natural resources program implementation. Consider costs and the cost-effectiveness of the projects proposed.

5.1 Managing the Property as a Whole

5.1.1 Identifying Core Natural Resource Values at Risk

Nested in an urban matrix, NAVWPNSTA Seal Beach supports certain irreplaceable natural resource values which cannot afford to be lost. Some of these exist now, and others are achievable through restoration or enhancement. Naval Weapons Station Seal Beach is one of very few locations in southern California where a potential for improving the future of declining and at-risk wetland habitats and species still exists. At the core of this opportunity is a military mission that carries an imperative for extensive

safety and security buffers. These buffers are exceptionally compatible with natural resources and necessarily exclude a high level of human activity.

The following is a brief summary of the values already described in Chapter 3.0, in order to highlight thematically what is special about the resources at NAVWPNSTA Seal Beach.

Pacific Flyway stepping stone. Naval Weapons Station Seal Beach is one of the great migratory "stepping stones" of the Pacific Flyway used by millions of birds traveling between northern breeding grounds and southern wintering sites. It is one of a dwindling number of stopovers used by migrants to replenish their energy during their timeless journey, repeated seasonally over eons since long before the landscape they cross became so human-changed.

Avian biodiversity. Naval Weapons Station Seal Beach supports more than 250 bird species and large populations of over-wintering birds that depend on its resources for food, shelter, resting, and staging before migration. The Station also serves as the northern range of some tropical species, including some that breed and nest locally. The SBNWR (along with other Orange County wetlands) has been designated a Globally Important Bird Area by the Audubon Society. Fully one-third of birds dependent on southern California coastal wetlands have been identified as sensitive or declining by the federal or state governments or by the Audubon Society.

Shorebird shelter and recovery on intertidal flats. Shorebird abundances have been impacted by the loss of intertidal flats for foraging, as well as transitional areas for nesting. When marshes and mudflats are as scarce and isolated as they are in southern California, and because only so much food is available, shorebirds find difficulty distributing themselves to find adequate nutrition (Baird 1993). Most of nutrition from intertidal areas is eliminated by shoreline stabilization structures. Shorebirds in decline on a regional basis include the American avocet, western snowy plover, and common snipe (*Capella gallinayo delicata)* (Baird 1993). The long-billed curlew (*Numenius americanus*) is declining on a larger scale. The Southern Pacific Shorebird Conservation Plan (Hickey *et al.* 2003) recommends a focus on 10 species for which the California coast is especially important: snowy plover, black-bellied plover (*Pluvialis squatarola*), semi-palmated plover (*Charadrius semipalmatus*), black oystercatcher (*Haematopus bachmani*), willet (*Tringa semipalmata*), marbled godwit (*Limosa fedoa*), black turnstone (*Arenaria melanocephala*), short-billed dowitcher (*Limnodromus griseus*), red-necked phalarope (*Phalaropus lobatus*), and red phalarope (*Phalaropus fulicarius*).

Fish nursery. Naval Weapons Station Seal Beach contains important nursery habitat for commercial fisheries such as California halibut, spotted sand bass (*Paralabrax maculatofasciatus*), and white croaker (*Genyonemus lineatus*). Connections among habitats such as eelgrass, mudflats, and tidal channels are necessary so that fishes can move to necessary habitats during their life cycles. Ensuring accessibility of fishes migrating along the coast and to shallow and intertidal nurseries via tidal flows contributes to their productivity in the greater Pacific Ocean.

Fish biodiversity. Resident endemic fishes of the intertidal zone contribute to global biodiversity.

Coastal grasslands. Coastal grasslands are increasingly scarce because of their development potential, and many declining species depend on them, such as burrowing owls, black-tailed jackrabbit, short-eared owl, and loggerhead shrike. This habitat continues to be vulnerable on a regional basis, because it is not protected like coastal sage scrub. Coastal grasslands are more compatible with Navy security requirements than shrublands.

High-elevation salt marsh. There are remnants of and we should support plants and animals of the high salt marsh such as salt marsh bird's beak; Coulter's goldfields *(Lasthenia glabrata* ssp. *coulteri)*; and southern tarplant *(Hemizonia parryi* var. *australis).* Palmer's frankenia (*Frankenia palmeri*) is a CNPS List 2 species.

Endemic beetles of salt panne and other habitats. Salt pannes are upper intertidal areas that are devoid of vegetation. They have a winter aquatic phase with algae/ditch grass *(Ruppia maritima)* and aquatic insects/ducks, then appear barren in summer with most of the resident insects and other arthropods living in the soil. Naval Weapons Station Seal Beach contains some of the few remaining populations in the U.S. of the mudflat tiger beetle, Frost's tiger beetle, and Gabb's tiger beetle (a globally ranked species). Tiger beetle populations have declined in range due to habitat destruction, off-road vehicle use, insecticide use and human foot traffic.

Tidal creek and microchannel diversity. We are missing and should recover the density of tidal creeks and microchannels at all elevations of the marsh because they provide diverse microsites for sheltering endemic marine organisms and birds.

Middle Marsh pickleweed species such as Belding's savannah sparrow and large-billed savannah sparrow. The Belding's savannah sparrow is listed as endangered by the CDFW. This nonmigratory subspecies is endemic to coastal salt marshes in southern California (Powell and Collier 1998), and surveys over the last 30 years have revealed that the SBNWR contains the third largest subpopulation in southern California. This subpopulation numbers roughly 10 percent of the entire population of Belding's savannah sparrow, and in 2006 consisted of 272 nesting pairs (R. Schallmann, *pers. comm.*, 2006).

Light-footed clapper rail endangered species support and other values of the Low Marsh. Seal Beach is important to maintaining the federally listed light-footed clapper rail populations in southern California. A study funded by the CDFW and conducted in 1996 determined that the 52 nesting pairs inhabiting the SBNWR represented the third largest population of light-footed clapper rails throughout its range (Zembal *et al.*1996). Intensive management efforts to shield the population from predation was accompanied by a dramatic increase in the numbers of clapper rails up until the mid-1990s. As of 2005 the clapper rail population had dropped to 105 and 96 individuals in 2006. In previous years there have been heavy, female-skewed winter fatalities. Continued upgrading and maintenance of the artificial rafts on the SBNWR is crucial to the protection of the wintering rails and success of the breeding rails.

California least tern endangered species support. Seal Beach is important to recovering the federally listed California least tern in southern California.

Golden and bald eagles present on the station are federally protected and merit special conservation effort.

Habitat and species support for sandy beaches, dunes, and bluffs. The western snowy plover is a federally threatened species that visits the beaches of NAVWPNSTA Seal Beach. Naval Weapons Station Seal Beach has the sandy beach tiger beetle, a federal Species of Concern. Lewis's evening primrose (*Cammisonia lewisii*) is considered rare and grows in very sandy substrates near the beach, typically on beach bluffs or coastal strand. *Hemizonia parryi* ssp. *australis* (saline soils of vernal wetlands, salt marsh, and coastal bluff grassland) had its type collection in 1933 at Seal Beach. Seaside calandrinia (*Calandrinia maritima*) is native to coastal strand and sandy bluffs near the beach. Red sand verbena occurs on NAVWPNSTA Seal Beach and is a CNPS listed species.

5.1.2 Management Emphasis Areas and Restoration Planning

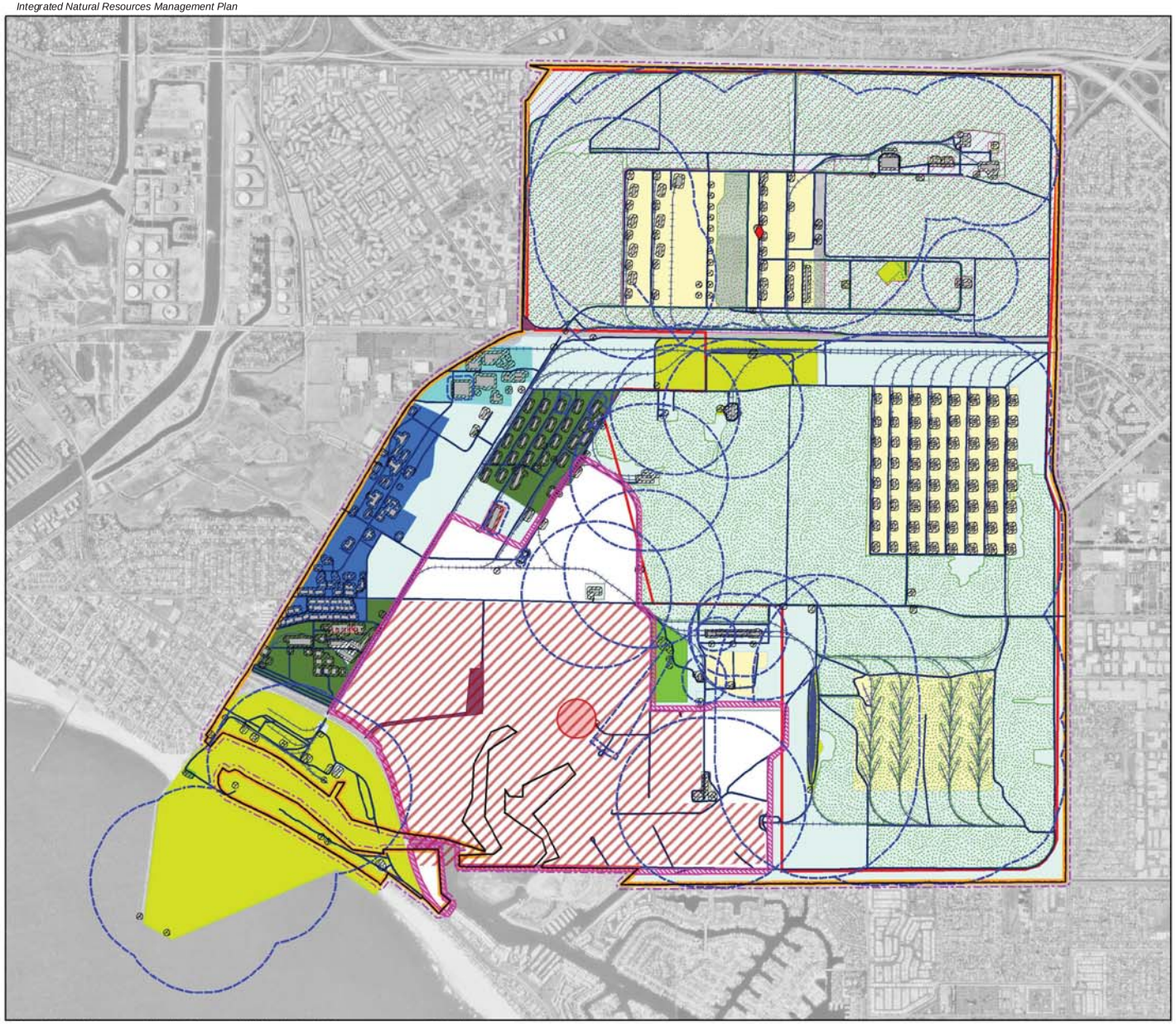
Map 5-1 depicts various priority land use emphasis subareas of NAVWPNSTA Seal Beach. By describing use priorities and constraints for each Management Emphasis Area, a Conceptual Restoration Plan can be developed which is compatible with achieving mission needs into the future. Table 5-1 compares the various military and natural resource priorities in each subarea depicted on Map 5-1.

Table 5-1. Comparison of military and natural resources priorities and constraints for various locations depicted on Map 5-1.

MILITARY CONSTRAINTS AND PRIORITIES	NATURAL RESOURCE CONSTRAINTS/OPPORTUNITIES
Administration	
Security barrier distances from buildings and the use landscaping in between the barrier and the structure. Quality work environment. Efficient movement and circulation. Compliance with Executive Orders on water use, energy efficiency, pesticide use, runoff control, and beneficial landscaping, use of natives.	Landscaped Areas: manage weeds, runoff. Design stringer wetlands that enhance saline wetland function. Wildlife and wetland enhancement of landscaping. Follow Audubon guidelines for golf courses in the landscaped area. Incorporate freshwater wetlands into landscaping. Select landscape species to support water quality and wildlife values of the wetlands as upland transition. Use hedgerows or similar concepts for enhanced diversity, exotic species control, and enhanced wildlife values.
ESQD Safety Arcs	
Explosive safety compliance. Essential personnel only.	Wetland restoration and enhancement. Recovery of threatened and endangered species and coastal-dependent species at risk, prioritizing those formerly on the site and local endemics.
Ordnance Storage and Handling	Maximum height restrictions for vegetation.
Explosive safety compliance, security, fire hazard management. Low vegetation height.	Coastal grassland, weed management, burrowing owls and other coastal upland species. Ground squirrel management as prey. Erosion control on magazines.
Perimeter Security / Encroachment Buffer	
Security clear zones (30 feet inside the fence, 20 feet outside)	Dust Management. High-priority location to restore freshwater connections to off-property locations and enhance brackish, riparian strainers, and missing upland transition habitats.
Encroachment Control Area	
Secure the property boundary from development pressure. Military mission sustainability. Security clear zone requirements.	High priority to establish freshwater or brackish wetlands to reduce encroachment threat while improving water quality and wildlife values. Sensitive species support such as tri-colored blackbird.
Harbor/Wharf Activity	
Security and safety. Need to support MILCON for harbor entrance realignment, potential harbor deepening for future larger ships. Manage for 303(d) impairment correction, beneficial uses. Mitigation for future projects which may affect regulated waters and Special Aquatic Sites. Pre-approve dredge spoil uses for wetland enhancement.	Harbor security is compatible with sensitive species only as long as allowed to potentially harass T/E species while handling ordnance. Coastal connectivity. Exotic species detection and control. Feral animal management area.
Harbor Upland Transitions	
Locations for mitigating harbor project impacts to submerged aquatic sites. Security and explosive safety. Visual screen.	Eelgrass enhancement. Upland transition beach, dune, coastal grassland. Recovery of coastal-dependent species at risk, prioritizing those formerly on NAVWPNSTA Seal Beach.
Breitburn Oil Lease	
Future mitigation site for Navy projects? More secure location for public access than the marsh,	Provide for future alternative public access without transit for operational/administrative areas of NAVWPNSTA Seal Beach. Future interpretive center with access from Pacific Coast Highway. Could also be California least tern nesting site.
National Wildlife Refuge	

Table 5-1. Comparison of military and natural resources priorities and constraints for various locations depicted on Map 5-1.

MILITARY CONSTRAINTS AND PRIORITIES	NATURAL RESOURCE CONSTRAINTS/OPPORTUNITIES
Safety and security buffer. Compliance with requirement to support endangered species recovery. Clean Water Act compliance. IR site clean-up.	Congress mandated that the SBNWR support threatened and endangered species. Environmental interpretation, outreach. Improve tidal range and channel diversity.
Agricultural Lease	
Security and encroachment buffer. Vegetation height restrictions for security. Income generation and some routine maintenance accomplished by lessee. Agriculture for income and as a beneficial, sustainable use, with consideration of coast-dependent wetland functions.	Incorporate "working landscape" concepts. Mountain plover management area. Geese foraging area. Burrowing owl management area. Ensure that the baseline natural resource values are protected and also enhanced, where this is compatible with military sustainability. Upstream connections, stringer wetlands. Runoff management. Zero tolerance fertilizer/pesticide runoff. Exotic species detection and control in brackish or freshwater areas.
California least tern nesting, foraging, and predator management zone	
Encroachment if expanded use areas interfere with operations.	Predator management, nesting site enhancement, improved access to fish foraging. Control perches.
Light-footed clapper rail management area	
Avoid any expansion which could interfere with operations.	Improve both freshwater and tidal flushing to enhance nutrient status of cordgrass. Control perches.
Burrowing owl management area	
Compatible use. Avoid listing under Endangered Species Act.	Compatible use. Control perches, speed limits. Prevent conflict among California least tern areas to avoid chick mortality.
Marsh Flood/Expansion Buffer	
Mitigation for harbor or other MILCON projects. IR site clean-up. Protect against long-term increase in reach of flood tides (sea level rise combined with subsidence).	Restore former tidal range and marsh functions.
Installation Restoration (IR) sites	
Compliance	Mesh with natural resource benefit and restoration concepts.
Infrastructure, roadsides, railroads, and other transportation/utility rights-of-way	
Protect the services provided by infrastructure. Railroad tracks must be maintained 12 feet out from the center of the track and vegetation must be treated with weed killer (an explosive safety precaution). Only tracks in use must be maintained this way.	Underground the utility lines that cross the marsh. Weed control. Predator control.



Map 5-1. Land Management Emphasis Areas at NWSSB showing shifting management priorites by subarea.

5.1.3 Ecosystem Management

Ecosystem-based management involves a broad and comprehensive approach to the sustainable management of natural resources. Adaptive management principles are applied to ensure the sustainability of natural resources and their resilience to both natural and anthropogenic disturbance processes such as tillage, sea level rise, etc. This process involves anticipating and planning for these events, especially those caused by climate change. Management strategies will address current challenges posed by these disturbances, provide a mechanism for adaptation over time, and ensure soil and hydrologic processes remain intact.

Specific Concerns – Ecosystem Management

- Ecological dynamics and military needs require management that acknowledges changing conditions and remains flexible and adaptive. Flexibility is needed in applying principles of sustainability and proper use to agricultural leasing, to management as it relates to federally listed and other species, identifying and paying special attention to at-risk species, disturbance processes, and habitat condition. Three cornerstones of Navy ecosystem management are well underway toward implementation with adoption of this INRMP: a shift from single species to multiple species conservation; formation of partnerships to consider and manage ecosystems that cross boundaries; and use of the best available scientific information in decision-making and adaptive management techniques.
- The combination of natural disturbance, human-caused changes in ecological processes, and military mission-related land use may have adverse effects on plant communities and habitats. Maintaining the military mission as well as certain federally listed species require that some level of this disturbance continue in order to meet ecosystem management objectives. Although plant communities are naturally resilient to repeated and large-scale disturbance such as fire, as evidenced by their well-documented successional patterns, exotic disturbances likely have a different effect on them.

Objective 1: Maintain and restore the natural structure, function, and disturbance processes of NAVWPNSTA Seal Beach lands such that ecological values and biodiversity are protected, and exotic disturbances are minimized, while providing for full achievement of the military mission. Facilitate the shift from single species to multiple species conservation.

***Task*:** Adopt a set of Focus Management Species to assist managers in determining that the ecosystem is properly functioning and that natural biodiversity is provided for.

***Task*:** Adopt a map of sensitive species priority management emphasis areas. These areas are designed such that threatened and endangered species are provided for with a minimum of conflict with the military mission and each other.

I. Restore what is missing (tidal range, channel complexity, native grasslands and coastal scrub), based on an analysis of historical aerial photos and conclusions of a monitoring program.

II. Control invasive species and avoid or minimize exotic disturbance.

5.2 Habitat Conservation and Management

Specific Concerns–Habitat Protection and Management

- If nothing is done, the natural resource values will likely degrade over time due to a lack of resilience to sea level rise, subsidence, and climate change.
- Habitat loss or degradation is one of the most direct and obvious human impacts in Anaheim Bay and the Refuge, and the declining populations of many species are believed to be directly tied to these losses.
- Non-traditional measures will be required to enhance severely depleted habitats. Consensus is needed on priorities, as well as the flexibility to cross jurisdictional boundaries (both ownership and regulatory agency) in order to implement the appropriate means of enhancement or restoration, on a case-by-case basis.

Objective 2: Create a diverse, integrated system that provides habitat for native coastal wetland-dependent fish and wildlife, to provide a mix of habitat types for sensitive, rare, and endangered species, and to allow for the brackish water ecotone between the salt marsh and the freshwater wetland, and the upland transition to coastal grassland and scrub, within the context of vegetation height restrictions for military security needs.

***Task*:** Seek opportunities to create, restore, or enhance habitats in order to restore native, special-status plants and animals in all habitats at NAVWPNSTA Seal Beach.

***Task*:** Seek to improve the complexity of micro-channels in wetlands while supporting target species.

***Task*:** As appropriate, participate in regional planning efforts and projects in order to integrate and enhance planning and project implementation at NAVWPNSTA Seal Beach.

I. Establish habitat objectives that include, as quantitatively as possible, a description of the structure, function, diversity, and direction of change desired. The objective should identify the Management Focus Species for the structure, function, and diversity we are trying to achieve. Those for this INRMP are summarized in Table 5-2.

II. Multi-species Management. Rather than emphasizing federally listed species in isolation from other species objectives, establish habitat objectives that foster productivity and diversity overall through a full range of habitats, as represented by Management Focus species (see Appendix I). The following strategies are examples of multi-species management.

A. Restoration is to be centered on regional historic resources rather than the individual property to ensure the support of groups of at-risk species. This will make sure that the work completed produces the most difference while maximizing productivity for fish and birds, with emphasis on the endemics, commercially harvested species, shorebirds, and waterfowl.

B. Support food chains leading to harvestable fish and invertebrates.

C. Restore and enhance the tidal prism, or the natural range of tidal heights, to increase the area of land influenced by tides.

D. Increase the diversity of existing hydrogeomorphic features, including the abundance of complex creek networks which incorporates the augmentation of different orders of creeks, functioning to support a greater range of ecosystem functions for fish than more homogeneous habitats.

E. Improve the connectivity of the ponds with more intermediate habitats.

F. Restore assemblages of invertebrates and fishes by improving the heterogeneity (complexity) and connectivity (and factors related to edge) of the marsh habitats.

G. Avoid invasion by exotics in locations where soil salinities have been lowered by freshwater treatments, such as irrigation runoff.

H. Improve access across the intertidal-subtidal interface for animals that use multiple habitat types (e.g. mudflats for feeding and marsh plain for breeding or resting). Many estuarine species depend on access to both subtidal and intertidal resources. While the natural tidal areas provide this habitat, the recently dredged eelgrass ponds do not. The steep grading used in these areas is such that they provides little to no usable intertidal habitat. Transient species use intertidal mudflats and vegetated marsh surfaces at high tide to feed and/or avoid predators before retreating to subtidal channels at low tide. Incorporating a variety of habitats into the restoration site by creating a more gradual, natural grade within the ponds can potentially increase biodiversity of these areas.

I. Incorporate heterogeneity at each scale that is likely to influence key ecological processes (such as plant colonization or organic matter accumulation). Heterogeneity is also a tactic for hedging bets that something will work, and for creating refugia for genotypes and species when environmental conditions become inhospitable or extreme (Huenneke 1991; Natural Resource Conservation Service [NRCS] 1992), especially for species that are sessile or unable to locate favorable habitat.

Table 5-2. Proposed habitat objective and target species. Some of the target species for diversity are not known from Naval Weapons Station Seal Beach but are thought to have occurred there in the past. (Continued)

Habitat Type	Habitat Objective (structure/ function/ diversity/ outcome-based/ direction or quantity, as specific as possible)	Target Species for Structure and Function	Target Species for Diversity
MARITIME TRANSITION, UPLAND, AND FRESHWATER HABITATS			
Agricultural Fields	Adopt wildlife-compatible agricultural practices where economically feasible, while complying with regulatory requirements.	Aleutian Canada goose (*Branta canadensis leucopareia*)	Mountain plover (*Charadrius montanus*)
Ruderal or Mowed Areas to be Managed as Coastal Grassland	Establish a stronghold of native coastal grassland habitat in locations where it is compatible with security and safety requirements, in balance with the need for wetlands and wetland transition habitats, to support raptors, and to increase populations of sensitive or declining species native to these grasslands.	Threeawn *(Aristida* sp.); cane bluestem *(Bothriochloa barbinodis);* annual hairgrass *(Deschampsia danthonioides);* prairie junegrass *(Koeleria cristata)*; nodding needlegrass *(Nassella cernua);* purple needlegrass *(Nassella pulchra);* western blue-eyed grass *(Sisyrinchium bellum);* plants with bulbs; annuals in the Caryophylaceae, Compositae, Cruciferae, Labiatae, Fabaceaea, and Umbelliferae; California ground squirrel (*Otospermophilus beecheyi*)	Golden eagle *(Aquila chrysaetos)*; short-eared owl *(Asio flammeus)*; burrowing owl *(Athene cunicularia hypugaea)*; white-tailed kite (*Elanus leucurus*); Swainson's hawk *(Buteo swainsoni)*; northern harrier *(Circus cyaneus)*; peregrine falcon *(Falco peregrinus)*; loggerhead shrike *(Lanius ludovicianus)*; coyote *(Canus latrans)*; San Diego black-tailed jackrabbit *(Lepus californicus bennettii)*; Lewis's evening primrose (*Cammisonia lewisii)*;
Freshwater Wetland/Riparian and transition	Restore the historic acreage and function of freshwater wetland/riparian and transition habitat to, as nearly as possible, fulfill their natural ecological function as an intermittent and episodic source of sedimentation, organic matter, and freshwater input to the marsh.	Toad rush *(Juncus bufonis)* (in areas with freshwater influence. Needs low-salinity soils) Problem species: common brassbuttons *(Cotula coronopifolia);* hottentot fig *(Carpobrotus edulis)*	Tri-colored blackbird *(Agelaius tricolor)*; yellow warbler (*Dendroica petechia)* Problem species: hyssop loosestrife *(Lythrum hyssopifolium)* exotic, found mostly where there is freshwater runoff
Saline Wetland-Upland Transition [saline but no tidal inundation]	Restore the historic acreage and function of Saline Wetland-Upland Transition to, as nearly as possible, fulfill its natural ecological function as a buffer between upland and saline habitats, to trap sediment, to absorb long-term disturbance impacts to the marsh, and to protect against intertidal loss due to sea level rise or subsidence. Use dredge spoil locations to increase acreage of this plant community. Reserve two constructed islands for nesting California least terns, while Oil Island shall be reserved for a future nature interpretive center open to the public, due its more secure separation	Triangle orache *(Atriplex triangularis)* (exotic found in salt marsh that has a freshwater influence); spreading alkaliweed *(Cressa truxillensis);* saltgrass *(Distichlis spicata);* alkali heath *(Frankenia salina);* dwarf barley *(Hordeum depressum); Eastern* Mojave buckwheat *(Eriogonum fasciculatum);* Menzies' goldenbush *(Isocoma menziesii);* jimmyweed *(Isocoma veneta);* sticky sandspurry *(Spergularia macrotheca);* woolly	Nesting California least tern *(Sternula antillarum brownii)*; wandering skipper *(Panoquina errans);* Coulter's goldfields *(Lasthenia glabrata* ssp. *coulteri)*

Table 5-2. Proposed habitat objective and target species. Some of the target species for diversity are not known from Naval Weapons Station Seal Beach but are thought to have occurred there in the past. (Continued)

Habitat Type	Habitat Objective (structure/ function/ diversity/ outcome-based/ direction or quantity, as specific as possible)	Target Species for Structure and Function	Target Species for Diversity
	from Navy mission-related functions.	seablite *(Suaeda taxifolia)*; large shrub at margins Problem species: hottentot fig	
Beach and Dune	Ensure no net loss of existing structure and function of beach and dune habitat, and achieve a long-term net gain in its quantity, quality, permanence with a focus of sensitive or declining native species and elimination of exotics.	Red sand verbena (*Abronia maritima)*; sticky sandspurry *(Spergularia macrotheca)*	Western snowy plover *(Charadrius alexandrinus nivosus)*; peregrine falcon (*Falco peregrinus*); sandy beach tiger beetle *(Cicindela latesignata latesignata)*; Gabb's tiger beetle *(Cicindela gabbii)*; Frost's tiger beetle *(Cicindela senilis frosti);* globose dune beetle (*Coelus globosus*); Seaside calandrinia (*Calandrinia maritima*)
SALT MARSH (MHWS TO MSL)			
High Marsh-Salt Panne Complex [mostly inland of Bolsa and Case Roads. Dry all summer, aquatic in winter, flooded only during exceptionally high spring tide, between mean higher high water (MHHW) and mean high water spring (MHWS), most missing of habitats, along with Middle Marsh]	Ensure no net loss of existing structure and function of high marsh-salt panne habitat, and achieve a long-term net gain in its quantity, quality, permanence, and connectedness to lower-elevation habitats on the inland sides of Bolsa and Case roads.	*Watson's saltbush (Atriplex watsonii);* spreading alkaliweed; Saltgrass; dwarf barley; shoregrass *(Monanthochloe littoralis)* (preferred host of salt marsh bird's beak); glasswort *(Salicornia subterminalis)*; swaying bulrush *(Schoenoplectus subterminalis);* seepweed *(Suaeda calceoliformis);* algae; aquatic insects/ducks Problem species: curved sicklegrass *(Parapholis incurva)* exotic can displace natives	Black skimmer *(Rynchops niger)*; Elegant tern *(Sterna elegans);* Frost's tiger beetle; Gabb's tiger beetle; Salt marsh bird's beak (*Cordylanthus maritimus* ssp. *Maritimus);* Coulter's goldfields; tarplant *(Hemizonia parryi* var. *australis);* Marsh rosemary *(Limonium californicum)*

Table 5-2. Proposed habitat objective and target species. Some of the target species for diversity are not known from Naval Weapons Station Seal Beach but are thought to have occurred there in the past. (Continued)

Habitat Type	Habitat Objective (structure/ function/ diversity/ outcome-based/ direction or quantity, as specific as possible)	Target Species for Structure and Function	Target Species for Diversity
Marsh Plain [not covered during normal high tide, most missing of habitats along with High Marsh]]	Ensure no net loss of existing structure and function of marsh plain habitat, and achieve a long-term net gain in its quantity, quality, permanence, and connectedness to lower-elevation habitats. Restore tidal influence to impaired areas on the inland side of Bolsa and Case Roads.	Dodder *(Cuscuta salina)*; Alkali heath*;* jaumea *(Jaumea carnosa)* (an important matrix species at mid-elevations, does well with freshwater influence); shoregrass; perennial pickleweed *(Salicornia virginiata)* may out compete slower growing species, provides nesting for Belding's savannah sparrow *(Passerculus sandwichensis beldingi)*; algae; Belding's savannah sparrow	saltwort *(Batis maritima)*; Marsh rosemary; annual pickleweed *(Salicornia bigelovii);* seablite *(Suaeda esteroa);* slender arrowgrass *(Triglochin concinna)*
Low Marsh [submerged completely during most high tides, along major tidal arms and mudflats, now dominates the marsh]	Improve the functional value of low marsh for support of light-footed clapper rail nesting populations.	Cordgrass (*Spartina foliosa*) (4.1 to 6.3 foot MLLW) or (+3.5 to +5.5 foot) (Zedler *et al.* 1992)	Light-footed clapper rail *(Rallus longirostris levipes)*
CHANNELS			
Intertidal Creeks [1st and 2nd order, 1-4 m wide]	Restore dense networks of meandering, intertidal creeks to their historic density and function.	Spotted sand bass (*Paralabrax maculato fasciatus)*	Seablite; California killifish *(Fundulus parvipinnis)* (in habitats vegetated marsh edges)
Subtidal Channels [3rd or 4th order, inundated during all tidal stages]	Restore loss of tidal prism resulting from 40 percent loss of tidal access at mouth of channel and construction of roads and levees, with a focus on shiner surfperch, spotted sand bass. Restore sinuosity of subtidal channels and links to intertidal creeks, and subtidal vegetation where appropriate.	Shiner surfperch (*Cymatogaster aggregata);* spotted sand bass	osprey (*Pandion haliaetus carolinensis);* foraging California least tern (*Sterna antillarum browni)* (likes higher order channels which are broad and deep); California halibut *(Paralichthys californicus)*
INTERTIDAL, NO VASCULAR PLANTS (MSL TO MLLW)			
Mudflat	Achieve a long-term net gain in the area, function, value, and permanence of intertidal flats, the physical conditions that support this habitat, and populations of associated target species.	Dowitchers *(Limnodromus* sp.*)* as a group; ghost shrimp (*Callianassa californiensis);* spotted sand bass	Long-billed curlew *(Numenius americanus)*; whimbrel (*Numenius phaeopus*); marbled godwit (*Limosa fedoa*); Mudflat tiger beetle *(Cicindela trifasciata sigmoidea)*
Shoreline Stabilization, Artificial Hard Substrate	Minimize the use of shoreline stabilization structures that impact or replace natural intertidal habitats, and maximize the value and function that artificial structures contribute to the Anaheim Bay ecosystem.	Invertebrates...ghost anemone *(Diadumene cf. leucolena)*; breadcrumb sponge *(Halichondria panicea)*	Surf scoter (*Melanitta perspicillata*); California brown pelican *(Pelecanus occidentalis californicus)*; black oystercatcher (*Haematopus bachmani*)

Table 5-2. Proposed habitat objective and target species. Some of the target species for diversity are not known from Naval Weapons Station Seal Beach but are thought to have occurred there in the past. (Continued)

Habitat Type	Habitat Objective (structure/ function/ diversity/ outcome-based/ direction or quantity, as specific as possible)	Target Species for Structure and Function	Target Species for Diversity
SUBTIDAL MARINE, SOFT BOTTOM			
Shallow Vegetated, eelgrass (MLLW to about -20 foot based on water clarity)	Protect and enhance the attributes of vegetated shallow subtidal sites that sustain a diverse and abundant invertebrate community, fish and wildlife foraging, nursery function for numerous fishes, as well as an ecological role in detritus-based food web support. Reserve coastal uplands and shallow subtidal areas adjacent to uplands as future eelgrass mitigation banking sites in support of Navy mission and regional conservation needs.	Black brant (*Branta bernicla nigricans*); foraging California least tern *(Sterna antillarum browni)* Problem species: Japanese mussel (*Musculista senhousia*)	Osprey
Shallow Unvegetated	Protect and enhance the attributes of unvegetated shallows that sustain a diverse and abundant invertebrate community, fish and wildlife foraging, nursery function for certain species such as the California halibut, as well as an ecological role in detritus-based food web support. Improve connectedness of subtidal ponds and channels to intertidal habitat.	Problem species: Japanese mussel	Non-nesting seabirds such as Aleutian Canada goose, Common loon *(Gavia immer)*, American white pelican *(Pelecanus erythrorhynchos)*, California brown pelican, Double-crested cormorant, White-faced ibis *(Plegadis chihi)*, black tern *(Sterna forsteri);* California halibut (see write-up in Table 6-2); ghost shrimp
Deeper Water (deeper than deepest eelgrass))	Protect and enhance attributes of deeper subtidal habitat that support diverse and abundant invertebrate forage for fishes and birds, as well as needed exchanges of energy, materials, and biota among habitats, in balance with the need for shallow and intertidal habitats. Retain sufficient deep subtidal habitat to support safe navigation, good water quality, and physical and biological functioning in balance with the need for other habitat types in Anaheim Bay.	Hornyhead turbot *(Pleuronichthys verticalis)* (important for monitoring programs/bioaccumulation); round stingray (*Urolophus halleri)* Potential problem species: Marine algae (*Caulerpa taxifolia*)	Lesser scaup *(Aythya affinis)*; surf scoter

5.2.1 Jurisdictional Wetlands and Waters

Specific Concerns–Jurisdictional Wetlands and Waters

- While the Executive Order states that federal agencies are obliged to enhance wetlands, no budget is available sufficient for the scale of work needed. Partnerships and an ecosystem context are required.
- Water quality of these sensitive areas is protected under the Clean Water Act.
- Under the CWA and EO 11990 *Protection of Wetlands,* there shall be "no net loss" of wetland habitat. Jurisdictional wetland delineations are mandatory and should be performed at each installation to show which wetlands or water bodies are subject to regulatory jurisdiction under Section 404 of the CWA.
- The remediation of contamination sediments under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as part of IR Program, can require the use of clean water (such as pumped groundwater) under site investigation or as part of the remedial action. Joint planning for clean-up and restoration priorities together, may result in cost-savings and amplified benefits for both goals.
- Waters of the U.S. and jurisdictional wetlands require permits for ground disturbing activities and possible mitigation if there is a loss of wetland function. Questions about applicable site-specific impacts must be addressed with USACE.
- Freshwater and brackish habitats are prone to invasives.

Objective 3: *Protect the natural and beneficial functions of the NAVWPNSTA Seal Beach's waters and wetland vegetation. Preserve and enhance wetlands as directed under Executive Order 11990.*

Task: Perform periodic monitoring and mapping of changes in waters and wetland areas, including elevations.

Task: When actions are taken that have an impact to wetlands, support any required mitigation that results

5.2.2 Vegetation Community Mapping and Monitoring

Specific Concerns–Vegetation Community Mapping and Monitoring

- The vegetation map lacks detail and is out of date.
- There is insufficient resolution on the existing vegetation map to assess baseline health and detect change in vegetation condition.
- Vegetation patterns may be changing with subsidence or other factors, and may also change with project work at the harbor, or at the neighboring Bolsa Chica restoration project.

Objective 4: Conserve the native plant communities on NAVWPNSTA Seal Beach to support biodiversity and ecosystem health.

Task: Periodically survey, classify, and re-map plant community boundaries, possibly in conjunction with rare plant surveys and vegetation management plan revisions. The mapping preference is to use the Sawyer and Keeler-Wolf (1995) system of co-dominants, since this is tied quantitatively to national and international standards, and an MOU for its use is in place at the state of California level among state and federal resource agencies.

Task: Maintain a current Vegetation Management Plan to monitor the following:

A. Invasion by any non-native species considered to be nuisance or pest species such as giant reed or pampas grass;

B. Die-offs of native vegetative communities that might be attributed to disease, anomalous oceanographic conditions, or insect damage;

C. Shifts in species abundance, such as replacement of coastal salt marsh by freshwater species or the presence of new species such as increases in cordgrass or eelgrass;

D. General growth and expansion patterns in the vegetative transplant areas; and

E. Keep an updated herbarium, plant list, plant community map, and sensitive plant locations. See Appendix J for the approved plant palette.

5.2.3 Uplands and Upland Transition

Specific Concerns– Uplands and Upland Transition

- The perimeter of NAVWPNSTA Seal Beach is an interface with a densely populated urban area. Security requirements mandate that the Station maintain a 30-foot clear zone inside the perimeter fence, with vegetation growing no higher than eight inches. The need to maintain a level of privacy within the Station suggests the need for a vegetative barrier inside the security clear zone to serve as a visual screen to help obscure ordnance-related activities.
- Virtually no native upland communities exist on the Station, but much of the existing wetland area is bounded by grasslands or agricultural lands which could be converted to upland and wetland transition habitats.
- Upland areas not in agricultural cultivation currently support mostly non-native species and some weedy invasives.

Objective 5: Establish a stronghold of native coastal grassland habitat in locations where it is compatible with security and safety requirements, in balance with the need for wetlands and wetland transition habitats, to support raptors, and to increase populations of sensitive or declining species native to these grasslands, with a focus on mountain plover.

Objective 6: Maintain a windbreak/dustbreak around perimeter of Station.

Task: Augment goals of force protection and air compliance by maintaining/expanding a vegetative windbreak/dustbreak around Station perimeter.

Task: Restore habitat for special-status species of coastal grasslands, such as the mountain plover and black-tailed jackrabbit, with patches of coastal scrub for added habitat values.

Task: Restore upland and wetland transition. Areas of the Station adjacent to existing and planned wetland communities should be restored to native wetland transition and upland plant communities to better emulate a natural estuarine habitat profile and buffer the wetland habitat from surrounding agricultural and military activities. Such restoration activities must be implemented subject to compatibility with the Station mission.

5.2.4 Riparian and Freshwater Wetlands

Specific Concerns–Riparian and Freshwater Wetlands

- The remnant and adventitious riparian and freshwater wetland habitat on the Station is highly fragmented and generally removed from its most important ecological functions, which are to provide fresh water and sediment to the salt influenced wetlands, habitat diversity, and filtration of urban and agricultural pollutants from the runoff entering the estuarine ecosystem.
- Invasive palms and other trees degrade the Station's riparian areas.

Objective 7: Maintain current acreage and function of limited freshwater wetland/riparian and transition habitat.

Task: Periodically survey, classify, and re-map riparian and freshwater wetland boundaries, possibly in conjunction with rare plant surveys and vegetation management plan revisions. The mapping preference is to use the Sawyer and Keeler-Wolf (1995) system of co-dominants, since this is tied quantitatively to national and international standards, and an MOU for its use is in place at the state of California level among state and federal resource agencies.

5.2.5 Southern Foredune and Sandy Beaches

Specific Concerns–Southern Foredune and Sandy Beaches

- One federally threatened species, the western snowy plover, and several invertebrates and plants recognized as sensitive, use these areas.
- These areas are sometimes threatened by invasive species and sand depletion.

Objective 8: Ensure no net loss of existing structure and function of beach and dune habitat, with a focus on sensitive or declining native species and elimination of exotics.

Task: Maintain the southern foredune plant community lying between the inner and outer jetties on both sides of the harbor entrance by removing exotic weeds and protecting from disturbance.

5.2.6 Coastal Salt Marsh

Specific Concerns–Coastal Salt Marsh

- While the salt marsh is protected within the boundaries of SBNWR, it is less productive and supports reduced functions that it did historically. It is severely depleted from its historic acreage, is degraded by impaired tidal access, is disconnected from upper habitats, and has less diversity.
- Sea level rise, subsidence, and erosion/sedimentation patterns are insufficiently understood at NAVWPNSTA Seal Beach to predict the future of marsh habitats.
- The salt marsh zones lack sufficient areas of high marsh salt panne complex and middle marsh habitat.

Objective 9: Ensure no net loss of existing structure and function of the high marsh-salt panne complex , with a focus on sensitive or declining native species and elimination of exotics.

Objective 10: Ensure no net loss of existing structure and function of the salt marsh/freshwater brackish marsh interface.

Objective 11: Ensure no net loss of existing structure and function of marsh plain habitat, and achieve a long-term net gain in its quantity, quality, permanence, and connectedness to lower-elevation habitats with a focus on sensitive or extirpated species such as salt marsh bird's beak and Belding's savannah sparrow.

Objective 12: Improve the functional value of low marsh for support of light-footed clapper rail nesting populations and achieve a long term net gain in its quantity, quality, permanence, and connectedness to wetland habitats.

Task: Identify, plan, and implement additional detailed salt marsh restoration and enhancement opportunities on the Station in order to maximize the function and values of rare coastal wetland. The following concept projects were developed in conjunction with the INRMP.

A. Restore marsh hydrology. Areas of the Station which formerly supported salt marsh vegetation, which can be restored to naturally functioning tidal marsh by the removal of restrictions to tidal flow, should be so restored insofar as such projects are determined to be economically feasible and are compatible with the mission of the Station and will not degrade existing sensitive resources.

B. Restore tidal flows to the area south of POLB Pond 3 by removing the road extending east from the drop tower, excavation of tidal channels into the area, and removal of the culvert accessing Pond 3.

C. Restore tidal flows to the area east and north of Pond 3 by removal of the bordering roads and excavation of tidal channels.

D. Restore tidal flows to the area north and east of Pond 4 by removal of old landfill deposits and the excavation of tidal access channels.

E. Restore direct tidal and storm flow access via the Bolsa Chica flood control channel to the area south of the rail system marshaling yard, adjacent to the south Station perimeter road, by removal of internal containment berms, enlargement and lowering of the access culvert under Perimeter Road, and excavation of tidal access channels.

F. Restore tidal access to the isolated salt marsh segment east of Case Road (Site 3) by partial removal of either Case Road or Slough Road and reconnection of tidal channels into the area. Prior to connecting this area to the main marsh, lead pellets in the vicinity of the abandoned skeet range must be removed from the surface soils.

G. Improve tidal access to the tributary runoff creek along the west side of Kitts Highway north of Bolsa Avenue by lowering culverts under Kitts Highway and Forrestal Avenue and lowering the bed elevation and alignment to assure unassisted fish access for mosquito control.

H. Recreate salt marsh around ponds. Areas adjacent to and within the margins of the POLB mitigation ponds where no habitat transition exists between the subtidal pool and adjacent roads, grasslands, or active use areas shall be modified to incorporate a salt marsh plain transition area to better emulate a natural estuarine habitat profile. Such modifications should be implemented subject to economic feasibility, compatibility with the Station mission, will not degrade existing sensitive resources, and acquisition of appropriate permits to deposit fill in waters created under the terms and conditions of the POLB mitigation requirement.

I. Extend the western half of the north boundary of POLB Pond 1 to create a salt marsh plain and tidal access channel using excavated material to extend the marsh plain into the northern perimeter of the pond.

J. Extend the north boundary of POLB Pond 2 to create a salt marsh plain and tidal access channels using excavated material to extend the marsh plain southwards into the northern perimeter of the pond. Raise the local tidal datum and improve marsh elevation tidal exposure times within this pond by reducing tidal damping caused by restricted inlet flow rates. Improve inlet flow rates by reconnecting tidal channel access to the main marsh central channel with an improved culvert under Bolsa Avenue and a new culvert under the south boundary rail right-of-way.

K. In conjunction with Tasks above, extend the marsh plain created under those tasks into the northern, eastern, and southern perimeters of Pond 3 using material excavated from the tidal channels and pond banks.

L. In conjunction with Task above, extend the marsh plain into the northern, eastern, and southern perimeters of Pond 4 using material excavated from the tidal channels and pond banks.

Task: In partnership with USFWS, seek to determine if the re-introduction of Salt Marsh Bird's Beak at Seal Beach is compatible with the long-term needs of the Navy.

Task: Work with USFWS and CDFW to perform periodic surveys of the state-endangered Belding's savannah sparrow.

5.2.7 Intertidal Mudflats

Specific Concerns–Intertidal Mudflats

- The area of intertidal flats has been severely reduced from their historic levels in the Bay and elsewhere in southern California, mostly from impacts that pre-dated the CWA. As a result, many dependent shorebirds are declining along the Pacific Flyway.

Objective 13: Achieve a long-term net gain in the area, function, value, and permanence of intertidal flats, the physical conditions that support this habitat, and populations of associated target species: ghost shrimp, dowitchers as a group; spotted sand bass, mudflat tiger beetle; and long-billed curlew.

Task: Through indicator species surveys, protect existing areas of intertidal flats and their use by dependent birds, fishes, and invertebrates, giving priority to medium and low intertidal elevations.

5.2.8 Unvegetated Shallows

Specific Concerns–Unvegetated Shallows

- Unvegetated shallow subtidal areas are important as a nursery for the California halibut and other fishes. The lack of descriptive or quantitative information about the values at stake in unvegetated shallow subtidal habitat has probably hindered its protection.

Objective 14: *Improve the function and value of unvegetated shallows, the physical conditions that support this habitat, and populations of associated target species.*

Task: Since project impacts are relatively infrequent and small-scale in unvegetated shallows, implement mitigation requirements on a case-by-case basis using the following as a guide:

A. Provide clear guidelines for minimizing impacts. Alternative, innovative designs should be encouraged and considered early in the project planning stages that minimize impacts. Adjustments in project siting should also be considered to avoid or minimize impacts.

B. Mitigate unavoidable impacts through preparation of a habitat restoration plan that defines specific goals and success criteria.

5.2.9 Vegetated Shallows

Objective 15: Achieve a long-term net gain in the area, function, value, and permanence of vegetated shallows, the physical conditions that support this habitat, and populations of associated target species.

Task: Perform periodic eelgrass surveys and mapping.

5.3 Plant and Wildlife Conservation and Management

Objective 16: Ensure that all elements of the ecosystem and biodiversity are healthy by focusing management attention on a set of species that represent a full set of ecological niches, and that operate at a full range of spatial and temporal scales.

Task: Select Management Focus Species that are indicators of ecological health or ecological problems, based on specific criteria. Federally listed species are automatically a focus of management due to their legal status.

A. The following are criteria for selecting and using suitable target management species using recommendations from the literature: (Patton 1987; Landres *et al.* 1988; Morrison *et al.* 1992; Marcot *et al.* 1994; Niemi *et al.* 1997). The set of species should meet most of these criteria. It should:

1. Be cost-effective to sample or analyze, so monitoring of its status can be feasible for the long-term.

2. Inhabit ecological niches or communities not previously considered in this INRMP through habitat or federally listed species management, to ensure all native species and ecological communities are provided for.

3. Be considered sensitive and could become listed in the future without proactive management.

4. Represent different places on the food chain or levels of ecological scale.

5. Rely on NAVWPNSTA Seal Beach lands to complete its life cycle.

6. Be sufficiently sensitive to disturbances that it provides a marker of environmental degradation or health.

7. Be a keystone upon which the diversity of a large part of a community depends.

8. Be a narrow habitat specialist that consistently uses one habitat type or condition, or a certain combination of habitats to complete its life cycle.

9. Have populations of sufficient size or density to be reasonably detected and monitored.

10. Be a year-round resident or, if migratory, is known or strongly suspected of being primarily affected by local disturbances.

11. Have populations that are not normally sensitive to other environmental factors that would confound determination of cause-and-effect relationships (e.g. weather, predation, disease, competition).

12. Be in decline even if the cause is known to be non-specific to NAVWPNSTA Seal Beach lands.

A wide array of species were chosen in order to facilitate management decisions without oversimplifying NAVWPNSTA Seal Beach's ecology by only considering federally listed species. The preliminary list of Management Focus Species for Ecological Health are listed in Table 5-2.

These species will be used to track the condition and trend of natural resources on NAVWPNSTA Seal Beach and make management decisions accordingly. The targeted species will be highlighted in project evaluations, long-term monitoring focus, and modeling and research priorities.

A second set of Management Focus Species, which are indicators of ecological problems, such as they are invasive (native or non-native) or pest species that are known to be increasing. These species should serve as an early warning for ecosystem threats. The preliminary list of Management Focus Species for Ecological Problems is:

1. Marine algae (*Caulerpa taxifolia*);
2. Argentine ant (*Linepithema humile*), an invasive exotic; and
3. California ground squirrel (*Spermophilus beecheyi nudipes*).

Table 5-2. List of Management Focus Species for Supporting Long-term Monitoring and for Project Planning.

Scientific Name	Common Name	Reasons Selected	Habitat
BIRDS			
Limnodromus sp.	dowitchers	HI	mudflats
Aechmophorus clarkii transitionalis/ A. occidentalis var. *occidentalis*	Clark's grebe western grebe	CI, HI	open water, subtidal, salt marsh
Pelecanus occidentalis californicus	brown pelican	HI, SS, PS, NCCP	subtidal, salt marsh, artificial structures
Phalacrocorax auritus	double-crested cormorant	CI, HI, SS	deep/medium subtidal, artificial structures
Egretta thula thula	snowy egret	CI, PI	upland transition, salt marsh
Branta bernicla nigricans	**black brant**	**HI, D**	**eelgrass**
Anas acuta	northern pintail	CI, HI, EI, D	shallow subtidal, shallow subtidal aquatic vegetation, salt marsh, upland transition
Aythya affinis	**lesser scaup**	**CI, HI, D**	**open water, deep/medium subtidal, eelgrass**
Melanitta perspicillata	**surf scoter**	**CI, HI, D**	**open water, subtidal, intertidal rocky, intertidal sandy**
Oxyura jamaicensis rubida	ruddy duck	CI, HI, D	open water, deep/medium subtidal, shallow subtidal aquatic vegetation, intertidal mudflat, salt marsh
Circus cyaneus hudsonius	northern harrier	HI, SS	upland transition
Falco peregrinus anatum	peregrine falcon	CI, SS, PS, PI, NCCP	upland transition
Rallus longirostris levipes	**light-footed clapper rail**	**CI, HI, SS, PS, PI, NCCP**	**low salt marsh**
Charadrius alexandrinus nivosus	**western snowy plover**	**CI, HI, SS, PS, SP, NCCP**	**intertidal sandy, intertidal mudflat, salt marsh, upland transition**
Ammodramus sandwichensis rostratus	large-billed sparrow	HI, SS	salt marsh plain
Ammodramus sandwichensis beldingi	**Belding's savannah sparrow**	**C1, H1, SS, DS, PI**	**salt marsh plain**
Pandion haliaetus carolinensis	osprey	HI, SS, PS, maybe CI	open water
Larus occidentalis wymani	western gull	CI, DS	deep water, medium subtidal, shallow subtidal, aquatic vegetation, intertidal rocky, sandy, mudflat, salt marsh, artificial structure, upland transition.
Sterna antillarum browni	**California least tern**	**CI, HI, PS, PI, NCCP**	**subtidal, intertidal sandy, intertidal mudflat, salt marsh, artificial structures**
Sterna elegans	elegant tern	HI, SS, D, NCCP	subtidal, intertidal sandy, intertidal mudflat, salt marsh
Sterna forsteri	Forster's tern	CI, HI, PI	shallow subtidal, intertidal sandy, intertidal mudflat, salt marsh
Arenaria interpres	ruddy turnstone	CI, HI	intertidal mudflats, breakwaters
Calidris canutus roselaari	red knot	CI, HI, SP	intertidal mudflat, salt marsh
Numenius americanus	long-billed curlew	CI, HI, SS, SP, NCCP	intertidal mudflat, salt marsh
Phalaropus lobatus	red-necked phalarope	CI, HI	
Eremophila alpestris	coast horned lark	HI, SS	intertidal mudflat, salt marsh, upland transition
FISHES			
Urolophus halleri	**round stingray**	**CI, HI, RC, D**	**intertidal, nearshore, channel**

Table 5-2. List of Management Focus Species for Supporting Long-term Monitoring and for Project Planning.

Scientific Name	Common Name	Reasons Selected	Habitat
Sardinops sagax caeruleus	**pacific sardine**	**HI, RC**	**nearshore, channel**
Engraulis mordax	northern anchovy	HI, RC, DS, PI	intertidal, nearshore, channel
Anchoa delicatissima	slough anchovy	BESPP, NC, SC, S	intertidal, nearshore, channel
Anchoa compressa	deepbody anchovy	BESPP, HI	intertidal, nearshore, channel
Leuresthes tenuis	California grunion	HI	nearshore
Atherinops affinis	topsmelt	CI, HI, RC, DS, PI	intertidal, nearshore, channel
Syngnathus griseolineatus	bay pipefish	CI	intertidal, nearshore, channel
Paralabrax maculatofasciatus	**spotted sand bass**	**BESPP, RC,HC**	**intertidal, nearshore, channel**
Paralabrax nebulifer	barred sand bass	RC, HI	nearshore benthic, channel benthic
Cymatogaster aggregata	**shiner surfperch**	**HI, RC, DS, PI,HC**	**intertidal, nearshore, channel**
Embiotoca jacksoni	black surfperch	HI	nonvegetated nearshore
Mugil cephalus	striped mullet	BESPP, HI	intertidal, nonvegetated nearshore, channel
Hypsoblennius gentilis	bay blenny	HI	intertidal, nearshore, channel
Heterostichus rostratus	giant kelpfish	HI, VEGSPP	vegetated intertidal, nearshore
Clevelandia ios	arrow goby	BESPP, CI, HI, DS, PI	intertidal, nearshore
Hypsopsetta guttulata	diamond turbot	BESPP	unconsolidated sediment in intertidal, nearshore, channel
Paralichthys californicus	**California halibut**	**HI, RC, DS, PI, HC**	**intertidal, nearshore, channel**
Pleuronichthys verticalis	hornyhead turbot		important for monitoring
INVERTEBRATES			
Halichondria panicea	crumb of bread sponge	CI, HI	artificial hard substrate
Tetilla mutabilis	wandering sponge	CI, HI	unconsolidated sediment
Diadumene cf. *leucolena*	anemone	CI, HI	unconsolidated sediment, hard substrate
Pseudopolydora paucibranchiata	spionid	CI, HI, DS	tidal flat
**Neanthes acuminata*	neriid	CI, HI, DS	unconsolidated sediment
Leitoscoloplos elongatus	orbinid	CI, HI, DS	unconsolidated sediment
Capitella capitata	capitellid	CI, HI, DS	eelgrass, unconsolidated sediment, marsh channels
Megalomma pigmentum	sabellid	CI, HI, DS	unconsolidated sediment
Fabricia limnicola	sabellid	CI, HI, DS	eelgrass, unconsolidated sediment
Euphilomedes carcharodonta	ostracod	CI, HI	eelgrass
Parasterope barnsei	ostracod	CI, HI, DS	eelgrass, unconsolidated sediment
Acuminodeutopus heteruropus	aorid	CI, HI, DS	unconsolidated sediment

Table 5-2. List of Management Focus Species for Supporting Long-term Monitoring and for Project Planning.

Scientific Name	Common Name	Reasons Selected	Habitat
Caprella mendax	skeleton shrimp	CI, HI, DS	eelgrass, unconsolidated sediment
Euphilomedes carcharodonta	seed shrimp	CI, HI, DS	unconsolidated sediment
Crangon franiscorum	crangonid shrimp	HI, PI	eelgrass
Cancer antennarius	common rock crab	HI, PI	unconsolidated sediment, hard substrate
Hemigrapsus oregonesis	mudflat crab	CI, PI	eelgrass, unconsolidated sediment
Cicindela trifasciata sigmoidea	mudflat tiger beetle	SS	low marsh
Cicindela latesignata latesignata	sandy beach tiger beetle	SS,HI	high marsh/salt panne
Cicindela senilis frosti	Frost's tiger beetle	SS, HI	high marsh/salt panne
Cicindela gabbii	Gabb's tiger beetle	SS, HI	high marsh/salt panne
Portunus xantusi	swimming crab	CI, PI	unconsolidated sediment
Callianassa californiensis	**ghost shrimp**	**CI, PI, RC**	**eelgrass, unconsolidated sediment**
Panoquina errans	wandering skipper	CI, NCCP, SS	high salt marsh
Cerithidea californica	California horn shell	HI, DS, PI	unconsolidated sediment, vegetated salt marsh
****Musculista senhousia***	**Japanese mussel**	**CI, HI, DS**	**eelgrass, unconsolidated sediment**
**Tapes japonica (semidecussata)*	venerid clam	HI, DS, PI	unconsolidated sediment
Tagelus californianus	jackknife clam	CI, HI, DS	eelgrass, unconsolidated sediment
Macoma nasuta	bent-nosed clam	CI, HI	eelgrass, unconsolidated sediment
PLANKTON	**ADD PLANKTONIC INDICATORS AS THEY CAN BE IDENTIFIED AND PRIORITIZED.**		
PLANTS			
Spartina foliosa	cord grass	HI, D	salt marsh
Cordylanthus maritimus maritimus	salt marsh bird's beak	PS	salt marsh
Zostera marina	eelgrass	HI	eelgrass
Suaeda esteroa		HI	marsh plain edges, intertidal channels, channel edges; regionally rare, commonly missing due to loss of tidal influence and short life, non-clonal
Batis maritima		HI	marsh plain. Commonly lost from southern California marshes due to extremely low seed germn rate
Salicornia bigelovii		HI	marsh plain. Regionally rare, commonly lost from southern California marshes due to loss of tidal influence and low seed dispersal & dormancy
Triglochin concinna		HI	marsh plain. Commonly lost from southern California marshes due to loss of tidal influence and /low seed germination, slow growth
Limonium californicum		HI	high marsh. Commonly lost from southern California marshes due to loss of tidal influence and slow growth, low biomass

Table 5-2. List of Management Focus Species for Supporting Long-term Monitoring and for Project Planning.

Scientific Name	Common Name	Reasons Selected	Habitat
Jaumea carnosa		HI	marsh plain. Commonly lost from southern California marshes due to loss of tidal influence and hypersalinity intolerance

Note: Some of these species are not documented currently at NAVWPNSTA Seal Beach, but are/were likely present. [1]Bolded items are considered highly likely candidates to be target species because of the number or importance of criteria met. * = Exotic, CI = Community Indicator, DS = Dominant Species, HI = Habitat Indicator, HC=Habitat Connectivity Indicator SS = Sensitive Species, PS = Protected Species, PI = Practical Indicator, SP = National Shorebird Conservation Priority, NCCP = Natural Communities Conservation Program, D= Decline noted, but no official status, RC = Recreational and/or Commercial Species, BESPP = endemic

5.3.1 Plankton

Specific Concerns

- Evaluating both primary (phytoplankton) and secondary (zooplankton) productivity would be valuable in the acquisition of a full understanding of the function of the bay and wetlands at Seal Beach. It would allow an assessment of the strength of the dependency between plankton productivity and changing conditions in the water column.
- Information about the dynamics of the larval stages of benthic invertebrates and local fish species would lead to a more complete understanding of reproductive activity among resident species. Finally, the information obtained would make it easier to interpret human impacts in the open water environment of the area.

Objective 17: *Identify and then protect the abundance, biomass, and diversity of plankton that reflect the Seal Beach bay and wetland ecosystem's health.*

Task: *Seek out opportunities to partner in periodic trend surveys for plankton. Monitor these species groups as part of a long-term monitoring program.*

5.3.2 Benthic Algae

Specific Concerns

- The scarcity of understanding about algal dynamics and how they are affected by pollution and disturbances in the bay and wetlands is a lost opportunity to use algae as an indicator of ecosystem and individual habitat health.
- The shortage of knowledge about what drives algal standing crop and seasonality in the area contributes to an inability to identify threats and protect the plants and animals that depend upon it.

Objective 18: Identify and then protect the abundance, biomass, and diversity of algal functional groups that reflect the Seal Beach bay and wetland ecosystem's health.

Task: Seek out opportunities to partner in periodic trend surveys for algae. Monitor these species groups as part of a long-term monitoring program.

5.3.3 Marine Invertebrates

Specific Concerns

- A lack of understanding of the relative importance of attributes of sediment and water quality compared to predation and other factors in shaping the invertebrate community makes management difficult.
- Invasive, exotic invertebrates can significantly impact native invertebrate assemblage and the higher trophic species that depend upon them.

Objective 19: Identify and then protect the abundance, biomass, and diversity of invertebrate functional groups that reflect health in each habitat and the ecosystem as a whole.

Objective 20: Protect and enhance the attributes of intertidal and subtidal sites that sustain a diverse and abundant invertebrate community, promote fish and wildlife foraging, serve as a nursery for numerous fishes, as well as an ecological role in detritus-based food web support.

Task: Through periodic focal species surveys, develop and implement methods that detect changes in the quality of the benthic invertebrate assemblage, especially with respect to food for shorebirds, water quality and toxics, and overall ecosystem health.

A. Continue to participate in annual Mussel Watch program to ensure that invertebrates are not negatively burdened with pollutants.

5.3.4 Terrestrial Invertebrates

Objective 21: Maintain an inventory and determine the health and trend of invertebrate populations in the context of ecosystem health and management, with a focus on sensitive or at-risk species.

Task: Through periodic focal species surveys, develop and implement methods that detect changes in the quality of the terrestrial invertebrate assemblage and overall ecosystem health.

Task: Conduct surveys in likely habitats for tiger beetles to detect species presence and population distribution and abundance.

Task: Conduct a survey of key pollinators in each of the key Station ecosystems. Special emphasis should be made to note if known pollinators of the extirpated salt marsh bird's beak are present.

5.3.5 Fishes

Specific Concerns

- The National Wildlife Refuge Seal Beach is an important nursery and refuge for marine fishes, thus successful protection of fish habitats is needed. California halibut, spotted sand bass, and white croaker all use NAVWPNSTA Seal Beach wetlands.
- Fish health may be affected by water quality conditions within the area, especially by contaminants.
- For some fish species, the historical loss of intertidal and shallow subtidal flats may limit their overall survivability and numbers within the SBNWR.

Objective 22: Conserve fish population abundance and diversity, with priority to those using the NAVWPNSTA Seal Beach as a nursery or refuge, and to indigenous species, focusing on habitat conservation as a first priority.

Objective 23: Protect and enhance the attributes of intertidal and subtidal sites that sustain a diverse and abundant invertebrate community, promote fish and wildlife foraging, serve as a nursery for numerous fishes, as well as an ecological role in detritus-based food web support.

Task: Through periodic focal species surveys, develop and implement methods that detect changes in the quality of the fish assemblage and overall ecosystem health.

Task: Promote education and outreach by cooperating with interagency environmental education programs and make available informational literature and signs to raise awareness of threats, concerns, and management needs for fishes, including enforcement of fishing regulations and continuation of the fishing line recycling program.

Task: Update Station Fishing Policy as necessary.

5.3.6 Reptiles and Amphibians

Specific Concerns – Reptiles and Amphibians

- The National Military Fish and Wildlife Association (NMFWA), Herpetology Working Group has developed a set of recommendations for the management and conservation of Reptiles and Amphibians which has been incorporated into the following management strategy.

Objective 24: *Inventory and determine the health and trend of amphibian and reptile populations, emphasizing those that may indicate ecosystem trends or may become federally listed, and control exotics that threaten this health.*

Task: Conduct management focus species baseline surveys (including non-natives and management sub-plan for example, legless lizard). Update baseline inventory of amphibians and reptiles, to include Management Focus Species and non-natives to determine if eradication is needed).

Task: Perform periodic inspections of culverts to ensure that they remain free of marine growth to provide access to green sea turtles.

Task: Capture ad-hoc observations of sea turtles and support regional green sea turtle research efforts.

5.3.7 Birds

Specific Concerns

- Effects on Pacific Flyway bird populations from substantial losses of historic nesting, foraging, and loafing habitats locally are not well documented or understood for most NAVWPNSTA Seal Beach-dependent birds.
- Remaining habitats—especially important intertidal mudflats and upland transitional habitats—are further degraded and fragmented directly by a host of factors, including invasion of exotic plants and animals, reconfiguration of sub- and intertidal topography and substrate type, shoreline stabilization structures, watercraft grounding or anchor impact, contamination from localized terrestrial runoff, and compaction by vehicle wheels.

- Predation is intensified as birds subsisting on fewer and smaller habitat patches are targeted by locally thriving urban populations of predators and scavengers, such as domestic cats and dogs, rats, gray foxes, opossums, kestrels, ravens, crows, gulls, raccoons, and the recovering peregrine falcon. This problem will probably always require intensive management for declining populations.
- Potential for disease outbreaks such as avian cholera and botulism are heightened as birds are crowded into diminished habitat patches, and water quality is impaired.
- Human-produced contaminants and toxins, including oil, threaten all Bay-dependent species from potential accidental spills, nonpoint and point source runoff, and bioaccumulation.
- Monofilament line, fish hooks, plastic six-pack rings, plastic balloons, and other items of human-generated refuse potentially threaten individual birds with injury or mortality, as do above-ground utility lines across flight paths.
- Changes to the invertebrate and vertebrate prey base of wetland-dependent birds due to direct, indirect, and cumulative causes raise concerns.
- Raptors that use NAVWPNSTA Seal Beach lands and waters benefit from habitat protection afforded them through current management, such as banding and monitoring. Perch protection devices retrofitted on telephone poles are also beneficial to lower the risk of electrocution. However, it needs to be determined if such management is sufficient to protect raptors, or if improvements can be made.

Objective 25: Maintain, enhance, and restore habitats that provide for the health of resident and migratory populations of birds that rely on NAVWPNSTA Seal Beach to complete their life cycles. Foster broader public knowledge and appreciation of the functional, aesthetic, recreational, and economic values.

Objective 26: Conserve viable habitat for migratory and resident birds that use NAVWPNSTA Seal Beach for stopover resting, feeding, and nesting, while removing species which may detrimentally affect declining native birds.

Objective 27: Promote and support the DoD's partnership role in protection and conservation of neotropical migratory birds and their habitat.

Objective 28: Protect the golden eagle and bald eagle. Determine the status, health, and habitat use of other raptors, and avoid, minimize, or compensate for any negative effects of human activity.

Task: Protect, enhance, and restore habitats that migratory bird populations depend upon.

A. Maintain and enhance primary roosting, foraging, and nesting sites.

1. Identify opportunities for maintaining and enhancing primary habitats.
2. Develop a migratory bird protection protocol for routine maintenance activities such as mowing, tree trimming.

B. Establish long-term priorities for management and conservation of habitat for birds that utilize NAVWPNSTA Seal Beach.

Task: Conduct management focus species baseline avian surveys. Update baseline inventory to include Management Focus Species.

A. Identify or develop standardized, scientifically sound survey protocols to collect and analyze population abundance and distribution of birds across water, upland, and transitional habitat types and seasonally. Ensure that survey protocols will establish current local population sizes and also permit credible estimates of population trends at five-year intervals.

B. Consolidate existing information and determine how current established monitoring programs might contribute to regional databases and monitoring protocols, including the Breeding Bird Survey, Breeding Bird Atlas, Colonial Waterbird Surveys, International Shorebird Survey, Hawk Migration Surveys, Breeding Bird Census, Christmas Bird Counts, Winter Bird Population Studies, survey information collected locally by federal and state agencies, and the U.S. Geological Survey (USGS) Bird Banding Laboratory. As appropriate, coordinate with Avian Knowledge Network and DoD e-bird databases to ensure bird monitoring data is being submitted.

Task: Develop and implement an Avian Protection Plan (APP).

A. Install bird perches that protect the raptors from electrocution as cost allows. Prioritize poles with the highest number of bird electrocution incidents first, as well as poles in areas where an electrocution could ignite a fire.

Task: Develop a Shorebird Management Plan for NAVWPNSTA Seal Beach that considers the effect of sea level rise and shorebird censusing methods.

Task: Coordinate with current local, regional, and national bird surveys and conservation initiatives to reduce duplication of effort and maximize local conservation of birds.

Task: Continue annual participation and support of Christmas Bird Count.

Task: Continue participation and support of monthly high- and low-tide avian censuses.

5.3.8 Terrestrial Mammals

Objective 29: Provide for healthy populations of native mammals by managing for a diversity of native habitats and habitat conditions and ensuring that trade-offs of all military and biological projects to native mammals are considered in planning.

Task: Conduct focus species surveys for mammals. Maintain baseline inventory that includes Management Focus Species.

A. Maintain a population of coyotes to control rodents, foxes and lagomorphs.

Task: Ensure that activities minimize impacts to black-tailed jack rabbit populations and their habitat.

A. Develop and implement a black-tailed jack rabbit management plan to ensure remnant population stays viable.

Task: Conduct periodic bat surveys to assess bat species presence/absence.

5.3.9 Marine Mammals

Specific Concerns

- Harbor seals and sea lions are particularly vulnerable to oil spills.
- As in other California bays, a potential exists for harbor seals and sea lions to become nuisances around piers, fishing boats, or other haul out sites in public places.
- Oil spill prevention and cleanup are another management action potentially affecting marine mammals. The CDFW's Office of Oil Spill Prevention and Response takes the lead for the state, while several agencies are involved at the federal level (i.e. USCG, NMFS, U.S. Navy). In addition, medical care of oiled wildlife is required under state (Lempert-Keene-Seastrand Oil Spill Act, SB 2040) and federal (Oil Pollution Act 90) laws (Jessup 1998).

Objective 30: *Provide for healthy populations of native marine mammals by avoiding harassment or other "take," and monitor any strandings.*

Task: Conduct focus indicator species surveys for marine mammals.

Task: Capture ad-hoc observations of marine mammals and support regional marine mammal survey efforts.

Task: Record and report marine mammal mortality and stranding events.

A. Do not attempt to handle a sick or injured animal.

B. Contact appropriate authorities when sick, injured, or dead marine mammals are observed.

1. For sick or injured marine mammals call the Pacific Marine Mammal Center: (949-494-3050).

2. For injured whales call National Marine Fisheries Service (NMFS_: (562) 980-4017.

3. Follow directions in policy when removal of a dead marine mammal is required.

C. After contacting the above authorities notify the CNRSW, NRO at (619) 524-0043 or (619) 524-1130.

5.4 Special Status Plant and Wildlife Populations

5.4.1 Special Status Plants

Specific Concerns - Sensitive Plants

- One federally listed plant, salt marsh bird's beak, was once confirmed on the Station, but has not been observed in recent years. Six species that are listed as sensitive by CNPS have been confirmed on NAVWPNSTA Seal Beach as well.

- There is a lack of linkage between the salt marsh and upland habitat for pollinators.
- There have been no recent sensitive plant surveys (since 1996).
- Additional species catalogued in the CNDDB as occurring on NAVWPNSTA Seal Beach or within a mile of the boundary have never been targeted for searches. These are presented in Table 5-3.

Table 5-3 Additional species listed in the California Natural Diversity Database.

Species Name	Common name	Status	Surveyor, Date (or last seen, if multiple records exist), Record Type .	Data type	Presence
Hemizonia parryi ssp. *australis*	Southern tarplant	CNPS 1B			Common
Nama stenocarpum	Mud nama	CNPS 2B	Booth, L. Herbarium specimen. Last seen in 1932.	Non-specific point data, given a 1 mile radius.	Presumed extant.

Objective 31: Protect and enhance sensitive plant populations while ensuring compatible land use and flexibility to fulfill mission requirements.

Task: Conduct focused surveys for rare plants, targeting species considered sensitive by CNPS.

5.4.2 Special Status Wildlife Populations

5.4.2.1 California Least Tern

Specific Concerns

- California least tern populations are not self-sustaining without intensive management, and probably never will be (Photo 5-1 and Photo 5-2).
- There is a strong relationship between endangered species success and predator management. While there are differences among sites, predator management has at times been inconsistent from site to site, with the variation primarily related to different contracting agencies, their mandates and responsibilities, and individual biologist experience or opinion.
- Land managers practicing successful predator management have supported progressively more of the populations of sensitive species and are then held to more restrictive use due to the success of their programs. Good management should not be punitive.
- Natural predator avoidance tactics used by the California least terns are no longer successful in smaller colonies. The species' inherent strategy for predator avoidance is based on their habit of nesting in large, conspicuous colonies, grouped closely together. They occasionally rise into the air as a clamorous unit, to frighten and sometimes mob would-be predators. In many cases, the tern now nests in such low numbers that this self-protection tactic is no longer successful.
- The California least tern's need to nest on the ground in small colonies in what is now an urbanized setting, with no protective buffer between the colony and surrounding areas, leaves it vulnerable to intense predation at unnatural levels. A single feral cat or skunk can wipe out a colony in a night, forcing abandonment of that colony. Avian predators such as kestrels, ravens, crows, gulls, burrowing owls,

shrikes, northern harriers, and peregrine falcons can cause severe losses to breeding adults, young birds, and eggs in a single episode.

- Implementation of predator management field methods requires expertise and can be very species- and site-specific. Some of the most common predators are common species such as ravens or feral cats, while other severe losses have been caused by species, which themselves have a sensitive status: the peregrine falcon, gull-billed tern, northern harrier, shrike, and burrowing owl. Agency mandates and responsibilities also affect the approach taken.

Objective 32: Manage California least tern to maximize colony success at NAVWPNSTA Seal Beach as measured by fledgling productivity and pair numbers.

Photo 5-1 California least tern chick. Photo courtesy of Bob Schallman.

Photo 5-2 California least tern chicks. Photo courtesy of Bob Schallman.

Task: Continue intensive management of California least terns, which has proven effective in increasing their population, including breeding surveys and monitoring.

A statewide breeding census of the least tern has been conducted annually under the guidance of CDFW and USFWS. Least tern breeding site monitoring is somewhat standardized: nesting colony inspections of nests and tern breeding activity twice a week between middle April to late August, by a qualified permitted monitor. Additional observations may be made from a suitable distance outside the nesting colony to avoid disturbance. Other pertinent observations will also be made (e.g. evidence of disturbance by humans, predators, other nesting birds). This census program, at a minimum, determines the breeding population at the site, number of nests, and number of fledglings, or breeding success, each year during and after project construction.

Task: Manage predators of the California least tern to maximize colony success.

A. The start date for predator work should be a month before anticipated nesting, around February 1 for the snowy plover, and around March 1 for the least tern. Effort should continue until all nests are fledged.

B. Incorporate appropriate protocols for predator management conducted by Refuges, USDA Wildlife Services, or other agencies in a region-wide environmental impact assessment statement.

C. Develop protocols for the most common species, the ones for which a tern or plover loss is unacceptable under any circumstance.

Task: Prepare the tern nesting site annually.

A. To provide a site attractive to nesting least terns, the site should be relatively free of vegetation prior to the breeding season. All nesting sites should be inspected in January. If vegetation coverage exceeds 5 percent, vegetation must be removed. The presence of some low profile native vegetation that provides cover for chicks is acceptable. Removal of excess vegetation would be carried out by scraping, dragging, hand weeding, and sometimes appropriate herbicides, before middle March, when plover nesting begins. Controlled access and regular maintenance of the security fences, to preclude the damaging influence of human trespass, but especially feral cats and dogs, are also essential.

5.4.2.2 Light-footed Clapper Rail

Specific Concerns

- Severe depletion and fragmentation of salt marsh habitat, especially cordgrass as nesting habitat, has affected the light-footed clapper rail's ability to survive.
- The rail is threatened by predation, especially from adjacent urban areas.
- Salt marsh habitat with potential to grow cordgrass is limited and fragmented. It is vulnerable to El Ni–o and other storms that can cause it to die off.

Objective 33: Protect the listed light-footed clapper rail population at NAVWPNSTA Seal Beach and seek to contribute to its recovery.

Task: Continue intensive management of light-footed clapper rails, which has proven effective in increasing their population, including breeding surveys and monitoring.

Task: Manage predators of the light-footed clapper rails to maximize breeding success.

A. Incorporate appropriate protocols for predator management conducted by Refuges, USDA Wildlife Services, or other agencies in a region-wide environmental impact assessment statement.

B. Develop protocols for addressing the most common predator species

Task: Maintain light-footed clapper rail nesting platforms in cooperation with USFWS.

5.4.2.3 Western Snowy Plover

Specific Concerns

- The western snowy plover's preference for nesting on sandy beaches has led to its decline as a nesting bird along the coast.
- Foraging areas have been restricted by development, but also by the presence of human recreational activities in foraging areas.

Objective 34: Protect the listed western snowy plover population at NAVWPNSTA Seal Beach and seek to contribute to its recovery.

Task: Participate in and support regional breeding and winter window surveys for western snowy plover.

5.4.2.4 Green Sea Turtle

Specific Concerns

- The lack of information regarding the green sea turtle status and utilization of NAVWPNSTA Seal Beach waters restricts the development of effective management strategies.
- The presence of green sea turtles may negatively impact the military mission within tidal waters of NAVWPNSTA Seal Beach.
- Anthropogenic water conditions attract green sea turtles to otherwise marginal habitat.
- Current site approval and project review processes may be insufficient to evaluate potential impacts to green sea turtles or their habitat.

Objective 35: Protect the listed green sea turtle population at NAVWPNSTA Seal Beach and seek to contribute to its recovery.

Task: Perform periodic inspections of culverts to ensure that they remain free of marine growth to provide access to green sea turtles.

Task: Capture ad-hoc observations of sea turtles and support regional green sea turtle research efforts.

5.4.3 Other Sensitive Species

5.4.3.1 Burrowing Owls

Specific Concerns

- In the past there were 50 pairs of burrowing owls just in the ordnance magazine area in the northeast portion of the NAVWPNSTA Seal Beach south parcel (south of Westminster Road). Now, the best estimate is that there are probably no more than three or four individuals, based on recent banding (Schallmann, *pers. comm.* 2013).
- Burrowing owls appear to be in worse shape than California least terns (Bloom *pers. comm.* 2004). There are about 3,000 terns in southern California, but no more than 30 pairs of owls between Ventura County and the Mexican border. The NAVWPNSTA Seal Beach may be the only coastal site where the owls can have a stronghold between Ventura and the Tijuana River. There may be potential at Naval Auxiliary Landing Field Imperial Beach, but are viewed as a conflict with least tern nesting on the coast at that location by NWR managers, and potentially with helicopter flight. They are viewed as a conflict with bird-aircraft strike hazard concerns at North Island. They do well at Naval Space Surveillance Facility (Brown Field) on Otay Mesa, which supports an antennae array as a passive use, and where the 64 hectare grounds are mowed, but otherwise little activity occurs outside an office complex.

- While other theories have been put forward about the demise of the owl on NAVWPNSTA Seal Beach, including use of ground squirrel bait by the agricultural lessee, the problem is likely to have been the large population of red foxes that previously inhabited the south side grounds (Bloom pers. comm. 2004). It was removing these red foxes that instigated the need for an EIS on endangered species management, completed more than ten years ago.
- The burrowing owl is now proposed for listing by the State of California; it may be listed federally within the coming decade.
- Burrowing owls are a colonial species that naturally evolved on flat, treeless ground and resided in burrow networks. If isolated, they do not survive. At NAVWPNSTA Seal Beach, the burrowing owls use ground squirrel burrows, but also have preferred fireplugs sites and certain six-inch diameter drains in the bunkers, which are interconnected and adjacent to the ground. The fireplug locations are good because the ground is soft and they are not mowed. The six-inch drainage systems are perfect for them, better than ground squirrel holes, which are temporary. The owls are absent from agricultural fields due to disking of ground squirrel holes.
- Another location that appears to be good burrowing owl habitat is the northern field on the south parcel, which runs along Westminster Road and also borders on Kitts Highway. It is a saline field due to deposition of dredge spoils there. The sensitive plants, Coulter's lasthenia and southern tarplant, are known from this field.
- The habitat for burrowing owls at NAVWPNSTA Seal Beach is essentially unlimited for the foreseeable future. Almost any open field that is not disked and is one kilometer from tern nesting could be potential habitat. Unused bunkers and berms adjacent to structures may be good habitat, and the owls would serve the purposes of ground squirrel and gopher control at these locations.

Objective 36: Protect the burrowing owls population at NAVWPNSTA Seal Beach and seek to contribute to its recovery.

Task: Implement cornerstone elements of Burrowing Owl Management Plan.

Task: Place artificial burrows at appropriate locations, such as at fireplugs.

A. Manage the burrow complexes to prevent ground squirrels from using the burrows. Keep artificial nest openings clear of weeds. Weeds now bury formerly placed nests.

B. Do not disk where burrowing owls nest. Mowing is appropriate and provides benefits for the owls.

Task: In partnership with USFWS and CDFW, seek to establish a program that will allow active and passive relocation of burrowing owls.

5.4.4 Predator Management of Special Status Wildlife Populations

Objective 37: Monitor population of potential predators to contribute to the recovery of special status wildlife populations.

Task: Conduct periodic avian predator surveys and track their movements through trapping and banding efforts.

A. Participate in and support monthly night mammal surveys to ensure that populations of predators of special status species are appropriate.

5.5 Animal Damage Control, Feral Animal Removal, Urban Wildlife

Specific Concerns –Animal Damage Control

- Certain vertebrate species pose a nuisance and possible health hazard when they co-inhabit spaces with humans. They should be controlled without jeopardizing the survival of the pest species in other locations or any non-target wildlife. Special protection measures may be needed for non-target sensitive species. Accurate and timely information is needed on potential human health risks and protection measures.
- The presence of endangered species on NAVWPNSTA Seal Beach places a premium on preventing damage to the recovery of these species by other animals, whether native or non-native.

Objective 38: Control species that pose a nuisance or potential health hazard.

Task: Monitor areas inhabited by sensitive species to determine the presence or potential introduced predators including domestic, feral, and exotic species. Remove invasives as appropriate.

A. Pest Control Education.

1. Attend courses or workshops on improved methods for controlling vertebrate pests.

2. Ensure that residents of the housing area and Navy recreational visitors in the RV Park comply with a policy of "Do not feed wild animals" and pets are controlled. Feeding will encourage conflicts with humans and attract nuisance animals to areas with federally listed species.

5.6 Invasive Species Management

5.6.1 Invasive Plants

Specific Concerns - Invasive Plants

- Concern: increased freshwater inputs can allow the invasion of weedy species.
- The potential for exotic species introductions and the threat to the NAVWPNSTA Seal Beach ecosystem is so significant, especially in shallow or brackish habitats, that early detection is essential and would require resources and collaboration among jurisdictions. Presently there is no efficient and effective program for detecting exotic species threats.
- Weapons storage magazines support a non-native grassland with populations of invasive plant species including noxious weeds. The mowing regime may favor noxious weed populations.

- The most abundant and potentially problematic species include acacia, castor bean *(Ricinus communis),* giant reed (*Arundo donax*), pampas grass *(Cortaderia sp.),* iceplant, *Cenchrus echinatus,* fountain grass *(Pennisetum* sp.*),* fennel *(Foeniculum vulgare),* tamarisk, and eucalyptus. Additional herbaceous exotic weeds are also present.
- A priority system is needed for addressing invasive weeds because they are pervasive. Those that infest and degrade sensitive habitats or directly impact endangered and other sensitive species should receive the highest priority for control measures. However, pest weeds should be removed from within and adjacent to all native plant communities, when feasible.

Objective 39: Control the spread and introduction of invasive and noxious species with priority on those with the greatest potential for sensitive species population or habitat degradation, and restore to native habitat when feasible.

Task: Update the existing Weed Management Plan as appropriate.

Task: Map and monitor invasive plant communities (Noxious Weed Control Act and EO 13112; Section 3.7.1 "Invasive Terrestrial Plants"). Implement prioritization programs as needed.

A. Identify new infestations of invasive species as they become known and map all infestations of invasive plants every three years to gauge the effectiveness of control efforts or record species' rate of spread.

B. Prioritize treatment areas based on known aggressiveness of invasive, extent of infestation, and threat risk to native plants and animals.

C. Initially target the following areas and species for control: tamarisk, pampas grass, and giant reed should be actively eradicated. Efforts to control invasive weeds should begin in the fall/winter outside of the breeding season for birds, and at a time when the weed species are in non-growth phases more susceptible to herbicide application.

D. Monitor invasive weeds and those which have the potential to become noxious by remapping every five years.

E. Ensure that invasive plant control is not affecting federally listed plants or animals.

Task: Give appropriate personnel non-native plant recognition training so newly arriving invasive species can quickly be discovered and eradicated.

Task: Implement control measures based on established criteria.

A. Set priorities in order to tackle the fastest growing and most disruptive problems first; in this way hoping to minimize the total long-term workload. First act to prevent new pest species from becoming established, then attack incipient problems and outliers of larger infestations. Next prevent the expansion of larger infestations and then work to reduce their size or, if possible, eliminate them, and finally, learn to 'live with' pests/infestations that cannot reasonably be controlled but keep our eyes out for innovations that might allow us to control them.

B. Appendix J contains the list of Exotic Pest Plants of Greatest Ecological Concern in California produced by Cal-IPC. If any of these species are discovered on NAVWPNSTA Seal Beach they should immediately be removed.

C. Coordinate timing of control of invasives near the property boundary with adjacent landowners and managers to achieve maximum control and minimize cross-boundary re-invasions. Teaming with other agencies often greatly increases the likelihood of receiving grant monies to control exotics.

D. Restoration, construction, and mitigation plans should include contingencies for removing invasives as they appear and for implementing new control measures as they become available.

E. Control programs and removal projects should cause the least possible disturbance to native species and communities.

5.6.2 Marine Invasives

Specific Concerns–Marine Invasives

- An infestation of the alien seaweed, *Caulerpa taxifolia,* was discovered in Huntington Harbor (about 75 miles north of its first appearance near Carlsbad, June 2000 in San Diego County). An aggressive clone of this species has proven to be highly invasive in the Mediterranean Sea, where the governments of France, Spain, Monaco, and Italy have been unable to control its spread. The first confirmed American occurrence of this invasive species in California caused considerable alarm. Efforts are underway to eradicate *Caulerpa taxifolia* from California and control its spread before the infestation reaches the magnitude seen in the Mediterranean.
- The invasive mollusk *Littorina littorea* has been detected in Anaheim Bay as recently as 2004. This snail can negatively impact populations of native invertebrates, therefore efforts to monitor its presence and control or eradicate should be undertaken.
- The marine environment could potentially be affected by the Naval vessels adjacent to the salt marshes of the NWR. In order to prevent accelerated rates of invasion by non-native marine wildlife, regulations have been established by the National Invasive Species Act of 1996 for the ballast water from the vessels being loaded and unloaded each year.

Objective 40: Prevent infestation, monitor, and aggressively control any infestation of marine invasive species in the harbor and wetland areas including Caulerpa taxifolia and Littorina littorea.

Task: Establish a regular program to monitor for the invasive marine snail, *Littorina littorea,* in the harbor and marsh. If it appears, aggressively contain and eradicate it before it becomes established.

Task: *Establish a regular program to monitor for the appearance of the invasive marine algae, Caulerpa taxifolia, in the harbor and marsh. If it appears, aggressively contain and eradicate it before it becomes established.*

5.7 Agricultural Outleases

Objective 41: Ensure the long-term viability, land use compatibility, and fair-market value of all leases and outgrants, in conjunction with the military mission, and natural resource compliance and best practices.

Objective 42: Adopt wildlife-compatible agricultural practices where economically feasible, while complying with regulatory requirements, and support the back-tailed jackrabbit, burrowing owl, and mountain plover as management focus species.

Task: Maintain the primary role of agricultural land as a buffer against encroachment and for income to offset maintenance requirements of the Station.

Task: Oversee, inspect and monitor lessees for compliance/cooperation with natural resources program.

The Conservation Program Manager is responsible for ensuring compliance with environmental requirements of outgrants and leases, and that these requirements meet the standards of BOs and other regulatory agreements of NAVWPNSTA Seal Beach.

5.8 Outdoor Recreation, Environmental Education, Public Access, and Public Outreach

Specific Concerns – Outdoor Recreation Environmental Education, Public Access, and Public Outreach

- A MOU between the DoD and USDI provides guidance on the management of natural resources for outdoor recreation (Appendix D). It set up the National Park Service as a cooperator in developing outdoor recreation plans for military installations where there are suitable resources for such a program consistent with national security.

Objective 43: Promote compatible, sustainable outdoor recreation opportunities which enhance quality of life for military personnel, while conserving natural resources, and without compromising Fleet readiness.

Objective 44: Establish a culture of conservation for the NAVWPNSTA Seal Beach lands as an ecosystem, including the relationship to its watershed.

Objective 45: Enhance the opportunities for observation and appreciation of coastal and biological resources by providing public access and viewing areas, and creating recreational and interpretive facilities.

Objective 46: Develop programs for public education on wetland values.

Task: Develop an updated outdoor recreation plan that includes both military personnel and public components.

Task: Develop and utilize interpretive materials, guides, and signage. Provide multimedia interpretive material, on-site interpretive signage, and a field guide for wildlife viewing. Include appropriate signage on the burrowing owl program.

Task: Participate in National Public Lands Day events (Photo 5-2).

Task: Participate in Migratory Bird Day events.

Task: Participate in Earth Day events.

Photo 5-2. National Public Lands Day. Photo courtesy of Naval Weapons Station Seal Beach.

5.9 Information Management

NAVWPNSTA Seal Beach uses GIS to manage information about the installation's environment and resources. GIS allows users to store and manipulate temporal and spatial data (e.g., maps, aerial photos, satellite images). It deals with data in vector (lines, points, and polygons) and raster (imagery) formats. Data can be displayed and manipulated to create maps. More importantly, GIS data are used to process and analyze information used in natural resources management. Primary GIS software consists of ArcGIS.

Objective 47: Ensure the technically sound, practical and appropriate use of library and computer technology to manage, analyze, and communicate natural resource information in support of management decisions.

Task: As needed, develop a current military use map that shows environmental considerations as well as military facilities

Task: Store, analyze, and maintain data for research and survey projects involving natural resources on NAVWPNSTA Seal Beach, making the information accessible and readily available to multiple users.

5.10 Restoration and Enhancement Long-term Visionary Objectives

This section provides long-term objectives for restoration and enhancement projects. NAVWPNSTA recognizes that these objectives will not be achieved in the immediate future because of funding constraints; however, they are important for long-term planning. Table 5-4 provides considerations for future development of restoration guidelines, and Map 5-2 provides a visual representation of future restoration objectives.

Specific Concerns–Restoration and Enhancement Projects

- Restoring only the missing pieces may not be sufficient to provide for at-risk species and impaired wetland processes, when on a regional historic basis 90 percent of wetlands are missing.
- The type of work that needs to be accomplished to restore wetlands is fundamentally big and structural. Weed control projects are helpful but they only maintain existing values. The work needed is beyond conventional budget allocations of the U.S. Navy or any individual agency. Partnerships and collaboration are essential to get the work done.
- The market framework of a mitigation bank may not provide the economic opportunity to restore the most missing or most essential elements of the wetlands. What is irreplaceable and what is NAVWPNSTA Seal Beach's market niche are two very separate questions – for instance, salt marsh is irreplaceable but may not be very marketable in a regulatory setting.
- The conventional mitigation pathway is not triggered sufficiently to get the needed work done, and such a pathway only results in compliance with a no-net-loss standard.
- The Navy needs to offset operating costs of managing any restoration work undertaken.
- The framework should facilitate pushing the envelope for project sponsors to explore the true limits of what can be done to improve habitats at NAVWPNSTA Seal Beach.
- The Navy needs to be protected from liability and impairment of its operations, and to be able to say in a short timeframe whether or not a project meets criteria to be implemented on its property.

Objective 48: Improve the success of mitigation and enhancement projects based on regulatory, functional, and ecosystem criteria.

Table 5-4. Considerations for developing restoration guidelines for Naval Weapons Station Seal Beach.

• Habitat losses at Seal Beach can be attributed to: sedimentation from old streams, blockage of tidal access at the marsh entrance and by roads, direct fill of areas, or channelization (Huntington Harbor). • For the salt marsh to be able to respond to rising sea level as well as subsidence, there must be a broad wetland-upland transition	• Tidal stream order and subtidal elevation, substrate, and distance from channel are features that correlate with fish species composition and abundance in the salt marsh (McIvor and Rozas 1996, Williams and Zedler 1999). Marshes with a diversity of hydrogeomorphic features, including complex creek networks, should support a greater range of ecosystem functions for fish than

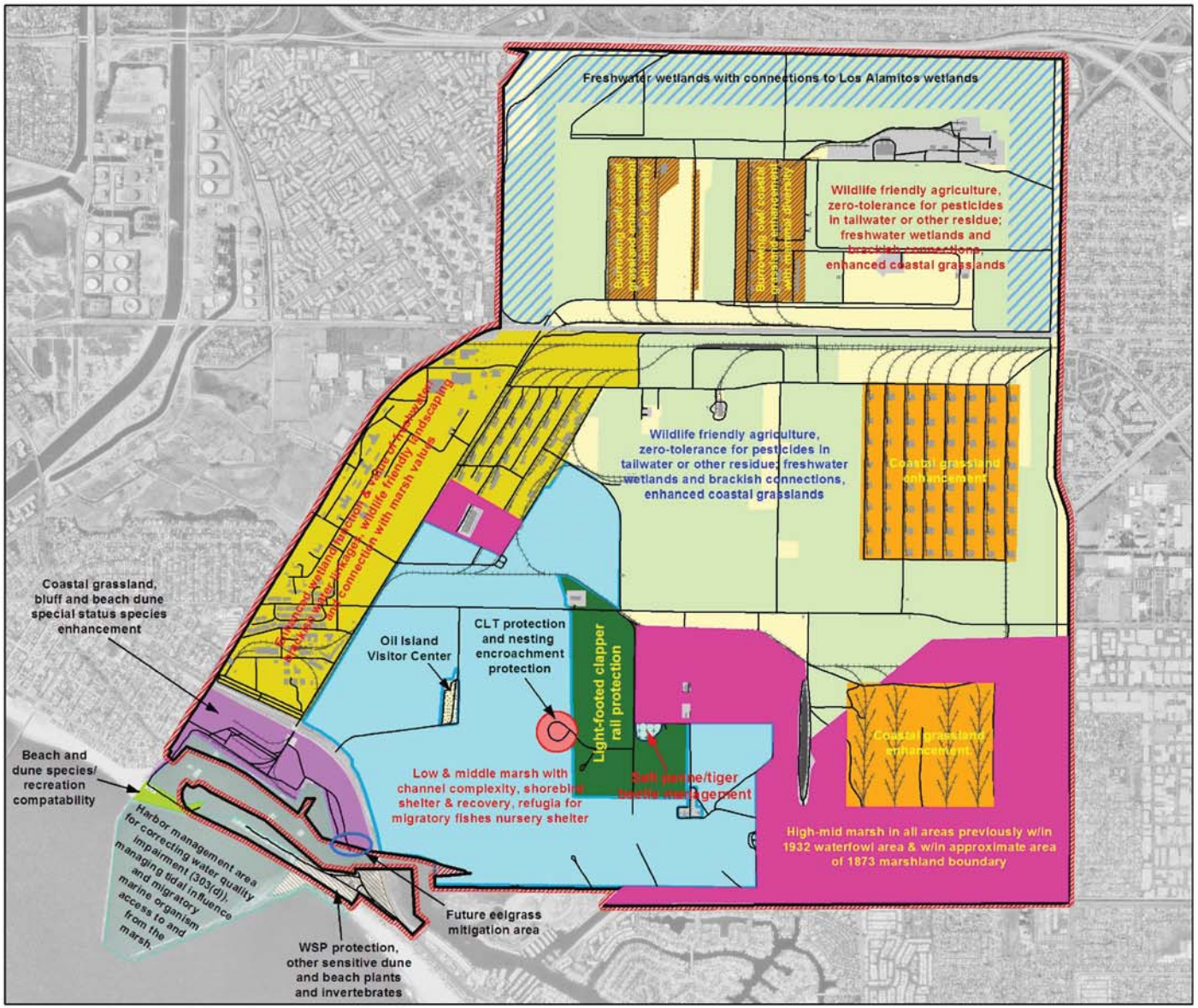
Table 5-4. Considerations for developing restoration guidelines for Naval Weapons Station Seal Beach.

zone with very gentle slopes (as are found in most natural wetlands), and probably a source of sediment. The lower edges of the salt marsh will gradually succumb to excess inundation, and the entire marsh will need to move inland to compensate. The probability that subsidence and sea-level rise will threaten intertidal and shallow nearshore communities gives more justification to targeting shallow subtidal, intertidal, and upland transition habitats now in restoration objectives. Sea level in San Diego Bay has risen 21 cm (0.7 foot) in a century. Low seas now appear a bit higher than highest El Niño seas in the early 1900s.

- Without some hydrologic manipulation, restoring tidal flow to an area that has subsided would create a subtidal pond, rather than an intertidal wetlands. If a former wetland has been extensively filled, the original wetland soil may be so compacted that removal of fill would leave the site substantially below the "project elevation" for intertidal flooding. The original soil would be best for restoration, but it would be buried below fill, unless exceptional measures were taken to over excavate the site, stockpile the original wetland soil, and re-grade the area to the correct elevations. Soil texture may be suitable, but soil organic matter may be lacking, due to enhanced decomposition under aerobic conditions.
- Estimates of the amount of salt marsh that has been destroyed in southern California range from 75 to 90 percent (Zedler 1996). Faber *et al.* (1989 cited in SCWRP 2001) estimated riparian losses in southern California at 90-95 percent.
- In order to benefit plant and animal distributions and to support a full range of biotic processes, the distribution and size of tidal creeks across a wetland and within particular habitat types should be considered. This includes creek sinuosity; creek stability and migration; and creek morphology such as topography along the interface between creek bank and marsh that facilitates over bank flooding and small-scale heterogeneity. Channel slope affects prey availability, predator encounter rates, and bioenergetic costs. At Tijuana Estuary, Desmond (1996) found that 1st-order creeks make up 45 percent of the total creek network. Pestrong (1965) measured similar parameters for salt marshes in San Francisco Bay. In coastal Virginia, low abundances of shellfish and fish in a constructed marsh were attributed to insufficient morphometric heterogeneity (i.e. fewer stream rivulets) and lower levels of organic carbon (Havens *et al.* 1995).

will more homogeneous habitats (Williams and Desmond 2001, in Zedler 2001). Species composition in the Sacramento-San Joaquin Delta varied distinctly by stream order. Small, first-order "sloughs" were mainly occupied by native resident species, while larger, higher-order channels were occupied by seasonal visitors (Moyle *et al.* 1986; Meng *et al.* 1994). In San Diego County, Desmond *et al.* (2000) found that size structure of juvenile California killifish *(Fundulus parvipinnis)* was strongly related to channel depth. Small juveniles had an affinity for shallow habitat, including first-order creeks and shallow (less than 0.25 m deep) areas in higher-order channels. All of these studies support the idea that small creeks are important to resident marsh species. On the east coast, Rozas and Odum (1987) found that stream order affects species abundance patterns in tidal freshwater marshes of Virginia and that fish numbers were greater in small headwater and main creek marshes than in the larger river marshes. They attributed this pattern primarily to the increased abundance of refuges provided by submerged aquatic vegetation in the lower-order creeks.

- The four basins excavated at Seal Beach were connected to tidal areas by a system of culverts, with limited connectivity to intertidal areas. While the project provided habitat for certain species or adult life history stages, it lacked essential functions for species and life history stages that depend on shallow marsh (Ruiz *et al.* 1993; Baltz *et al.* 1993).
- Deep subtidal areas with steep edges lack the gradual, sloping interface between subtidal and intertidal, and they lack the full range of wetland habitats. Thus, they are unlikely to provide the essential refuges and spawning habitats required of the various fish species found in natural coastal wetlands.
- In restoration, the normally thousands of years it takes for a marsh's natural development are condensed into a geographic space that encompasses a fully functional marsh. Most coastal wetlands are thousands of years old and their natural development has taken place over a scale of centuries.



Conceptual Restoration Plan for NWS Seal Beach

Restoration Concepts

- Low intensity use/Open areas
- Burrowing owl/Coastal grassland enhancement
- Coastal grassland, bluffs, and beach/dune
- Enhanced freshwater wetland function
- Low & middle marsh w/ channel complexity
- Light-footed clapper rail management area
- Oil Island Visitor Center
- Western snowy plover protection
- Harbor management area
- Beach & dune species/Recreation compatibility
- Operations
- Wildlife friendly agriculture
- High-mid marsh restoration in previous 1932 waterfowl areas
- California Least Tern Nesting Site
- Salt pannes/tiger beetle management
- Riparian freshwater linkages
- Coastal grassland enhancement
- Perimeter encroachment control/ High priority wetlands area
- Buildings
- Roads
- Railroads
- Base Boundary

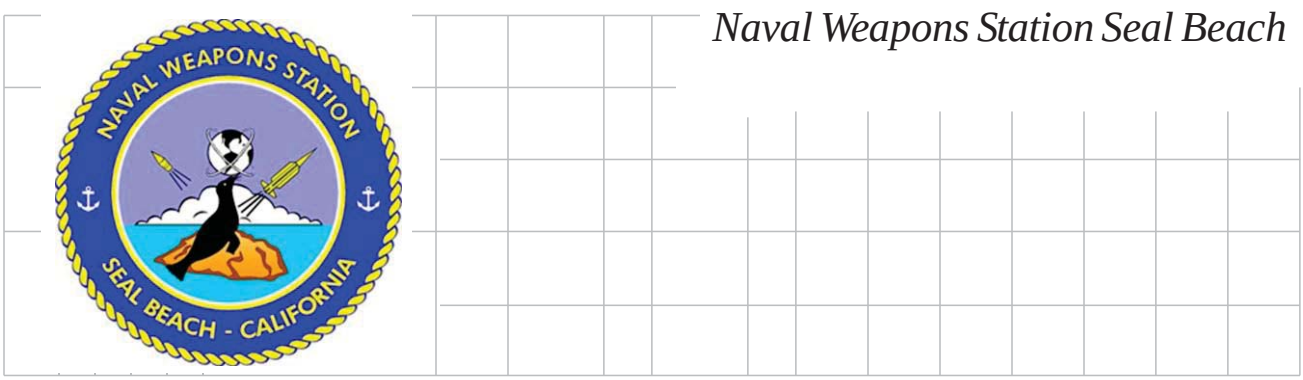
Freshwater wetlands and riparian communities are only a priority when they improve the quality or quantity of salt-influenced communities.

N
W E
S

0 0.1 0.2 0.4 0.6 0.8 1 *Miles*

0 0.10.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2 *Kilometers*

Map 5-2. Conceptual restoration plan for Naval Weapons Station Seal Beach



6.0 INRMP Implementation

6.1 Introduction

Implementation of this revised INRMP will be realized through the accomplishment of specific goals and objectives as measured by the completion of projects described herein. An INRMP is considered implemented when the installation performs the following:

- Actively requests, receives, and uses funds for "must fund" projects and activities (See Section 6.2 below for a description of "must fund");
- Ensures that sufficient numbers of professionally trained natural resources management staff are available to perform the tasks required by the INRMP;
- Coordinates annually with cooperating agencies; and
- Documents specific INRMP action accomplishments undertaken each year.

The Navy intends to implement this INRMP within the framework of regulatory compliance, mission obligations, anti-terrorism and force protection limitations and funding constraints. Any requirement for the obligation of fund for projects in this INRMP shall be subject to availability of funds appropriated by Congress, and none of the proposed projects shall be interpreted to require obligation or payment of funds in violation of any applicable law, most notably the Anti-Deficiency Act (31 USC 1324, *et seq.*).

Successful implementation of this INRMP will depend upon not only the guidelines set up and projects described, but how well these are translated into performance work statements (who will do what and with what money), project lists and scopes of work, and a workload plan. It must fit into the formal EMS established at NAVWPNSTA Seal Beach for integrating environmental considerations into day-to-day activities across all levels and functions of Navy enterprise. NAVWPNSTA Seal Beach depends on natural resources for the sustainability of many mission-related programs (i.e. aesthetics and recreation for military personnel, stormwater collection and transport, etc.) and will manage natural resources to ensure sustainable use. This INRMP is not intended to impair the ability of NAVWPNSTA Seal Beach to perform its mission. However, the INRMP does identify usage restrictions on sensitive attributes such as environmentally sensitive habitat areas. Appendix L provides critical habitat designation at the installation.

6.1.1 Responsibility

The responsibility for development, revision, and implementation of INRMPs is shared at every level among many different command elements. The SECNAV Instruction 6240.6E assigns responsibility for establishing, implementing, and maintaining the natural resources programs under the jurisdiction of SECNAV to the CNO/CNIC. Regional command and coordination is provided by the major claimant, Navy Region Southwest, and the Regional Environmental Coordinator. These entities ensure the programming of resources necessary to establish and support an integrated natural resources program consistent with legislative requirements, DoD policy, and stewardship. As the Navy shore infrastructure continues to change through reorganization and regionalization, many natural resources functions that formerly were the responsibility of installation commanders have passed to these regional commanders and area coordinators as part of their responsibilities.

NAVFAC Southwest is responsible for providing technical assistance for both compliance and stewardship obligations, and to evaluate and validate requests for funds for natural resources projects. This engineering activity administers the Navy forestry and agricultural outlease budgets, fish and wildlife/hunting and fishing fee and permit projects, contracts, and cooperative agreements. Upon request from CNO/CNIC, NAVFAC Southwest coordinates natural resources requirements with other federal, state, or local agencies, including the acquisition of INRMP mutual agreements between the Navy, USFWS, and state fish and wildlife agencies. Natural resources program information needed to satisfy reporting requirements, legislative information requests, and to support project requests is also maintained by NAVFAC Southwest. This information is collected in the NAVFAC Natural Resources Data Call Station and applicable GIS programs.

The installation Commanding Officer is responsible to act as the natural resource steward of lands under his or her jurisdiction and integrate natural resources requirements into the day-to-day decision-making process. To accomplish this, the Commanding Officer will involve appropriate tenant, operational, training, or research and development commands in the INRMP review process to ensure no net loss of the military mission. The Commanding Officer may ask the Navy Judge Advocate General or Office of the General Counsel Legal Counsel to provide advice and counsel with respect to legal matters related to natural resources management and INRMPs (5090.1C CH-1).
Formal adoption of an INRMP by the Commanding Officer constitutes a commitment to seek funding and execute, subject to the availability of funding, all "must fund" projects and activities in accordance with specific time frames identified in the INRMP. Under the Sikes Act (as amended), any natural resources management activity that is specifically addressed in the INRMP must be implemented (subject to availability of funds). Failure to implement the INRMP is a violation of the Act and may be a source of litigation. Since the Sikes Act (as amended) requires implementation of the INRMP, there is a clear fiscal connection between INRMP preparation, revision, implementation, and funding. Funding to implement natural resources management will largely come from program sources (through CNRSW).

Further, a SECNAV memorandum (12 August 1998) stated:

> "*All projects essential to fulfill the selected alternative (mix of management objectives) must be implemented within a timeframe indicated in the INRMP. Any deviation or change from achieving the selected alternative may require supplementation to the EA or EIS and an opportunity for public comment."*

Adequate training of natural resource personnel is important to the success of military sustainability and land management. The 5090.1C CH-1 requires that Navy commands develop, implement, and enforce the management plan through personnel with professional training in natural resources.

> *"Natural resources programs shall support military readiness and sustainability and commands shall assign specific responsibility, provide centralized supervision and assign professionally trained personnel to the program. Natural resources personnel shall be provided an opportunity to participate in natural resource management job training activities and professional meetings."*

The Sikes Act (as amended) (Section 670g) also addresses this need, as well as DoDI 4715.03 (18 March 2011).

6.1.2 Federal Anti-Deficiency Act

NAVWPNSTA Seal Beach intends to implement recommendations in this INRMP within the framework of regulatory compliance, national Navy mission obligations, anti-terrorism and force protection limitations, and funding constraints. All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 USC 1341, *et seq*.). Budgeting protocols based on DoD and DoN guidance, such as must fund projects and ERL, are discussed throughout Section 6.2.

6.1.3 Staffing

The Sikes Act (as amended) specifically requires that there be "sufficient numbers of professionally trained natural resources management and natural resources enforcement personnel to be available and assigned responsibility" to implement an INRMP.

NAVWPNSTA Seal Beach is responsible for identifying personnel requirements to accomplish INRMP goals and objectives. The Commanding Officer, via his Environmental staff and Conservation Manager, is responsible for providing input into budgeting and staffing processes CNRSW and higher authority endorse these requests and allocate budgetary and personnel resources. Personnel assigned to natural resources management, such as the installation Environmental Director and the installation Conservation Manager, are the core staff responsible for overseeing implementation of the INRMP. These personnel ensure that a consistent conservation program is carried out by using strategies outlined in this plan to support the Navy mission and achieve INRMP goals and objectives.

6.1.4 Annual Update, Review, and Metrics

DoD policy requires installations to review INRMPs annually in cooperation with the two primary parties to the INRMP (USFWS and the state fish and wildlife agency). Annual reviews facilitate "adaptive management" by providing an opportunity for the parties to review the goals and objectives of the plan, as well as establish a realistic schedule for undertaking proposed actions. The Navy Natural Resources Metrics is a guide for addressing annual INRMP review. These Natural Resources Metrics can be used to gather and report essential information required by Congress, EOs, existing U.S. laws, and the DoD. There are seven focus areas that comprise the Natural Resources Metrics to be evaluated during the annual review of the Natural Resources Program/INRMP.

1. Ecosystem Integrity
2. Listed Species and Critical Habitat
3. Fish and Wildlife Management for Public Use
4. Partnership Effectiveness
5. Team Adequacy
6. INRMP Project Implementation
7. INRMP Impact on the Installation Mission

A full copy of the most recent Natural Resources Metrics evaluation is presented in Appendix E.

Section 101(b)(2) of the Sikes Act (as amended) [16 USC 670a(b)(2)] specifically directs that the INRMPs be reviewed "as to operation and effect" by the primary parties "on a regular basis, but not less often than every five years," emphasizing that the review is intended to determine whether existing INRMPs are being implemented to meet the requirements of the Sikes Act (as amended) and contribute to the conservation and rehabilitation of natural resources on military installations. The OUSD guidance (17 May 2005) states that joint review should be reflected in a memo or letters.

Recent guidance on INRMP implementation interpreted that the five-year review would not necessarily constitute a revision; this would occur only if deemed necessary. The Annual Review process is broadly guided by the Natural Resources Conservation Program (DoDINST 4715.03 [DoD 2011]) and by OPNAVINST 5090.1C CH-1, Environmental and Natural Resources Program Manual (11 July 2011). Policy memoranda in 2002, supplemented in 2004, clarified procedures for INRMP reviews and revisions:

- DUSD [I&E] Policy Memorandum 10 October 2002, which replaced a 1998 policy memorandum.
- Assistant Deputy Under Secretary of Defense for Environment, Safety and Occupational Health Policy Memorandum (01 November 2004).
- Assistant Deputy Under Secretary of Defense Environment, Safety and Occupational Health Policy (September 2005 Memorandum).

The INRMP Implementation Guidance (10 October 2002 Memorandum) improved coordination external to DoD (USFWS, state agencies, and the public) and internal to DoD (military operators and trainers, cultural resources managers, pest managers). It also added new tracking procedures, called metrics, to ensure proper INRMP coordination occurred and that projects were implemented. These natural resources metrics have been updated and are available on the Navy Conservation website.

The 2002 guidance also required that each installation provide a notice of intent (NOI) to prepare or revise the INRMP. Each military installation now must request that USFWS and the state fish and wildlife agency participate in both the development and review of the INRMPs. Current coordination guidelines are that the USFWS field

office is the appropriate entry point for military installations, and the USFWS Regional Sikes Act Coordinator is the liaison to facilitate INRMP review.

The Supplemental DoD INRMP Guidance (01 November 2004 Memorandum) further defined the scope of the annual and five-year review, public comment on INRMP reviews, and ESA consultation. A formal review must be performed by the parties at least every five years. Informal annual reviews are mandatory to facilitate adaptive management, during which INRMP goals, objectives, and "must fund" projects are reviewed, and a realistic schedule established to undertake proposed actions. The outcome of this joint review should be documented in a memorandum or letter summarizing the rationale for the conclusions the parties have reached. This written documentation should be jointly executed or in some other way reflect the parties' mutual agreement.

The Supplemental DoD INRMP Guidance (September 2005) stated that all INRMPs must address resource management on all of the lands for which the subject installation has real property accountability, including lands occupied by tenants or lessees or being used by others pursuant to a permit, license, right of way, or any other form of permission. Per this memo, installation commanders may require tenants, lessees, permittees, and other parties that request permission to occupy or use installation property to accept responsibility, as a condition of their occupancy or use, for performing appropriate natural resource management actions. This does not, however, obviate the need to address natural resource management on any such lands in the INRMP.

There is no legal obligation to invite the public either to review or to comment upon the parties' mutually agreed upon decision to continue implementation of an existing INRMP without revision. If the parties determine that substantial revisions to an INRMP are necessary, public comment shall be invited in conjunction with any required NEPA analysis.

In most cases INRMPs will incorporate by reference the results of an installation's previous species-by-species ESA consultations, including any reasonable and prudent measures identified in an incidental take statement. Neither a separate biological assessment nor a separate formal consultation should be necessary. Nonetheless, because the INRMP may include management strategies designed to balance the potentially competing needs of multiple species, it may be prudent to engage in informal consultation.

6.2 Funding and INRMP Implementation

The Navy and NAVWPNSTA Seal Beach intend to implement recommendations in this INRMP within the framework of regulatory compliance, national Navy mission obligations, anti-terrorism and force protection limitations, and funding constraints. Any requirement for the obligation of funds for projects in this INRMP shall be subject to the availability of funds appropriated by Congress, and none of the proposed projects shall be interpreted to require obligation or payment of funds in violation of any applicable federal law, including the Anti-Deficiency Act, 31 USC § 1341, *et seq*.

For the purposes of this INRMP, the terms stewardship and compliance have specific meanings as criteria for implementing project lists. Project rankings are assigned based on whether an activity is mandatory to comply with a legal requirement such as under the ESA, CWA, or MBTA. Alternatively, a project may be considered good land stewardship but is not considered an obligation for NAVWPNSTA Seal Beach to be found in compliance with

environmental laws. Projects considered necessary to comply with the law are generally funded within budget constraints, whereas stewardship projects are ranked lower for funding consideration when projects are competed among multiple installations. Current policy is, however, that they will eventually be funded.

The funding strategies described here are implemented when projects are defined and prioritized, as for this INRMP in Table 6-1. The budgeting plan for the INRMP is based on programming and budgeting priorities for conservation programs described in 5090.1C CH-1.

6.2.1 Environmental Readiness Program Assessment Database

Environmental Portal and EPR-Web is an optimized online database used to define all programming for the Navy's environmental requirements. EPR-Web records data on project expenditures and provides immediate, web-based access to requirements entered by the multiple Navy environmental programs, including environmental compliance, pollution prevention, conservation, radiological controls, and range sustainment as related to environmental costs on military ranges. It is the Navy's policy to fully fund compliance with all applicable federal, state and local laws, Eos, and associated implementing rules, regulations, DoDIs and DoDDs, and applicable international and overseas requirements (OPNAVINST 5090.1C as amended). All natural resources requirements are entered into the EPR-Web and are available for review/approval by the chain of command by the dates specified in the Guidance letter that is provided annually by CNO (N45). This database is the source document for determining all programming and budgeting requirements of the Environmental Quality Program. EPR-Web is also the tool for providing the four ERL capabilities used in producing programming and budgeting requirements for the various processes within the budget planning system.

6.2.2 Navy Assessment Levels for Budget Prioritization

The Navy budget programming hierarchy for this INRMP is based on both DoD and Navy funding level classifications. The four programming and budgeting priority levels detailed in DoDI 4715.03 (18 March 2011) Natural Resources Conservation Program, implement policy, assign responsibilities, and prescribe procedures for the integrated management of natural and cultural resources on property under DoD control. Budget priorities are also described in 5090.1C CH-1, Environmental and Natural Resources Program Manual.

Navy Assessment Levels for Assigning Budget Priorities

Four Navy ERLs have been established to enable capability-based programming and budgeting of environmental funding and to facilitate capability versus cost trade-off decisions. ERL 4 is considered the absolute minimum level of environmental readiness capability required to maintain compliance with applicable legal requirements. Navy policy requires funding of all "must fund" projects, which the Navy INRMP guidance identifies as ERL 3 and ERL 4 projects. The Navy funding programming hierarchy of recurring and non-recurring projects consists of four ERLs. The definitions of ERL 1 through ERL 4 follow:

1. **Environmental Readiness Level 4 ("must fund")**
    - Supports all actions specifically required by law, regulation, or EO.

- Supports all DoD Class 0 requirements as they relate to a specific statute, such as hazardous waste disposal, permits, fees, monitoring, sampling and analysis, reporting, and record keeping.
- Supports recurring administrative, personnel, and other costs associated with managing environmental programs that are necessary to meet applicable compliance requirements.
- Supports minimum feasible Navy executive agent responsibilities, participation in OSD sponsored inter-department and interagency efforts, and OSD mandated regional coordination efforts.

2. **Environmental Readiness Level 3 ("must fund")**
   - Supports all capabilities provided by ERL 4.
   - Supports existing level of Navy executive agent responsibilities, participation in OSD sponsored inter-department and interagency efforts, and OSD mandated regional coordination efforts.
   - Supports proactive involvement in the legislative and regulatory process to identity and mitigate requirements that will impose excessive costs or restrictions on operations and training.
   - Supports proactive initiatives critical to the protection of Navy operational readiness.
3. **Environmental Readiness Level 2**
   - Supports all capabilities provided under ERL 3.
   - Supports enhanced proactive initiatives critical to the protection of Navy operational readiness.
   - Supports all Navy and DoD policy requirements.
   - Supports investments in pollution reduction, compliance enhancement, energy conservation, and cost reduction.
4. **Environmental Readiness Level 1**
   - Supports all capabilities provided under ERL 2.
   - Supports proactive actions required to ensure compliance with pending/strong anticipated laws and regulations in a timely manner and/or to prevent adverse impact to Navy mission.
   - Supports investments that demonstrate Navy environmental leadership and proactive environmental stewardship.

Budget priorities for threatened and endangered species management, especially compliance with a BO, receive the highest possible budgeting priority, and supports the NAVWPNSTA Seal Beach's need to avoid Critical Habitat designations under Section 4(b)(2) of the ESA, or Section 4(a)3 of the ESA (exemption from Critical Habitat designations for national security reasons). Four federally listed species and one candidate for federal listing are known to occur at NAVWPNSTA Seal Beach.

6.2.3 DoD Funding Classifications

Funds will be requested for tasks within this INRMP. The guidance on DoD funding classifications has been updated and Enclosure 4 of DoDI 4715.03 defines the four classes of conservation programs. The projects recommended in this INRMP have also been prioritized based on compliance and stewardship criteria provided in

the hierarchy below. The first three listed below are considered "must fund" under Navy funding criteria as they are needed to maintain compliance with applicable laws and regulations.

Recurring Natural Resources Conservation Management Requirements
These activities are needed to cover the administrative, personnel, and other costs associated with managing the DoD Natural Resources Conservation Program that are necessary to meet applicable compliance requirements in Federal and State laws, regulations, EOs, and DoD policies, or in direct support of the military mission. DoD components shall give priority to recurring natural resources conservation management requirements associated with the operation of facilities, installations, and deployed weapons systems. These activities include day-to-day costs of sustaining an effective natural resources management program, as well as annual requirements, including manpower, training, supplies, permits, fees, testing and monitoring, sampling and analysis, reporting and record keeping, maintenance of natural resources conservation equipment, and compliance self-assessments.

Non-Recurring Current Compliance
These projects and activities are needed to support an installation currently out of compliance, signed compliance agreements or consent order, meeting requirements with applicable federal or state laws, regulations, standards, EOs, or policies, immediate and essential maintenance of operational integrity or military mission sustainment, and projects or activities that will be out of compliance if not implemented in the current program year.

Non-recurring Maintenance Requirements
These projects and activities are needed to meet an established deadline beyond the current program year and maintain compliance. Examples include, compliance with future deadlines, conservation, GIS mapping, and data management to comply with federal, state, and local regulations, EOs, and DoD policy, efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives, wetlands enhancement to minimize wetlands loss and enhance existing degraded wetlands, and conservation recommendations in BOs.

Non-recurring Enhancement Actions Beyond Compliance
These projects and activities enhance conservation resources or the integrity of the installation mission or are needed to address overall environmental goals and objectives, but are not specifically required by law, regulation, or EO, and are not of an immediate nature. Examples include community outreach activities, educational and public awareness projects, restoration or enhancement of natural resources when no specific compliance requirement dictates a course or liming of action, and management and execution of volunteer and partnership programs.

6.2.4 Implementation Schedule

This INRMP will become effective upon the acceptance and signatory release described in Section 6.1.1 Responsibility. Current projects, activities, and plans have been incorporated into the INRMP, as the plan serves as a formal structuring and integration of the existing natural resources management program.

Future work identified herein will be implemented as funding becomes available. Priorities identified in this INRMP will generally determine the order of implementation. The EPSO will determine what projects and activities are appropriate to initiate, given funding, at any particular time. The INRMP is meant to be flexible,

dynamic, and adaptable to the immediate concerns and needs of natural resources management and the Navy mission.

Program Monitoring
The EPSO will be responsible for oversight and monitoring of the overall program identified within this INRMP. Cooperative projects among different Navy organizations will be monitored by the originating or controlling office as specified prior to project implementation.

6.2.5 External Assistance

Opportunities for external assistance with natural resource programs at NAVWPNSTA Seal Beach are identified below.

Other Agencies
NAVWPNSTA Seal Beach recognizes the importance of cooperating with federal and state agencies in addition to private organizations. These organizations, in particular the INRMP signatory partners (USFWS, NOAA and CDFW) will continue to assist with implementation of various aspects of this INRMP.

University Assistance
Universities are an excellent source of assistance for research and provide resource specific expertise, as well as assistance with implementation of restoration activities. Collaborative investigations performed in conjunction with EPSO biologist provide the most likely and cost effective sources of assistance with implementation of this INRMP.

Contractors
Most projects can be carried out with Navy staff. Some projects, such as targeted surveys, may require contractor services or other federal agency services because of a need for expertise or for necessary personnel. In accordance with Circular No. A-76, the federal government is mandated to use commercial sources to supply the products and services the Government needs. Contractors are able to provide a wide variety of specialties to aid NAVWPNSTA Seal Beach with implementation of this INRMP. Specialties include NEPA documentation, vegetation surveys, vertebrate and invertebrate surveys, vegetation surveys, water quality surveys, production of management plans, and similar activities. Contractor supported projects require preparation of a request for proposal to acquire services, which should be considered during project planning, to ensure appropriate funding can be obtained.

6.3 Funding Sources

In order to implement the various research, surveys, and programs necessary to fulfill the mission of NAVWPNSTA Seal Beach, funding must be identified and acquired. There are several avenues of funding available to the installation command to plan and implement projects and activities listed in Table 6-1. These funding sources are discussed below in general terms, as this process is dynamic and is dependent on annual budget fluctuations and the INRMP's continuously developing program.

These programs will be implemented using Navy personnel and program resources as much as possible; however, it is likely that contractors will accomplish many projects. The EPSO will identify projects that would be accomplished using contract vehicles, with existing contracts being used where possible and appropriate.

For large projects that involve different Navy organizations, representatives of these organizations would coordinate budgeting and scheduling to ensure that the project can be accomplished in the planned timeframe. Large-budget projects may not be completely funded in a fiscal year, requiring incremental funding over the term of the project.

In some cases, smaller, lower-priority projects may be conducted using unspent funds from other tasks or year-end fallout funding. Some projects may be accomplished with little or no funding required, such as those requiring only a change of policy or coordination and effort from volunteer labor. These tasks can be implemented virtually as soon as planning is performed.

Fish and Wildlife Fees

Fish and wildlife fees can be collected via sales of licenses to hunt or fish (Navy 2005a). They are authorized by the Sikes Act (as amended) and may be used only for fish and wildlife management on the installation where they are collected. NAVWPNSTA Seal Beach generates no fish and wildlife fees, and none are anticipated as hunting is prohibited and access for fishing is limited to authorized personnel only.

Legacy Funds

The Legacy Resource Management Program was enacted in 1990 to provide financial assistance to military natural and cultural resources management. The program assists with protection and enhancement of natural resources while supporting military readiness. Legacy projects may involve regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, and/or monitoring, and predicting migratory patterns of birds and other animals.

The Legacy Resource Management Program has three main components: stewardship, leadership, and partnership. Stewardship projects assist the military in sustaining its natural resources. Leadership initiatives provide programs that serve to guide and often become flagship programs for other military, scientific, and public organizations. Partnerships provide for cooperative efforts in planning, management, and research.

The Legacy Resource Management Program emphasizes five areas:

- Ecosystem approaches to natural resources management to maintain biological diversity and the sustainable use of land and water resources for the military mission and other uses.
- Interdisciplinary approaches that incorporate the often-overlapping goals of natural and cultural resources management. Legacy strives to take advantage of this by sharing management methodologies and techniques across natural and cultural resource initiatives.
- Promoting natural and cultural resources by public and military education and involvement.
- Application of resource management initiatives regionally. The Legacy Resource Management Program supports regional efforts between the military and other governmental and non-governmental organizations.

- Finally, development of innovative new technologies to provide more efficient and effective natural resources management.

Operations and Maintenance Funds

Funding sources for the natural resources program are derived from General and Administrative, Operations and Maintenance Navy (O&MN), and input into the Navy Environmental Program Requirements (EPR) system for funding. This primary budgetary source is the basis for maintaining the personnel and core programs inherent to the natural resources program. These appropriated funds are the primary source of resources to support must-fund, just-in-time environmental compliance (i.e. Navy Level ERL 4 projects). It is the responsibility of the Environmental Programs and Services Office (EPSO) to manage the natural resources program budget and funding. Once O&MN funds are appropriated for core personnel and the program, funding can be justified for other project requirements.

Forestry Revenues and Agricultural Outleasing

Revenues from the sale of forest products and rents on agricultural outleases on Navy lands are a source of funding for natural resource management programs. Funds accumulated through the outleasing of agricultural lands on many installations are directed back into the natural resource program and reallocated throughout the Navy by NAVFAC Headquarters. It should be noted that, NAVWPNSTA Seal Beach has no forestry program. Portions of NAVWPNSTA Seal Beach are currently outleased to two local growers.

Recycling Funds

Installations with a Qualified Recycling Program may use proceeds for some types of natural resource projects.

Special Initiatives

The DoD or Navy may establish special initiatives to fund natural resource projects. Funding is generally available only for a limited number of projects. There are currently two such DoD initiatives:

- Streamside Forests: Lifelines to Clean Water is a DoD streamside restoration small grants program. Funds are available to military installations working in partnership with a local school and/or civic organization to purchase locally native plant material for small streamside restoration projects. Funds are distributed as reimbursements. Up to $5,000 may be awarded per project. This is an ongoing program (no deadline), so proposals can be submitted at any time. Applications and additional information are available on the DENIX website.
- Sustaining Our Forests, Preserving Our Future is funding to ensure that the integrity of DoD forested lands remains intact.

6.3.1 Use of Cooperative Agreements and Partnerships

Cooperative agreements are legal relationships between the Navy and states, local governments, institutions of higher education, hospitals, non-profit organizations or individuals. The principal purpose of the relationship is to transfer a thing of value to the state, local government, or other recipient to carry out a public purpose of support or stimulation authorized by a law of the U.S. instead of acquiring (by purchase, lease, or barter) property or services for the direct benefit or use of the U.S. Government. Cooperative agreements may be entered into for inventories, monitoring, research, minor construction and maintenance, and public awareness, to provide for the maintenance and improvement of natural resources or conservation research on DoD installations (DoDINST 4715.03). To use a cooperative agreement, substantial involvement is expected between the Navy and the state, local government, or other recipient when carrying out the activity contemplated in the agreement. Cooperative agreements provide a mutually beneficial means of acquiring, analyzing, and interpreting natural resources data, which can then be used to inform natural resources management decisions. Cooperative agreements are funded by the Navy and produce information that can be used to help resource managers achieve project-specific compliance with environmental laws. Authorization for cooperative agreements is arranged through NAVFAC.

Cooperative Ecosystem Studies Units

The Cooperative Ecosystem Studies Units (CESU) program is a working collaboration among federal agencies, universities, state agencies, non-governmental organizations, and other nonfederal institutional partners. The CESU National Network provides multidisciplinary research, technical assistance, and education to resource and environmental managers. Although the overall program is overseen by USDI, one of the participating agencies is DoD.

6.3.2 Research Funding Requirements

Environmental program funding in the Navy is primarily based upon federally mandated requirements. Program managers are encouraged to seek outside funding for projects consistent with the INRMP, such as research, that will benefit natural resources on installations, but that are not directly related to federal mandates. New funding sources should be sought from federal, state, local, and nonprofit organizations with an interest in achieving the goals and objectives of this INRMP in partnership with NAVWPNSTA Seal Beach. Any such funding would need to be consistent with authorization to receive and use such funds. These will often require cost-sharing. This funding opportunity should be sought for projects that are not "must fund" items, tied directly to immediate regulatory compliance. Examples are watershed management, habitat enhancement, or wetland restoration.

6.3.3 Non-DOD Funding Sources

There are a number of grant programs available for natural resource management projects such as watershed management and restoration, habitat restoration, and wetland and riparian area restoration. When federally funded, these programs typically require non-federal matching funds. However, installations may be able to partner with other groups to propose eligible projects. One example grant program is listed below, but many more are available.

The National Association of Counties, National Association of Service and Conservation Corps, National Fish and Wildlife Foundation, and Wildlife Habitat Council sponsor the Five Star Restoration Challenge Grants program, in

cooperation with EPA, NMFS and other sponsors. This program provides modest financial assistance ($5,000 to $20,000) on a competitive basis to support community-based wetland and riparian restoration projects that build diverse partnerships and foster local natural resource stewardship. Installations would need to partner with other groups to be eligible for this type of program. Applications are due in March. Information is available on the web at http://www.epa.gov/owow/wetlands/restore/5star/.

6.4 INRMP Implementation Summary and Schedule

The objectives and strategies that support INRMP implementation are identified in detail in Section 5 and a list of projects is provided in Table 6-1. The implementation schedule identified in Table 6-1 is suggested for long-term planning purposes and is reviewed annually. The schedule may be modified based on need, available funding, resources, seasonal requirements, and the results of the annual metrics evaluation.

Naval Weapons Station Seal Beach

7.0 References

Agopian, E. V., 28 July 2005. Seal Beach OKs phone-alert system plan in wake of tsunami watch upgrades technology to notify 3,000 households simultaneously. The Orange County Register.

Agri Chemical & Supply, Inc. (AC&S). 2006. Exotic Plant Eradication. 2005 Annual Report. Prepared for Southwest Division Naval Facilities Command and Environmental Programs & Sciences Office, Naval Weapons Station Seal Beach, Seal Beach, California.

Allen, S.H. and A. B. Sargeant. 1975. A rural mail carrier index of North Dakota red foxes. Wildlife Society Bulletin 3:74-77.

American Ornithologists Union (AOU). 1983. Check-list of North American birds, Sixth Edition. Allen Press, Inc., Lawrence, KS.

Assis De Moraes, A.P. 1977. Flies (*Diptera*) attracted to blacklight at the Anaheim Bay salt marsh, California. Unpublished Master's Thesis, California State University, Long Beach, CA. 50 pp.

Atwood, J.L. and P.R. Kelly. 1984. Fish dropped on feeding colonies as indicators of Least Tern food habits. Wilson Bulletin. 96-34-47.

Atwood, J.L. and B. W. Massey. 1988. Site fidelity of Least Terns in California. The Condor. 90:389-394.

Atwood, J.L. and D. E. Minsky. 1983. Least tern foraging ecology at three major California breeding colonies. Western Birds 14:57-72.

Bailey, S.F. 1984. California least tern foraging and other off-colony activities around Alameda Naval Air Station during 1984. Final Job Report, Natural Resources Management Branch, Naval Facilities Engineering Command, San Bruno, CA.

Baird, P.H. 1993. In: Ecology of the southern California bight: a synthesis and interpretation, M.D. Dailey, D.J. Reish, and J.W. Anderson (eds) University of California Press, Berkeley, CA. pp.541-603.

----------. 1997. Foraging Ecology of the California Least Tern in San Diego Bay. Final Report. Prepared for Natural Resources Management Branch, U.S. Navy Southwest Division Naval Facilities Engineering Command, San Diego, CA.

Baker, P.C. 1975. The vascular plants of the salt marsh. *In* Land, E.D. and C.W.Hill, eds. The marine resources of Anaheim Bay. California Department of Fish and Wildlife, Fish Bulletin 165.

Baltz, D.M, C. Rakocinski, J.W. Fleeger. 1993. Microhabitat use by marsh-edge fishes in a Louisiana estuary. Environ Biol Fish 36:109–126.

Bass, R.E. and A.I. Herson. 1993. Mastering NEPA: A Step-by-Step Approach. Point Arena: Solano Press Books.

Bekoff, M. 1977. Coyote *(Canis latrans).* Mammalian Species 79:1-9

Beier, P. 1995. Dispersal of juvenile cougars in fragmented habitat. Journal of Wildlife Management 59(2):228-237.

Bender, K. 1974. California least tern census and nesting survey, 1974. California Department of Fish and Wildlife, Sacramento. Nongame Wildl. Invest. W-54-R. Final Rep. 17pp. pg 3-104

Bent, A.C. 1921. Life histories of North American gulls and terns. U.S. National Museum Bulletin 113:270-279.

Bertness, MD. 1984. Habitat and community modification by an introduced herbivorous snail. Ecology 65: 370-381.

Bloom, P.H. 2004. *Personal Communication*.

Bloom, P. H. 1996. Raptor Status and Management Recommendations for Naval Ordnance Center, Pacific Division, Fallbrook Detachment, and Naval Weapons Station, Seal Beach, 1993/1995. Western Foundation of Vertebrate Zoology. May 1996.

Bloom, P. H., J. W. Kidd, and S. E. Thomas. 2006. Avian Predator Abundance and Usage At Naval Weapons Station Seal Beach, California, 2004-2005. Western Foundation of Vertebrate Zoology. 2006.

Boland, J. 1981. Seasonal Abundances, Habitat Utilization, Feeding Strategies and Interspecific Competition Within a Wintering Shorebird Community and Their Possible Relationships with the Latitudinal Distribution of Shorebird Species. M.S. Thesis, San Diego State University, San Diego.

Boland, J. and J.B. Zelder. 1991. The functioning of Ballona Wetland in relation to tidal flushing. Part 1 - Before tidal restoration. National Audubon Society.

Borrero, Legg, M.R., Synolakis, C.E. 2004. Tsunami Sources in the Southern California Bight. Geophysical Research Letters, 28 (4) 643–646.

Borrero, J.C., S. Cho, J.E. Moore II, H.W. Richardson, and C. Synolakis. 2005. "Could it Happen Here?," Civil Engineering. Apr. 2005. pp. 54-65.

Bosalet, L. 2003. *Personal Communication*. Naval Weapons Station Seal Beach.

Brock, K. 2006. *Personal Communication.*

World Commission on Environment and Development, 1987. Our Common Future, Report of the World Commission on Environment and Development. Published as Annex to General Assembly document A/42/427, Development and International Co-operation: Environment, August 2, 1987.

Burkett, E. *Personal Communication*. California Department of Fish and Wildlife.

Caffrey, C. 1993. California least tern breeding survey, 1992 season. Wildlife Management Division, California Department of Fish and Wildlife, Sacramento, California. Nongame Bird and Mammal Section, Report 93-11.

California Audubon Society. 2002. Orange coast wetlands complex. Important bird areas of California. Available: http://ca.audubon.org/IBA.htm.

California Department of Fish and Wildlife (CDFW). 1999. California Wildlife Habitat Relationships System, Version 7.0.

California Department of Fish and Wildlife (CDFW). 2006. California Swainson's Hawk Inventory. Available online at: http://www.dfg.ca.gov/rap/projects/swainsonhawk/

California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS). 1976. The Natural Resources of Anaheim Bay – Huntington Harbour. Coastal Wetland Series #18. Prepared by Coastal Wetlands Program Staff of CDFW, under contract with USFWS.

California Department of Food and Agriculture (CDFA). 2001. Weed Management. Available online at: http://pi.cdfa.ca.gov/ weedinfo/HYPERICU2.html

California Regional Water Quality Control Board (CRWQCB). Santa Ana Region. 1995. Water Quality Control Plan, Santa Ana River Basin (8). 125 pp. Available online at: http://www.waterboards.ca.gov/santaana/pdf/R8BPlan.pdf

California Resources Agency. 1997. California's ocean resources: an agenda for the future. Sacramento, CA. Council on Environmental Quality (CEQ), U.S. Department of Agriculture (USDA), U.S. Department of the Army (U.S. Army), U.S. Department of Commerce (USDOC), U.S. Department of Defense (DoD), U.S. Department of Energy (USDE), U.S. Department of Housing and Urban Development (USDHUD), U.S. Department of the Interior (USDOI), U.S. Department of Justice (USDOJ), U.S. Department of Labor (USDOL), U.S. Department of State (USDOS), U.S. Department of Transportation (USDOT), Environmental Protection Agency (EPA), Office of Science and Technology Policy (OSTP). 1995. Memorandum of Understanding between CEQ, USDA, U.S. Army, USCD, DoD, USDOE, USDHUD, USDOI, USDOJ, USDOL, USDOS, USDOT, EPA and OSTP to Foster the Ecosystem Approach.

California Water Quality Control Board Region 9. 2001. *Caulerpa taxifolia*. Available online at: http://www.swrcb.ca.gov/rwqcb9/News/Caulerpa_taxifolia/caulerpa_taxifolia.html.

Callaway, J.C., J.S. Desmond, G. Sullivan, G.D. Williams, and J. B. Zedler. 2001. Assessing the progress of restored wetlands: Hydrology, soil, plants, and animals. Pages 271-335 *in:* J.B. Zedler, editor. Handbook for Restoring Tidal Wetlands. CRC Press, Boca Raton, FL.

Callaway, J. C. and J.B. Zedler. 2004. Restoration of urban salt marshes: Lessons from southern California. Urban Ecosystems, 7(2), 87-167.

Castro, P. and M.E. Huber, 1997. Marine Biology, second edition. WCB/McGraw-Hill.

Catalano, J. 1999. A Brief Overview of Orange County's Business and Economic History. Chapman University. Orange, CA.

CH2MHill. 1996. Naval Weapons Station Seal Beach Site 7 Station Landfill Conceptual Site Revegetation Plan, Appendix H.

Chan K.M. and E.D. Lane. 1975. Physical and chemical study of the Anaheim Bay salt marsh. *In* Lane, E.D. and C.W. Hill. 1975. The marine resources of Anaheim Bay, California Department of Fish and Wildlife, Fish Bulletin 165, 1-195 pp.

Chang, L. Andrew, A.W. Miller, and G.M. Ruiz. Unpublished Draft (2007). New Records and Removals of the Northern Atlantic Periwinkle Littorina littorea from San Francisco and Anaheim Bays, California, USA. Department of Environmental Science and Policy, University of California at Davis.

Chief of Naval Operations (CNO) Environmental Protection, Safety and Occupational Health Division. 2004. Navy Environmental Requirements Guidebook. Developed by the Naval Facilities Engineering Command (NAVFAC).

Churcher, P.B and J.H. Lawton. 1989. Beware of well-fed felines. Natural History. 98(7): 40-46.

City of Long Beach. 2004. City of Long Beach Natural Hazards Mitigation Plan. Prepared under contract with: Emergency Planning Consultants, San Diego, CA.

City of Long Beach 2007. Tsunami Hazards in the City of Long Beach. Section 9. Accessed online at: http://www.longbeach.gov/civica/filebank/blobdload.asp?BlobID=6274.

Clark, G.H. 1930a. The California halibut *(Paralichthys californicus)* and an analysis of the boat catches. California Department of Fish and Wildlife. Fish Bulletin 32:1-52

----------. 1930b. California halibut. California Department of Fish and Wildlife 16(4):315-317.

Clevenger, A.P., B. Chruszcz, and K.E. Gunson. 2001. Highway mitigation fencing reduces wildlife-vehicle collisions. Wildlife Society Bulletin 29:646-653.

Coastal Geotechnical, Inc. 2001. Geotechnical Investigation: Project No. 369.1, 16525 South Pacific Avenue, Sunset Beach, CA. Laguna Beach, CA. January 2001.

Coats, R., M. Swanson and P. Williams.1989. Hydrologic analysis for coastal wetland restoration. Environmental Management 13:715-727. Cited in Callaway 2001.

Cohen, A.N. 1998. Ships' ballast water and the introduction of exotic organisms into the San Francisco Estuary. Current status of the problem and options for management. San Francisco Estuary Institute. Richmond, CA.

Collins, C.T., D.D. Rypka, B.W. Massey, and J.L. Atwood. 1979. California Least Tern banding project, 1979. State of California, Resources Agency, Department of Fish and Wildlife.

Collins, C.T. and R.E. Landry. 1977. Artificial nest burrows for burrowing owls. North American Bird Bander. 2: 151-154.

Commander U.S. Pacific Fleet. Accessed online at: http://www.cpf.navy.mil

Conkle, T. *Personal Communication*. Commander Navy Region Southwest. San Diego, California.

Copper, E. *Personal Communication*. Ornithologist. San Diego, California.

Copper, E. 1997a. The status of the Western snowy plover at the Radio Receiving Facility, Imperial Beach in 1995. Unpublished report prepared for the Natural Resources Management Branch, Southwestern Division Naval Facilities Command, San Diego, CA.

----------. 1997b. The status of the Western snowy plover at Naval Base Coronado, from November 1994 through February 1998. Draft report prepared for the Natural Resources Management Branch, Southwest Division Naval Facilities Engineering Command, San Diego, CA.

Coues, E. 1874. Birds of the Northwest. Government Printing Office, Washington D.C.

Council on Environmental Quality (CEQ), U.S. Department of Agriculture (USDA), U.S. Department of the Army (U.S. Army), U.S. Department of Commerce (USDOC), U.S. Department of Defense (DoD), U.S. Department of Energy (USDE), U.S. Department of Housing and Urban Development (USDHUD), U.S. Department of the Interior (USDOI), U.S. Department of Justice (USDOJ), U.S. Department of Labor (USDOL), U.S. Department of State (USDOS), U.S. Department of Transportation (USDOT), Environmental Protection Agency (EPA), Office of Science and Technology Policy (OSTP). 1995. Memorandum of Understanding between CEQ, USDA, U.S. Army, USCD, DoD, USDOE, USDHUD, USDOI, USDOJ, USDOL, USDOS, USDOT, EPA and OSTP to Foster the Ecosystem Approach.

County of Orange Health Care Agency Public Health Services Environmental Health. March 2008. 2007 Annual Ocean and Bay Water Quality Report.

Cramp, S. and K.E.L. Simmons, eds. 1983. The Birds of the Western Palearctic, vol. 3.Oxford: Oxford University Press.

Crooks, J. A. 1998. Habitat alteration and community-level effects of an exotic mussel, *Musculista senhousia*, Marine Ecology Progress Series 162, 137-152.

Davis, C. 2001. *Personal observation*. Tierra Data Inc. biologist, Escondido, CA.

Delaplaine, M. *Personal Communication.* California Coastal Commission, San Diego, CA.

Desmond, J.S. 1996. Species composition and size structure of fish assemblages in relation to tidal creek size in southern California. San Diego, California, San Diego State University.

Desmond, G.B., E. Cyran, V. Caruso, G. Shupe, R. Glover, and C. Henkle. 2000. Topography of the Florida Everglades, *in* Greater Everglades Ecosystem Restoration (GEER) Science Conference. December 11-15, 2000. Naples, FL. p. 284-5.

Dorr, J.B. 1976. Story of Seal Beach. Seal Beach: Whale & Eagle Publishing Co. History of Seal Beach beginning with prehistoric inhabitants. Includes chapters on civic institutions such as police and fire departments, libraries and schools. Information on wildlife, recreation and the Naval Weapons Station. 44 pp.

Eberhard, T. 1954. Food habits of Pennsylvania house cats. Journal of Wildlife Management 18:284-286.

England, A.S., M.J. Bechard, and C.S. Houston. 1997. Swainson's Hawk (*Buteo swainsoni*). *In* The Birds of North America, No. 265 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Errington, P.L. 1936. Notes on food habits of southern Wisconsin house cats. J. Mammal. 17:64-65.

Evink, G.L. 1996. Florida Department of Transportation initiatives related to wildlife mortality. pp. *In* G.L. Evink, P. Garrett, D. Zeigler and J. Berry (eds.) Trends in Addressing Transportation Related Wildlife Mortality, proceedings of the transportation related wildlife mortality seminar. State of Florida Department of Transportation, Tallahassee, FL. FL-ER-58-96.

Faber, P.M., Keller, E., Sands, A. and Massey, B.M., 1989. The ecology of riparian habitats of the Southern California coastal region: a community profile. US Fish & Wildlife Service, Biol. Rep. 85(7.27). 152 pp.

Falkner, M., Takata, L. and Gilmore, S. 2006. California state lands commission report on performance standards for ballast water discharges in California waters. Prepared for California State Legislature.

Fancher, J.M. 1992. Population status and trends of the California least tern. Transactions of the Western. Section of the Wildlife Society. 28:59–66.

Ferrel, C.M., H.R. Leach, and D.F. Tillotson. 1953. Food habits of the coyote in California. California Department of Fish and Wildlife. 39:301-341.

Fleskes, J. P. 1988. Predation by ermine and long-tailed weasels on duck eggs. Journal. Iowa Acad. Sci. 95:14-17.

Forman, R.T.T., D. Sperling, J.H. Bissonette, A.P. Clevenger, C.D. Cutshall, V.H. Dale, L. Fahrig, R. France, C.R. Goldman, K. Heanue, J.A. Jones, F.J. Swanson, T. Turrentine, and T.C. Winter (editors). 2003. Road Ecology: Science and Solutions. Island Press, Covelo, CA.

Foster, M.L. and S.R. Humphrey. 1995. Use of highway underpasses by Florida panthers and other wildlife. Wildlife Society Bulletin 23:95-100.

Frederickson, L. 1979. Furbearer population surveys: techniques, problems and uses in South Dakota. Pages 62-70 *in* Proceedings of the Midwest furbearer conference, Cooperative Extension Service, Kansas State University, Manhattan, Kansas, USA.

Garrett, K., and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles: Los Angeles Audubon Society.

George, W.G. 1974. Domestic cats as predators and factors in winter shortages of raptor prey. Wilson Bulletin 86:384-396.

Governor's Office of Planning and Research (OPR). 2000. 2000 Planning, Zoning, and Development Laws. Available online at: http://ceres.ca.gov/planning/pzd/2000/pzd_2000.pdf. Accessed 2001 Sept.

Gould, G. I. 1980. Status of the red fox in California.Calif. Dept. of Fish and Wildlife, Nongame Wildlife Investment, Job I-8, Progress Report.

Grad, S. "History: Seal Beach Home to Casinos during Prohibition." *Los Angeles Times*. May 31, 1993. Available online at: http://articles.latimes.com/1993-05-31/local/me-41996_1_seal-beach.

Gray, R. L. 1975. Sacramento Valley red fox survey. California Department of Fish and Wildlife, Nongame wildlife investment. Progress report. 6 pp.

----------. 1977. Extensions of red fox distribution in California. California Department of Fish and Wildlife. 63:58.

Griffis, R.B. 1987. A floral and invertebrate faunal survey of unrestored, restored, and natural saltmarsh habitats of the Seal Beach NWR and NWS. U.S. Navy, Seal Beach, Rept. No. NEFC-10436. 86pp.

Grinnell, J. and A.H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27. 608pp.

Grinnell, J., J. S. Dixon, and J. M. Linsdale. 1937. Fur-bearing Mammals of California. Vol. 2.University of California Press, Berkeley, CA. 777 pp.

Hall, E. R. 1981. Mammals of North America. Second ed. John Wiley & Sons. New York. 1:5-8

Harrison, D.J., J. A. Bissonette, and J. A. Sherburne. 1989. Spatial relationships between coyotes and red foxes in eastern Maine. Journal of Wildlife Management 53:181-185.

Haug, E.A, B.A. Millsap. and M.S. Martell. 1993. Burrowing Owl (Speotyto cunicularia). In The Birds of North America, No. 61. (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C., USA.

Havens, K.J., Varnell, L.M., Bradshaw, J.G., 1995. An assessment of ecological conditions in a constructed tidal marsh and two natural reference tidal marshes in coastal Virginia. &01. Eng. 4, 117-141.

HDR Inc. In Progress. *Basewide Mammal Surveys for NAVWPNSTA Seal Beach Orange County, California*

Heady, H.F. 1966. Influence of grazing on the composition of Themeda triandra grassland. East Africa Journal of Ecology, 54: 704-727.

Hesson, B.H. and H.R. Olilang. 1990. Seal Beach Oil Field Alamitos and Marine Areas. Publication No. TR39. Department of Conservation, Division of Oil and Gas. Sacramento, CA.

Hickey, C., W.D. Shuford, G.W. Page, and S. Warnock. 2003. Version 1.1. The Southern Pacific Shorebird Conservation Plan: A strategy for supporting California's Central Valley and coastal shorebird populations. PRBO Conservation Science, Stinson Beach, CA.

Hickman, J.C. 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley, CA. 1400pp.

Ho, J.S. 1974 Parasitic copeopods as indicator of hake's (Merluccius) zoogeography. Proceedings of the 3rd International Congress of Parasitology 3:1633-1634 as cited in Murry and Bray, 1993.

Holland, K. and D. Keil 1995. California vegetation. Kendall/Hunt Publishing Company, Iowa. 516 p.

Holland, R.F.1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. State of California Department of Fish and Wildlife.

Hood, L. 1998. Science-Based Stewardship: Recommendations for Implementing the National Wildlife Refuge System Improvement Act. Washington D.C.: Defenders of Wildlife.

Hopkins, D.D. and R.B. Forbes. 1980. Dietary patterns of the Virginia opossum in an urban environment. Murrelet 61:20-30.

Hubbs, E.L. 1951. Food habits of feral house cats in the Sacramento Valley. California Fish and Wildlife 37(2): 177 - 189.

Huenneke, L.F. 1991. Ecological implications of genetic variation in plant populations. Invited chapter, pp. 33-41 in: D.A. Falk & K.E. Holsinger, eds. Conservation of Rare Plants: Biology and Genetics. Oxford University Press.

Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press. Stanford, California.

Interagency Ecosystem Management Task Force 1995. The ecosystem approach: healthy ecosystem and sustainable economics.

Jackson, A. 2002. *Littorina littorea*. Common periwinkle. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme. Plymouth: Marine Biological Association of the United Kingdom.

James, M. L. and J.B. Zedler. 2000. Dynamics of Wetland and Upland Subshrubs at the Salt Marsh-Coastal Sage Scrub Ecotone. The American Midland Naturalist, 143(2), 298-311.

Jameson, Jr., E.W. and H.J. Peeters. 1988. California mammals. California natural history guides: 52. Univ. of Ca. Press, Berkeley, CA.

Jessup, D. A. 1998. Rehabilitation of Oiled Wildlife. *Conservation Biology, 12*(5), 1153-1155.

Johnson, D.H., A.B. Sargeant, and R.J. Greenwood. 1989. Importance of individual species of predators on nesting success of ducks in the Canadian prairie pothole region. Canadian Journal of Zoology 67:291-297.

Johnson, J. 2002. *Personal Communication*. Environmental Division. Naval Weapons Station Seal Beach.

Jones, B.J., and R.M. Love. 1945. Improving California Ranges. Circ. 129, College of Agriculture., UC Berkeley, 47 pp.

Jorgensen, P. D. 1975. Habitat preference of the light-footed clapper rail in Tijuana Marsh, California. Unpublished report for U.S. Fish & Wildlife Service. 69 pp.

Josselyn, M. 1997. Ballona Wetlands, current conditions. Available: http://www.ballonafriends.org/existing_conditions.htm.

Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin Co., Boston. 675 pp.

Kauwling, T.J. and D.J. Reish. 1975. A quantitative study of the benthic polychaetous annelids of Anaheim Bay and Huntington Harbour, California. Pages 57-58 In E.D. Land and C.W. Hill, eds. The marine resources of Anaheim Bay. California Department of Fish and Wildlife, Fish Bulletin 165.

Kenney, M. 2002. *Personal Communication.* U.S. Fish and Wildlife Service, Carlsbad, CA.

Klingbeil, R. A, R. D. Sandell, and A. W. Wells. 1975. An annotated checklist of the elasmobranchs and teleosts of Anaheim Bay. *In:* The marine resources of Anaheim Bay, E. D. Lane and C. W. Hill, eds. Calif Dep. Fish Game, Fish Bulletin. 165:79-115.

Knopf, F.L. 1996. Mountain Plover (*Charadrius montanus*). *In* The Birds of North America, No. 211 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Kramer, S.H. 1991. Growth, mortality and movements of juvenile California halibut *Paralichthys californicus* in shallow coastal and bay habitats of San Diego County, California. Fish Bulletin 89:195–207

Kus, B.E. and P. Ashfield. 1989. Bird Use of the Tijuana River Estuary. Unpublished report, SDSU. 36 pp. [Technical Report]

Landres, P. B., Verner, J., & Thomas, J. W. (1988). Ecological Uses of Vertebrate Indicator Species: A Critique. *Conservation Biology, 2*(4), 316-328.

Lane, E.D., and C.W. Hill. 1975. The marine resources of Anaheim Bay. California Department of Fish and Wildlife, Fish Bulletin 165,1–195.

Lane, J.M., and A. Woods. 1975. A History of Anaheim Bay. *In* The Marine Resources of Anaheim Bay, edited by E. D. Lane and C. W. Hill, pp. 9-12. California Department of Fish and Wildlife, Fish Bulletin 165 cited in USFWS and CDFW 1976.

Law Crandall Inc. October 1997. Final Non-point Source Pollution Monitoring Program for Agricultural outlease Programs for Naval Weapons Station Seal Beach, California. Prepared for Southwest Division, Naval Facilities Engineering Command Contract No. N68711-93-D-1452-49. San Diego, CA.

Levin, L. *Personal Communication.* Scripps Institute of Oceanography, UC San Diego.

Levin, L.A. 1984. Life history and dispersal patterns in a dense infaunal polychaete assemblage: community structure and response to disturbance. Ecology 65:1185–1200.

Levin, L., D. Tally, and G. Thayer. 1996. Succession of macrobenthos in a created salt marsh. Marine Ecology Progress Series. 141:67-82.

Liberg, O. 1984. Food habitat and prey impact by feral and house-based domestic cats in a rural area in southern Sweden. Journal of Mammalogy 65:424-432.

Lubchenco, J. 1978. Plant species diversity in a marine intertidal community: importance of herbivore food preference and algal competitive ability. American Naturalist 112: 23-39.

MacDonald, K.B. 1977. Coastal salt marsh. *In* Terrestrial Vegetation of California. (Barbour, M. B. & Major, J., eds.). John Wiley and Sons, New York, pp. 263–294.

----------. 1990. South San Diego Bay Enhancement Plan, Volume 1. Resources Atlas. Marine Ecological Characterization, Bay History, and Physical Environment. San Diego Unified Port District, San Diego, California.

Marcot, B.G., M.J. Wisdom, H.W. Li, and G.C. Castillo. 1994. Managing for featured, threatened, endangered, and sensitive species and unique habitats for ecosystem sustainability. General Technical Report PNW-GTR-329. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Marschalek, D.A. 2006. California least tern breeding survey, 2005 season. California Department of Fish and Wildlife, Habitat Conservation and Planning Branch, Species Conservation and Recovery Program Report, 2006-01.

Massey, B. W. 1974. Breeding biology of the California least tern. Proceedings of the Linnean Society of New York 72:1-24.

----------. 1986a. California least tern foraging study, Los Angeles Harbor, 1986. Unpublished report, Marine Biological Consultants, Encinitas, CA. pg

----------. 1988. California least tern study, 1988 breeding season. California Department of Fish and Wildlife, EW87 X-1, Contract FG 8553 Final Rep. 20 pp. + app.

Massey, B. W., and J. L. Atwood. 1984. Application of ecological information to habitat management for the California least tern. Final Job Progress Report #1-7, U.S. Fish and Wildlife Service, Endangered Species Program, Sacramento, CA.

Massey, B. W., and J. L. Atwood. 1981. Second-wave nesting of the California least tern: age composition and reproductive success. Auk 98:596-605.

Massey B.W. and E. Copper, *Personal communication*.

Massey, B.W and R. Zembal. 1979. A comparative study of the light-footed clapper rail, *Rallus longirostris levipes* in Anaheim Bay and Upper Newport Bay, Orange County, CA. US Fish and Wildlife Service Endangered Species Office, Sacramento, CA.

----------. 1980. A comparative study of the Light-footed Clapper Rail (*Rallus longirostris levipes)* populations in Anaheim Bay and Upper Newport Bay, Orange County, CA. Rep. to U.S. Fish and Wildlife Service, Endangered Species Office, Sacramento, CA.

Massey, B.W., R. Zembal, and P.D. Jorgensen. 1984. Nesting habitat of the light-footed clapper rail in southern California. Journal of Field Ornithology. 53:67-80.

McArthur, A.G. 1962. Control burning of eucalyptus forests. 8th Commonwealth Forestry Conf. (Canberra Australia), Forestry and Timber Bureau, Leaflet No. 80.

McCormick, A.I. 1899. Breeding habits of the least tern in Los Angeles County, California. Bulletin of the Cooper Ornithological Club: 49 as cited in Bent, 1921.

McDowell, K. 2002. West coast ballast water management review. In: Ballast Water Exchange Vol. 4 Spring/Summer 2002, publ. by University of California Sea Grant Program.

McIvor, C. and L.P. Rozas. 1996. Direct use of intertidal saltmarsh habitat and linkage with adjacent habitats: a review from the southeastern United States. Pages 311-334 in K. F. Nordstrom and C. T. Roman, editors. Estuarine shores: evolution, environments and human alterations. John Wiley & Sons, New York.

McMurry, F.B., and C.C. Sperry. 1941. Food of feral house cats in Oklahoma, a progress report. Journal of Mammalogy, 22(2):185-190.

MEC Analytical Systems Inc. 1995. 1994 and 1995 field survey report of the ecological resources of Agua Hedionda Lagoon. 47 pp., plus appendices.

Meng, L., P. B. Moyle, and B. Herbold. 1994. Changes in abundance and distribution of native and introduced fishes of Suisun Marsh. Transactions of the American Fisheries Society 123:498-507.

Merkel & Associates. 2006. Naval Weapons Station Seal Beach Wetland Delineation.

Messick, J.P. and M.G. Hornocker. 1981. Ecology of the badger in southwestern Idaho. Wildlife Monographs 76:1-53.

Miller, A.W., A.L. Chang, G.M. Ruiz, N. Cosentino-Manning. 2004. A new record and eradication of the Northern Atlantic alga Ascophyllum nodosum (Phaeophyceae) from San Francisco Bay, California, USA. Journal of Phycology 40.

Miller, R.L. 1969. Ascophyllum nodosum: A source of exotic invertebrates introduced into West Coast near-shore marine waters. The Veliger 12: 230-231.

Minsky, D. 1984. A study of the foraging ecology of the California least tern at Camp Pendleton, season of 1984. Unpublished Report. Contract #N62474-84-M-4561. Department of the Navy, Natural Resource Management Branch, Western Division Naval Facilities Engineering Command, San Bruno, CA.

----------. 1987. Physical and social aspects of nest site selection in colonies of the California least tern. M. S. thesis, California State University, Long Beach, CA.

Montague, R. Fire Consultant, Firewise 2000. *Personal Communication.* 2003

Morale, Welfare & Recreation. 2010. Seal Beach. Available online at: http://www.mwrtoday.com/Sealbeach/liberty.htm.

Morale, Welfare & Recreation Department. *Personal commnunication.*

Morris, R.H., Abbott, D.P. & Haderlie, E.C. 1980. Intertidal Invertebrates of California. Stanford University Press, Stanford, CA.

Morrison, M.L., B.G. Marcot, and R. W. Mannan. 1992. Wildlife-habitat relationships. University of Wisconsin Press, Madison, Wisconsin.

Morton, P.K. 1984. A short history of mineral extractive industries of Orange County in Natural Sciences of Orange County Vol. I. Natural History Foundation of Orange County. Newport Beach, CA.

Moyle, P.B. and J.J. Cech, Jr. 1982. Fishes: an introduction to ichthyology. Prentice-Hall, Trenton, NJ.

Moyle, P.B., R.A. Daniels, B. Herbold, and D.M. Baltz. 1986. Patterns in the distribution and abundance of a non-coevolved fish assemblage of estuarine species. U.S. National Marine Fisheries Service Bulletin 84:105-117.

Mudie, P.J., 1970. A survey of the coastal wetland vegetation of San Diego Bay, California Department of Fish and Wildlife.

Murray, S.N. and R.N. Bray. 1993. Benthic macrophytes. In *Ecology* of the Southern California Bight: A synthesis and interpretation. (Dailey, M. D., Reish, D. J. & Anderson, J. W., eds) University of California Press, Los Angeles, CA, pp. 304–368.

Myrick, R.M., and L.B. Leopold. 1963. Hydraulic geometry of a small tidal estuary. U. S. Geol. Surv. Prof. Paper 422-B. 18 pp.

National Climatic Data Center (NCDC), 2002, Newport Beach Harbor weather station data 1934-2005. Available online at: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?WWDI~StnSrch.

Nagano, C.D. 1980. Population status of the tiger beetles of the Cicindela (Coleoptera: Cicindellidae) inhabiting the marine shoreline of southern California. Atala 8(2): 33-42.

Nagano, C.D. and J.N. Hogue, 1982. The insects and related terrestrial arthropods of Point Mugu Naval Air Station, Ventura County, Ca. Report to U.S. Navy, Point Mugu, No. N63126-80-M-3441. 118 pp.

Natural Resource Conservation Service (NRCS), 2002. Field Office Technical Guide: Section IV, Conservation Practice Standards and Specifications. Available online at: http://efotg.nrcs.usda.gov/treemenuFS.aspx?Fips=06059&MenuName=menuCA.zip. Accessed October 8, 2003.

Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach). October 2001. Storm Water Discharge Management Plan Volume 1 and 2 (with revised figures) for Naval Weapons Station Seal Beach at Seal Beach, California. Prepared for Southwest Division, Naval Facilities Engineering Command by LAW Crandall, a Division of Law Engineering and Environmental Services, Inc. Contract No. N68711-99-D-6509.

----------. 2002. Mission and Vision Statement. Available online at: http://www.cnic.navy.mil/SealBeach/About/index.htm.

Naval Facilities Engineering Command Southwest (NAVFAC Southwest). 2005. Final Integrated Cultural Resources Management Plan (ICRMP) for Naval Surface Warfare Center, Corona Division. Submitted by RECON, San Diego, CA. 6 January.

Neuman, K., G. W. Page, L. E. Stenzel, J. C. Warriner, and J. S. Warriner. 2004. Effect of Mammalian Predator Management on Snowy Plover Breeding Success Kristina PRBO Conservation Science, 4990 Shoreline Highway, Stinson Beach, CA, USA 94970.

National Oceanic and Atmospheric Administration (NOAA), Office of Coast Survey (OCS). 2000. U.S. Coast Pilot 7, Pacific Coast: California, Oregon, Washington, Hawaii, and Pacific Islands, (32nd) Edition.

Nguyen, P. *Personal Communication.*

Niemi, G. J., J. M. Hanowski, A. R. Lima, T. Nicholls, and N. Weiland. 1997. A critical analysis on the use of management indicator species. Journal of Wildlife Management 61: 1240-1253.

National Marine Fisheries Services (NMFS). 2007. NMFS strategic plan for fisheries research. U.S. Department of Commerce, NOAA Tech. Memo. NMFS F/SPA-80, 170 p.

Nybakken, J.W. 1997. Marine biology: an ecological approach. 4th ed. California: Addison-Wesley Educational Publishers Inc.

Ogden, J.C. 1995. A comparison of wading bird nesting colony dynamics (1931-1946 and 1974-1989) as an indication of ecosystem conditions in the Southern Everglades. In: Everglades: The ecosystem and it's restoration, S.M. Davis and J.C. Ogden (Eds.) 1995. St. Lucie Press, Delray Beach, Fla. Chap. 25.

Orange County Government Online. 2004. Orange County History. Available online at: http://www.oc.ca.gov/ochistory/ochistory.asp.

Page, G.W., J.S. Warriner, J.C. Warriner and P.W.C. Patton. 1995. Snowy Plover (*Charadrius alexandrinus*). *In* The Birds of North America (154), A. Poole and F. Gill (Eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, DC.

Patton, D.R. *Personal Communication.* Northern Arizona University.

Patton, D.R. 1987. Is the use of management indicator species "feasible"? Western Journal of Applied Forestry 2:33-34.

Pestrong, R. 1965.The development of drainage patterns on tidal marshes. Stanford University Publications in Geological Science 10: 1-87.

Powell, A. *Personal Communication*. US Geological Service Biological Resource Division, North Prairie Wildlife Research Center.

Powell, A.N. and C.L. Collier. 1998. Reproductive success of Belding's Savannah Sparrow in a highly fragmented landscape. Auk 115:508-513.

Powell, A.N., B.L. Peterson and J.M. Terp. 1996. The status of western snowy plovers (*Charadrius alexandrinus nivosus*) in San Diego County, 1996. Report to the California Department of Fish and Wildlife, Sacramento, California, and U.S. Fish and Wildlife Service, Carlsbad, California, and Portland, Oregon, USA.

Powell, J.A., and C.L. Hogue. 1979. California Insects. University of California Press, Berkeley, CA.

RBF/Sholders & Sanford. October 1994. Naval Weapons Station Seal Beach, California Subsidence Monitoring Study. Completed under Contract N68711-93-D-1580 with Southwest Division, Naval Facilities Engineering Command.

Regional Environmental Consultants (RECON). 1996. Draft Integrated Natural Resources Management Plan for Naval Weapons Station Seal Beach. Prepared for Southwest Division, NAVFACENGCOM, San Diego, California.

Regional Environmental Consultants (RECON). 1997. Final Integrated Natural Resources Management Plan for Naval Weapons Station Seal Beach. Prepared for Southwest Division, NAVFACENGCOM, San Diego, California.

Reardon, J.D. 1951. Identification of waterfowl nest predators. Journal of Wildlife Management. 15:386-395.

Reardon, J.B. 1981. Depositional environments of Anaheim Bay salt marsh, Seal Beach, California. Master's Thesis, California State University, Long Beach.

Redfield, A.C. 1972. Development of a New England salt marsh. Ecological Monographs 42 (2):201-237.

Regional Water Quality Control Board (RWQCB) Santa Ana Region. 1995. Water Quality Control Plan for the Santa Ana River Basin.

Regional Water Quality Control Board (RWQCB) Santa Ana Region. 2004. Watershed Management Initiative Chapter. Revised November 2004. Available online at: http://www.swrcb.ca.gov/rwqcb8/water_issues/programs/wmi/index.shtml.

Reish, J.R. 1975. Invertebrates, especially benthic annelids in outer Anaheim Bay. Pages 73-78 in E.D. Lane, C.W. Hill, eds., the Marine Resources of Anaheim Bay. California Department of Fish and Wildlife, Fish Bulletin 165.

Reish, J.R., T.K.J. Kauwling, and T.C. Schreiber. 1975. Annotated checklist of the marine invertebrates of Anaheim Bay. Pages 41-51 in E.D. Lane, C.W. Hill, eds., the Marine Resources of Anaheim Bay. California Department of Fish and Wildlife, Fish Bulletin 165.

Reise, K. 1985. Tidal Flat Ecology. Springer- Verlag, Berlin, Heidelberg, New York.

Roest, A.I. *Personal Communication.* California Polytechnic State University.

Roest, A.I. 1977. Taxonomic status of the red fox in California. California Department of Fish and Wildlife, Nongame Wildl.Invest. Final report. 15 pp.

Romero, P.D. 1972. Anaheim Bay study, July 1970 - June 1971. California Department of Fish and Wildlife, Special Wildl. Investigations rep., Proj. W-54-R-3, Job III-12. 21pp. + appends.

----------. 1976. Bird Use of Anaheim Bay: A Southern California Salt Marsh. Thesis presented to the Department of Biology California State University, Long Beach.

Roundtree, Barbara. President. Seal Beach Historical Society, in Grad 1993.

Rozas, L.P. and W.E. Odum. 1987. Use of tidal freshwater marshes by fishes and macrofaunal crustaceans along a marsh stream-order gradient. Estuaries, *10,* 36–43.

Rudd, B. 2008. *Personal communication.* Landscape Architect.

Ruiz, G. M., A. H. Hines, and M. H. Posey. 1993. Shallow water as refuge habitat for fish and crustaceans in nonvegetated estuaries - an example from Chesapeake Bay. Marine Ecology Progress Series. 99(1-2):1-16.

Salmon, T. 2002. *Personal Communication.* County Director and Wildlife Specialist. San Diego, California.

Santa Ana River Watershed. 2001. Watershed Profile. Available online at: http://www.wrpinfo.scc.ca.gov/watersheds/sa/. Accessed January 2006.

Sargeant, A.B. *Personal Communication*. U.S. Fish and Wildlife Society.

Sargeant, A.B. and D.W. Warner. 1972. Movements and denning habits of a badger. Journal of Mammalogy 53:207-210.

Sargeant, A. B., S. H. Allen, and J. O. Hastings. 1987. Spatial relations between sympatric coyotes and red foxes in North Dakota. J. Wildl. Mgmt., 51:285-293.

Sawyer, J.O. and T. Keeler-Wolf. 1995. A manual of California vegetation. California Native Plant Society. Sacramento, CA.

Schallmann, R. 2004. *Personal Communication*. Conservation Program Manager, Naval Weapons Station Seal Beach, Seal Beach, CA.

Schallmann, R. 2006. *Personal Communication*. Conservation Program Manager, Naval Weapons Station Seal Beach, Seal Beach, CA.

Schallmann, R. 2009. *Personal Communication*. Conservation Program Manager, Naval Weapons Station Seal Beach, Seal Beach, CA.

Schempf, P. F. and M. White. 1977. Status of six furbearer populations in the mountains of northern California. U.S. Department of Agriculture, Forest Service., San Francisco, CA. 51pp.

Schitoskey, F. Jr. and S. R. Woodmansee. 1978. Energy requirements and diet of California ground squirrel. Journal of Wildlife Management. 42:373-382.

Schmidt, R. H. 1986. Community-level effects of coyote population reduction. Pp. 49-65, *in* Community toxicity testing (J. Cairnes, Jr., ed.). American Society of Testing and Materials, Special Technical Publication, 920:1-350.

Schoenherr, A.A. 1992. Natural history of California. Berkeley: University of California Press.

Seismic Safety Commission. 2005. The tsunami threat to California: Findings and recommendations on tsunami hazards and risks. U.S. State of California, Seismic Safety Commission. California, U.S.

Seymour, G. 1968. Furbearers of California. California Department of Fish and Wildlife, Sacramento. 55pp.

Silbernagle, M. U.S. Fish and Wildlife Service. *Unpublished data*.

Small, A. 1994. California birds: their status and distribution. Ibis Publishing Company, Vista, CA.

Smith, C.F. 1976. A flora of the Santa Barbara region, California. Santa Barbara Museum of Natural History, Santa Barbara, CA.

Snyder, N. F., and J. W. Wiley. 1976. Sexual size dimorphism in hawks and owls of North America. Ornithological Monograph 20.

Southern California Wetlands Recovery Project Regional (SCWRP). 2001. Restoration Strategy. Adopted 29 November 2001. Available online at: http://www.scwrp.org/regional_strategy.htm

Southern California Wetlands Recovery Project Regional (SCWRP) 2007. Available online at: http://www.scwrp.org/index.htm

Speer, Rod. 1994. History of the weapons station. The Orange County Register. 10 November 1994.United States Census Bureau. 2002. State and County Quickfacts web page. Accessed September 13, 2002 at: http://quickfacts.census.gov/qfd/

State of California, Department of Transportation (CalTrans). 2002. California storm water best management practices handbooks including project planning and design guides, storm water pollution prevention plan and water pollution control program preparation manuals, and construction site BMPs manual. Website. Available online at: http://www.cabmphandbooks.com/

Stathos, G. 2002. *Personal Communication*. U.S. Navy. Naval Weapons Station Seal Beach.

Swift, C. 1997. The fish fauna of Ballona Marsh, an urban estuary on the western Los Angeles Basin. Abstract. California and the World Ocean, '97.

Talbert, T.B. 1952. My sixty years in California; memories of pioneer days of Long Beach...and of the lower Santa Ana Valley...Orange County coast; Bolsa Chica; Huntington Beach, and Newport Harbor.

----------. 1963. The historical volume and reference works, Volume 3, Orange County, Ca. Historical Publishers, Whittier, CA.

Tierra Data Inc. 2008. 2007 Herpetological Survey Report. Final April 2008. Prepared for Naval Weapons Station Seal Beach, under contract N68711-05-D-8004/0015 with Naval Facilities Engineering Command Southwest. San Diego, CA.

Tu, M., C. Hurd, and J. M. Randall. 2001. Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas. Pages 3.3, 7d.1, 7j.1. The Nature Conservancy Wildland Invasive Species Team. Available at http://tncweeds.ucdavis.edu/handbook.html.

United Nations Framework Convention on Climate Change (UNFCCC). 2006. Climate Change Information Sheet 11. Available online at: <http://unfccc.int/>

U.S. Census Bureau. 2002. Orange County Census 1990-2000. Available online at: <http://quickfacts.census.gov/qfd/states/06/06059.html>

U.S. Congress. 1972. *An Act to Establish the Seal Beach National Wildlife Refuge.* P.L. 92-408, August 29, 1972.

U.S. Department of Agriculture.1978. Soil survey of Orange County and western part of Riverside County, California. Soil Conservation Service.

U.S. Department of Defense. 1996. Integrated natural resources management in the Department of Defense. Draft. Office of the Deputy Under Secretary of Defense (Environmental Security). DoD 4715.DD-R. Washington, DC.

U.S. Department of Defense (DoD). 2007. Guidance to Implement the Memorandum of Understanding to Promote the Conservation of Migratory Birds. Available online at: https://www.denix.osd.mil/portal/page/portal/content/environment/NR/PolicyGuidance/MIGRATORY-BIRD-MEMO-AND-TOOLS-FOR-MOU-3-APR-07.PDF.

U. S. Department of Defense Instruction 4715.3. Environmental Conservation Program. May 3, 1996. Available online at: https://www.denix.osd.mil/denix/Public/ES-Programs/Conservation/Legacy/ETB/DoDI47153.htm

U.S. Deparment of the Navy (DoN) and U.S. Fish and Wildlife Service (USFWS) San Diego National Wildlife Refuge Complex. In progress. Memorandum of Understanding (MOU). *Management of Seal Beach National Wildlife Refuge*.

U.S. Department of the Navy (DoN). 1988. Master Plan Update, Cultural Resources Assessment Final Report, Naval Weapons Station - Seal Beach Complex. Western Division, Naval Facilities Engineering Command, San Bruno, California.

----------. 1994. Memorandum from the Assistant Secretary of the Navy, Installations and Environment, for the Vice Chief of Naval Operations and the Assistant Commandant of the Marine Corps. Department of the Navy Natural Resources Conservation Strategic Plan. 13 June 1994

U.S. Department of the Navy (DoN) Commander Navy Region Southwest (CNRSW). 2002. Ordnance Storage Magazines Final Erosion Maintenance/Repair Study.

U.S. Department of the Navy Southwest Division (DoN SWDIV). 1995. Naval Weapons Station Seal Beach, Seal Beach, California Installation Restoration Program Final National Wildlife Refuge Study Report 5 April 1995.

U.S. Department of the Navy Southwest Division (DoN SWDIV). 1997. Final Integrated Natural Resources Management Plan for Naval Weapons Station, Seal Beach. Prepared by RECON, San Diego, CA.

U.S. Department of the Navy Southwest Division (DoN, SWDIV) and San Diego Unified Port District (SDUPD). 2000. San Diego Integrated Natural Resources Management Plan, September 2000. San Diego, CA. Prepared by Tierra Data Systems, Escondido, CA.

U.S. Department of the Navy. Western Division (DoN WESTDIV), Naval Facilities Engineering Command. 1985. Naval Weapons Station Seal Beach Base Exterior Architecture Plan. Prepared by Takata Associates, South Pasadena, California.

U.S. Department of the Navy. Western Division (DoN WESTDIV). 1989. Master Plan Update. Naval Weapons Station, Seal Beach Complex Master Plan Update. Contract No. N62474-86-C-1397. Prepared for U.S. Naval Weapons Station, Seal Beach, by ARCHIPLAN, Inc., San Bruno, CA.

U.S. Fish and Wildlife Service (USFWS). 1984. Recovery plan for salt marsh bird's beak (C. maritimus maritimus ssp. maritimus). Portland, Oregon. U.S.A.: U.S. Fish and Wildlife Service.

U.S. Fish and Wildlife Service (USFWS). 1985a. California Least Tern recovery plan. Portland, OR.

U.S. Fish and Wildlife Service (USFWS). 1985b. Light-Footed Clapper Rail Recovery Plan. Portland, OR.

U.S. Fish and Wildlife Service (USFWS). 1995. Brown Pelican. U.S. Fish and Wildlife Service Division of Endangered Species, Species Accounts. Available online at: http://endangered.fws.gov/i/b/sab2s.html.

U.S. Fish and Wildlife Service (USFWS). 1997. Guidelines for managing fireworks in the vicinity of piping plovers and seabeach amaranth of the U.S. Atlantic Coast. Available online at http://www.fws.gov/northeast/pipingplover/fireworks.html.

U.S. Fish and Wildlife Service (USFWS). 2007. Green sea turtle (*Chelonia mydas*). U.S. Fish and Wildlife Service Species Profile. Website. Available online at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C00S.

U.S. Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. [Online version available at http://www.fws.gov/migratorybirds]

U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW). 1976. The natural resources of Anaheim Bay and Huntington Harbor. Coastal wetland Series No. 18. 103 pp. + app

U.S. Fish and Wildlife Service (USFWS) and U.S. Department of the Navy (DoN). 1990. Endangered species management and protection plan, Naval Weapons Station - Seal Beach and Seal Beach National Wildlife Refuge. Final environmental impact statement. Portland, Oregon. 591 p.

U.S. Fish and Wildlife Service (USFWS) San Diego National Wildlife Refuge Complex. 2012. Comprehensive Conservation Plan.

Unitt, P. A.1984. Birds of San Diego County.Memoir No.13. San Diego Society of Natural History.

Unitt, P. 2004. San Diego County Bird Atlas. San Diego Natural History Museum, San Diego, California, USA. 645pp.

UC IPM Publication, 1994. Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide.

VanRossen, A.J. 1947. A synopsis of the savannah sparrows of northwestern Mexico. Condor 49: 97 – 107.

Voigt, D.R. 1987. Red fox. In M. Noval, J. Baker, M. Obbard, B. Malloch, ed., Wild furbearer management and conservation in North America. Ministry of Natural Resources, Ontario, Canada. pp. 379-392

Vitousek, P.M. and D.U. Hooper. 1993. Biological diversity and terrestrial ecosystem biogeochemistry. Pages 3 - 14 *in* E.D. Schulze and H.A. Mooney, editors. *Biodiversity and Ecosystem Function.* Springer-Verlag, Berlin, Germany.

Wells, S.M., R.M. Pyle, and N.M. Collins. 1980. The IUCN invertebrate red data book. International union for the conservation of nature and natural resources, Gland, Switzerland. 632+L. Cited in USFWS 1990.

Wietzel, M. *Personal Communication*. U.S. Fish and Wildlife Service.

Wilen, C.A., D.L. Haver, M.L. Flint, P.M. Geisel and C.L. Unruh. 2006. Pesticides: Safe and effective use in the home and landscape. Integrated pest management for home gardeners and landscape professionals. Pest Notes Publication 74126. Produced by IPM Education and Publications, UC Statewide IPM Program, University of California, Davis, CA.

Williams, D. F. 1986. Mammalian species of special concern in California. California Department of Fish and Wildlife, Sacramento. Admin. Rep. 86-1. 112pp.

Williams, G. D. and J. S. Desmond. 2001. Restoring assemblages of invertebrates and fishes. In Handbook for Restoring Tidal Wetlands, ed. J. Zedler, pp. 235-269. CRC Press, Boca Raton, Florida.

Williams, G. D. and J. B. Zedler. 1999. "Fish assemblage composition in constructed tidal channels of a southern California salt marsh: Influence of channel morphology and alteration history." Estuaries. 22:702-716.

Williams, T. 2002. America's largest weed. Audubon 1: January/February 2002.

Wlodarski, R. J., J. F. Romani, and D. A. Larsen. 1985. Archaeology investigations at CA-Ora-1054, A later period site in Llalguna Canyon, Orange County, California. *Pacific Coast Archaeology Society Quarterly* 21(3):1-24. Costa Mesa, California.

Yolo County RCD, 2002. Hedgerows: A Traditional Idea with Real Payoffs. Available online at: http://www.yolorcd.ca.gov/hedgerows/design/hedgerow.html. Accessed 8 October 2003.

Zedler, J. B.1982. The ecology of southern California salt marshes: a community profile. U.S. Fish and Wildlife Service FWS/OBS-8154. Second printing with corrections, 1984.

Zedler, J. B. 1992a. Invasive exotic plants: threats to coastal ecosystems. Pages 49-68 *In* Perspectives on the marine environment: Proc. of a symposium on the marine environment of Southern California. University of California Sea Grant Publication USCSG-TR-01-92. Los Angeles, CA.

Zedler, J. B. 1992b. Restoring cordgrass marshes in southern California. Pages 7-51 *In* Restoring the Nation's Marine Environment, G. W. Thayer, ed. College Park: A Maryland Sea Grant Book.

Zedler, J. B. 1993b. Canopy architecture of natural and planted cordgrass marshes: selecting habitat evaluation criteria. Ecological Applications. 3(1):123–138.

Zedler, J. B. 1996. Tidal wetland restoration: a scientific perspective and southern California focus. California Sea Grant Report T-038, La Jolla, CA.

Zedler, J.B. 2001. Handbook for restoring tidal wetlands.CRC Press, Boca Raton, FL.

Zedler, J.B., C.S. Nordby, and B.E. Kus. 1992. The Ecology of Tijuana Estuary, California: A National Estuarine Research Reserve. NOAA Office of Coastal Resource Management, Sanctuaries and Reserve Division, Washington, DC.

Zedler, J.B., J.C. Callaway, J.S. Desmond, G. Vivian-Smith, G.D., G. Sullivan, A.E. Brewster, and B.K. Bradshawl. 1999. California salt marsh vegetation: an improved model of spatial pattern. Ecosystems. v2.19-35.

Zembal, D. *Personal Communication*. U.S. Fish and Wildlife Service. Ornithologist.

Zembal, R. 1993. "The need for corridors between coastal wetlands and uplands in southern California". Pages 205-208 *In I*nterface Between Ecology and Land Development in California. J.E. Keeley, ed. Los Angeles: Southern California Academy of Sciences.

Zembal R. and J.M. Fancher, 1988. Foraging behavior and foods of the Light-footed Clapper Rail. Condor 90:959-962.

Zembal, R., J.M. Fancher, C.S. Norby, and R.J. Bransfield. 1985. Intermarsh movements by Light-footed Clapper rails indicated in part through regular censusing. California Department of Fish and Wildlife 71:164-171.

Zembal, R., S. Hoffman and J. Konecny. 2006. A Survey of Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*) in California, 2006. Prepared for California Department of Fish and Wildlife South Coast Region, San Diego, CA. Contract S0450020 (FY04/05).

Zembal, R., Susan M. Hoffman, John Konecny and Charles Collins. 2005. Status and Distribution of The Light-footed Clapper Rail in California, 2005. Prepared for Naval Base Ventura County Natural Resources Management Office Environmental Division (Code N45V) Point Mugu CA, U.S. Fish and Wildlife Service Carlsbad CA, and California Department of Fish and Wildlife South Coast Region Sensitive Bird and Mammal Monitoring Program San Diego CA

Zembal, R. and Susan M. Hoffman. 2002. A survey of the Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) in California, 2001. California Department of Fish and Wildlife, Habitat Conservation Planning Branch, Species Conservation and Recovery Program Report 2002-01, Sacramento, CA.

Zembal, R., Susan M. Hoffman, and John R. Bradley. 1996. Light-footed clapper rail management and population assessment. Available online at: http://www.dfg.ca.gov/hcpb/info/bm_research/bm_pdfrpts/97_08.pdf

Zembal, R. and B. W. Massey. 1983b. The Light-footed Clapper Rail: distribution, nesting strategies, and management. Cal-Neva Wildlife Trans. 1983: 97-103.

Zembal, R., and B.W. Massey. 1988. Light- footed clapper rail census and study, 1988. California Department of Fish and Wildlife, Sacramento, California.

Zembal, R., B.W. Massey, and J.M. Fancher.1989. Movements and activity patterns of the Light-footed Clapper Rail. Journal Wildlife Management. 53 (1):39-42.

Appendix A: Environmental Assessment and FONSI to the NAVWPNSTA Seal Beach INRMP

This Page Intentionally Blank

ENVIRONMENTAL ASSESSMENT

for the
Naval Weapons Station Seal Beach
Revised Integrated Natural Resources Management Plan
Seal Beach, California

Prepared for the U.S. Department of the Navy
Naval Weapons Station Seal Beach
Environmental Department
800 Seal Beach Blvd.
Seal Beach, CA 90740-5000

Point of Contact
Jo Ellen Anderson, Environmental Planner
Naval Facilities Engineering Command, Southwest
1220 Pacific Highway
San Diego, CA 92132
Phone: (619) 532-2633

Final Environmental Assessment

October 2011

This Page Intentionally Left Blank

ENVIRONMENTAL ASSESSMENT

for the

Naval Weapons Station Seal Beach
Revised Integrated Natural Resources Management Plan
Seal Beach, California

Lead Agency:

U.S. Department of the Navy

Abstract

This Environmental Assessment (EA) has been prepared for the U.S. Department of the Navy (DoN) to determine if an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI) should be prepared on the policy strategies proposed in the Revised 2011 Revised Integrated Natural Resources Management Plan (INRMP) for Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach) located in Seal Beach, California. The purpose of this revised INRMP is to meet statutory requirements under the Sikes Act Improvement Act, Public Law 105-85, Div. B Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2022, as well as the requirements of various Department of Defense, Department of the Navy, and Navy Instructions. The 2011 Revised INRMP is designed to provide for the continuation of military activities while preserving, protecting, and enhancing the natural resources and biodiversity of the NAVWPNSTA Seal Beach. The 2011 Revised INRMP and 1997 INRMP provide strategies to guide natural resources management on the installation. This EA describes four alternatives based upon management strategies contained within the INRMPs. The Proposed Action would implement the 2011 Revised INRMP for NAVWPNSTA Seal Beach with a mosaic of management focus areas. The Proposed Action would balance management primarily focused on federally listed species and other sensitive species at risk in coastal southern California with the military needs, requirements, and mission of NAVWPNSTA Seal Beach. Alternative 2 would adopt the 2011 Revised INRMP with the emphasis on the management of listed species. It would include the conversion of some agriculture land to native grasslands and restore the historic marsh and riparian areas. Alternative 3 would adopt the 2011 Revised INRMP with the emphasis on management of grassland species, converting all agriculture land to restored grasslands. The No Action Alternative would continue implementation of the existing 1997 INRMP. The Navy would implement the selected alternative within the framework of regulatory compliance, national Navy mission obligations and force protection limitations. Any requirement for the obligation of funds for projects in this 2011 Revised INRMP or 1997 INRMP shall be subject to the availability of funds appropriated by Congress, and none of the proposed projects shall be interpreted to require obligation or payment of funds in violation of any applicable federal law including the Anti-Deficiency Act, 31 U.S.C. § 341, *et seq.*

Point of Contact: Jo Ellen Anderson, Environmental Planner
Naval Facilities Engineering Command, Southwest
1220 Pacific Highway
San Diego, CA 92132
Phone: (619) 532-2633

This Page Intentionally Left Blank

List of Acronyms

Acronym	Definition
ADC	Animal Damage Control
APE	area of potential effect
ARRA	Archeological Resources Protection Act
BCC	Birds of Conservation Concern
BEPA	Bald Eagle Protection Act
BMP	best management practice
BRAC	Base Realignment and Closure Act
CAA	Clean Air Act
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CASHPO	California State Historic Preservation Officer
CCA	California Coastal Act
CCP	Comprehensive Conservation Plan
CDFG	California Department of Fish and Game
CDR	Center for Demographic Research
CE	California endangered
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFP	CDFG fully protected species
CFR	Code of Federal Regulations
CH_4	methane
CMP	Coastal Management Plan
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CNRSW	Commander, Navy Region Southwest
CO	carbon monoxide
CO_2	carbon dioxide
CRPI	Comprehensive Regional Planning Instruction
CSC	California Special Concern Species
CT	California threatened species
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DoD	United States Department of Defense
DoDINST	Department of Defense Instruction
DoN	United States Department of the Navy
EA	Environmental Assessment
EARR	Environmental Aspects and Requirements Review
EDD	Employment Development Department
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
FE	federally endangered
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact

Acronym	Definition
FT	federally threatened
GCM	global climate models
GHG	greenhouse gases
GIS	geographical information system
H_2S	hydrogen sulfide
HC	United States Shorebird Conservation Plan species of High Concern
HI	United States Shorebird Conservation Plan Highly Imperiled species
I-405	Interstate 405
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
IRWMP	Integrated Regional Water Management Plan
JFTB	Joint Forces Training Base
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
MWR	Morale, Welfare, and Recreation
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities Engineering Command
NAVFAC SW	Naval Facilities Engineering Command Southwest
NAVFACINST	Naval Facilities Instruction
NAVSEA	Naval Sea Systems
NAVWPNSTA	Naval Weapons Station Seal Beach
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIFZ	Newport-Inglewood Fault Zone
NMFS	National Marine Fisheries Service
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NWR	National Wildlife Refuge
O_3	ozone
OCTA	Orange County Transportation Authority
OCWD	Orange County Water District
OCWIB	Orange County Workforce Investment Board
OP-5	Ordnance Pamphlet 5
OPNAVINST	Naval Operations Instruction
OWOW	"One Water One Watershed"
PM_{10}	respirable particulate matter
$PM_{2.5}$	fine particulate matter
PPM	parts per million
POLB	Port of Long Beach
RCRA	Resource Conservation Recovery Act
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SAIA	Sikes Act Improvement Act
SAWPA	Santa Ana Watershed Project Authority
SBNWR	Seal Beach National Wildlife Refuge
SCAQMD	South Coast Air Quality Management District

Acronym	Definition
SCCWRP	Southern California Coastal Waters Research Program
SCWRP	Southern California Wetlands Recovery Project
SCS	Soil Conservation Service
SO_2	sulfur dioxide
SO_X	sulfur oxides
SR-1	State Route 1
SWDMP	Stormwater Discharge Management Plan
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TCP	traditional cultural place or property
TNR	Trap-Neuter-Release
UN IPCC	United Nations Intergovernmental Panel on Climate Change
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
WESTDIV	Western Division

This Page Intentionally Left Blank

ENVIRONMENTAL ASSESSMENT

for the

Naval Weapons Station Seal Beach
Revised Integrated Natural Resources Management Plan
Seal Beach, California

October 2011

Executive Summary

This Environmental Assessment (EA) has been prepared for the Department of the Navy (DoN) to determine if an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI) should be prepared on the policy strategies proposed in the Revised 2011 Revised Integrated Natural Resources Management Plan (INRMP) for Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach) located in Seal Beach, California. The INRMP for this federal property addresses a requirement to fulfill goals and objectives for natural resources compliance and conservation, including for many special-status natural resources, while achieving the property's primary use to sustain the military mission.

The purpose and need for the Proposed Action is to meet statutory requirements under the Sikes Act Improvement Act (SAIA) of 1997 (16 United States Code § 670a *et seq*.), as well as the requirements of various Department of Defense (DoD) and DoN Instructions. The 1997 SAIA requires the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate this program, the 1997 SAIA amendments require the Secretaries of the military departments to prepare and implement an INRMP for each military installation in the United States. The current INRMP (implemented in 1997) needs to be revised to address recent management concerns and Navy guidelines, to take into consideration recent scientific studies and monitoring results, and to reevaluate current natural resource management practices.

An interagency working group developed a goal, objectives, and management strategies for the INRMP revision. Led by DoN representatives of the NAVWPNSTA Seal Beach Environmental Department, the working group included other representatives from within the Navy. Working group partners from outside the Navy included the U.S. Fish and Wildlife Service (USFWS) – Refuges, USFWS - Ecological Services, California Department of Fish and Game, National Marine Fisheries Service, U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board, and the Friends of Seal Beach National Wildlife Refuge.

This EA analyzes four alternatives: the Proposed Action, two alternatives that propose differing management emphases of the INRMP, and a No Action Alternative that uses current management levels and approaches as a baseline. Each possible alternative was screened using certain criteria to be accepted as a reasonable alternative, and which must:

- Be compliant with the SAIA;

- Be compliant with Navy land use requirements as described in the Naval Sea Systems (NAVSEA) Command Ordnance Pamphlet 5, Volume 1 (OP-5) and Naval Operations Instruction 5530.14C: Navy Physical Security, Chapter 6;
- Be consistent with the use of the installation for military preparedness;
- Result in no net loss in the capability of the installation's lands to support the military mission of the installation;
- Conform to all applicable natural resource laws; and,
- Provide ecosystem soundness and sustainability.

Proposed Action: Would adopt the 2011 Revised INRMP and implement a mosaic of management focus areas. The Proposed Action would balance management primarily focused on federally listed species and other sensitive species at risk in coastal southern California with the military needs, requirements, and mission of NAVWPNSTA Seal Beach. It would establish minimum habitat conditions for addressing the conflicting needs of federally listed species and identified management focus species in the same physical space. The agriculture leases would continue, with the possibility of conversion to native habitats over the long-term. This alternative would address management concerns by establishing one goal and over 80 objectives that are the consensus of the interagency working group. The Proposed Action is also the environmentally preferred alternative.

Alternative 2: Would adopt the 2011 Revised INRMP and emphasize the management of federally listed species. This alternative would highlight the recovery of federally listed species occupying Navy lands: the California least tern (*Sterna antillarum browni*), light-footed clapper rail *(Rallus longirostris levipes)*, and western snowy plover (*Charadrius alexandrinus nivosus*) and enhance habitat for the potentially occurring listed species on the installation, including least Bell's vireo (*Vireo bellii pusillus)* and southwestern willow flycatcher (*Empidonax traillii extimus*). This alternative would meet all natural resource objectives currently established for the property except for the loss of agricultural lands, as some current agriculture land would be converted to native grassland habitat. Alternative 2 would also result in a benefit to listed species with the physical footprint of the marshlands expanded to late-1800s acreage and marsh and remnant riparian areas enhanced. De-conflicting management needs between listed and other species and with the military mission would not be incorporated.

Alternative 3: Would adopt the 2011 Revised INRMP and emphasize restoring coastal grassland uplands. All current agriculture land would be converted to native grassland habitat. De-conflicting management needs between listed and other species with the military mission would not be incorporated.

Alternative 4 (No Action Alternative): Would retain the current INRMP and continue current management levels and practices. This alternative would maintain over 2,200 acres of agricultural leases, which reduces maintenance costs, generates revenue for the installation, and is consistent with security requirements. While the 1997 INRMP complies with Sikes Act requirements, it does not address the conflicting requirements of federally listed and other special status species. The 1997 INRMP is also outdated with regard to species occurrences, habitat mapping, recent federal listings, new Executive Orders, other legal matters, and mission-related operational investments.

Under the SAIA, DoD landowners may not conduct activities that result in a net loss to the capability of the installation to achieve its military mission. Navy managers have examined the Proposed Action and determined that the combination of actions provided for in this EA would not result in the impairment of any military mission values.

For further information, contact:

Jo Ellen Anderson, Environmental Planner
Naval Facilities Engineering Command, Southwest
1220 Pacific Highway
San Diego, CA 92132
Phone: (619) 532-2633

This Page Intentionally Left Blank

Table of Contents

List of Maps

List of Tables

1.0 Purpose and Need

1.1 Introduction

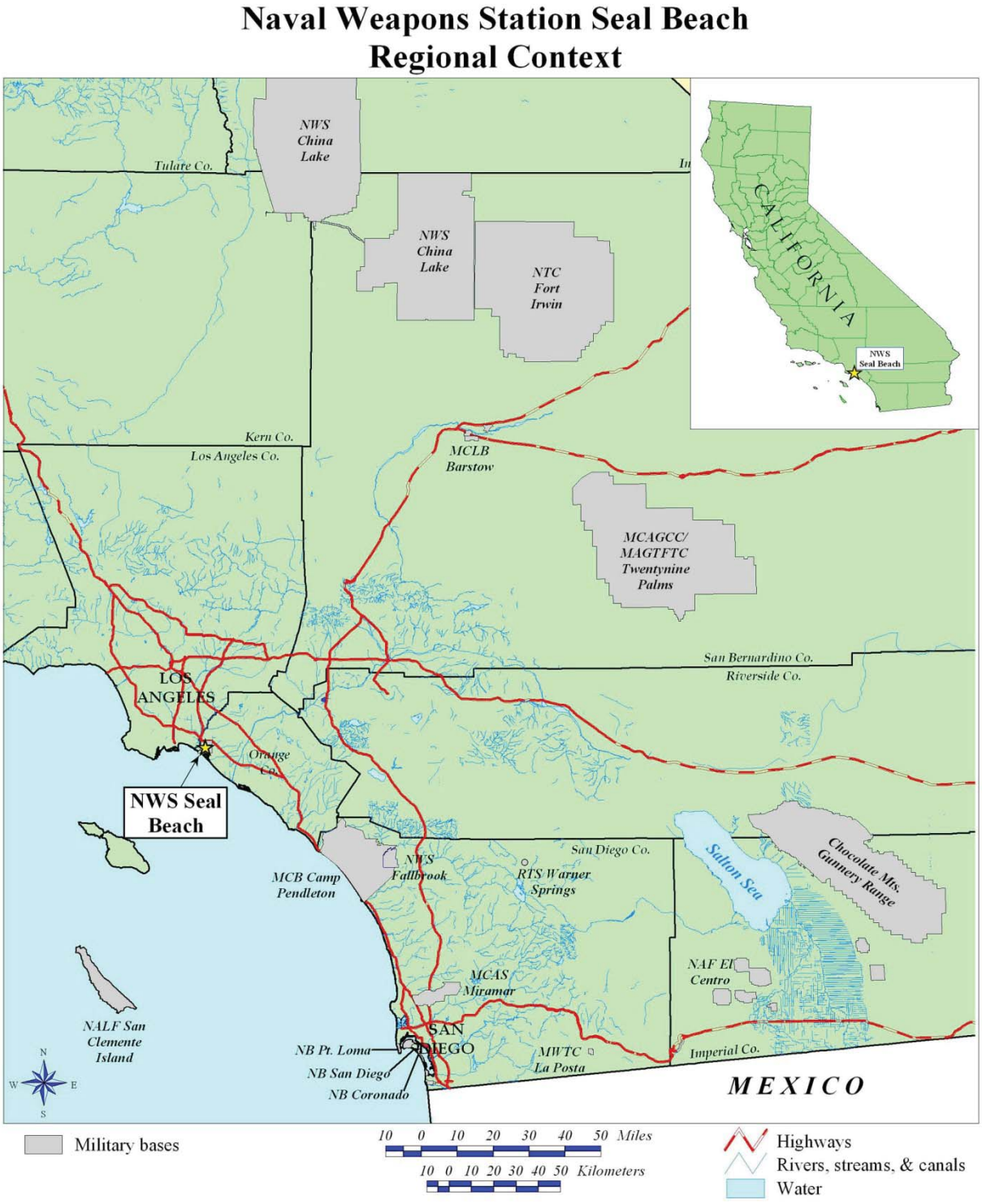
The Commanding Officer, Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach or installation) proposes to implement a revised Integrated Natural Resources Management Plan (INRMP) for NAVWPNSTA Seal Beach (United States Department of the Navy [DoN] 2011). The INRMP is a programmatic document designed to guide natural resource management decisions at NAVWPNSTA Seal Beach. This Environmental Assessment (EA) is intended to analyze proposed actions based upon management strategies outlined in the Revised INRMP 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 management proposal reflects the level of detail currently available for the specific proposal. The habitat restoration proposals analyzed in the INRMP should be viewed as conceptual. It is during subsequent project level "step-down" planning that additional studies would be conducted, additional baseline data would be gathered, the appropriate project level National Environmental Policy Act (NEPA) documentation would be prepared, all necessary permits would be acquired, and final engineering and implementation steps would be conducted. This planning would also include a public involvement component similar to that provided during the INRMP development.

This EA analyzes four alternatives, the Proposed Action and two alternatives that propose differing management emphases of the Revised INRMP and a No Action Alternative that uses current management levels and approaches as a baseline.

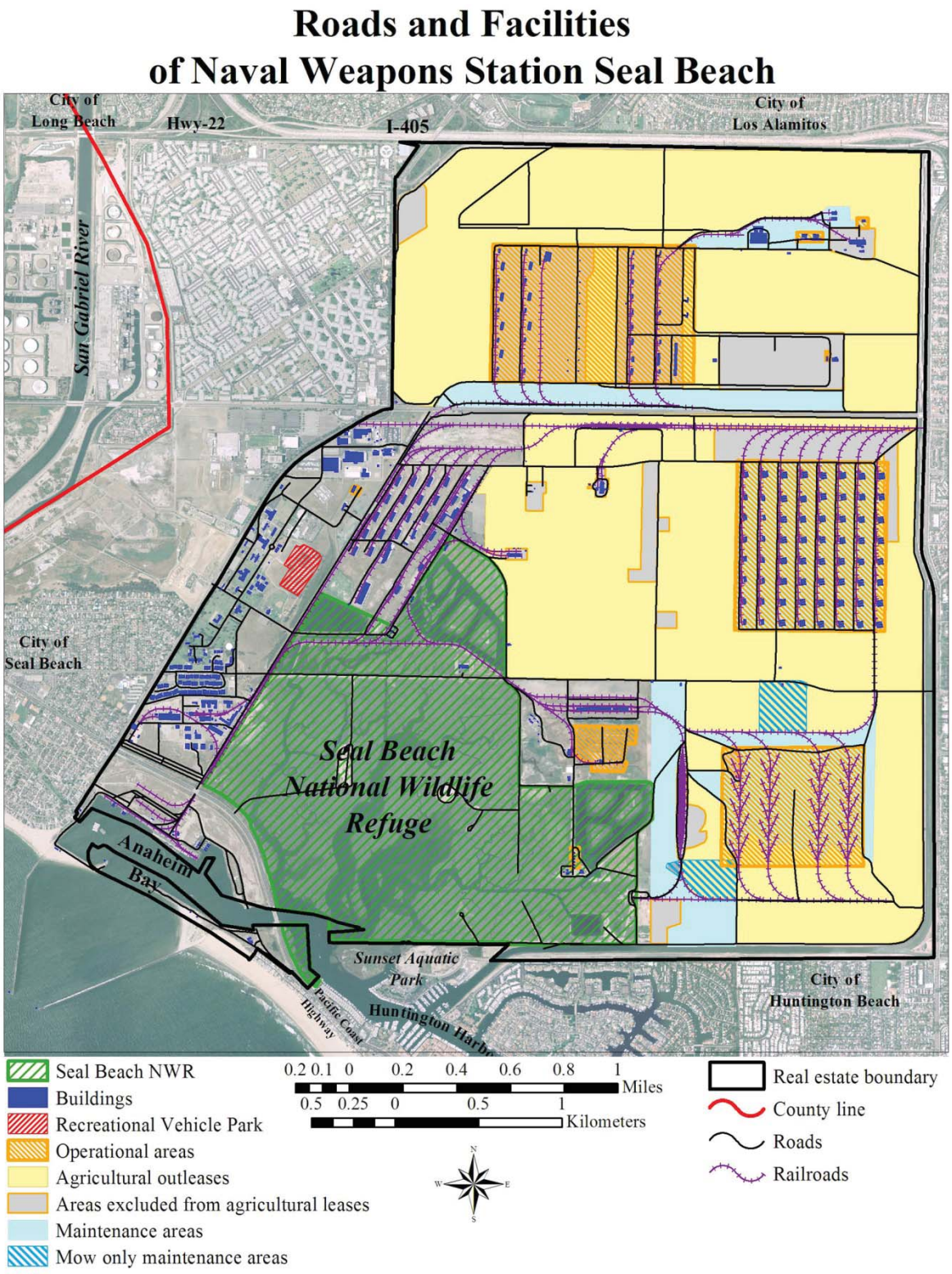
1.2 Project Location

Naval Weapons Station Seal Beach is located in northern Orange County between Huntington Beach and Long Beach, California (Maps 1-1 and 1-2), approximately 25 miles south of the Los Angeles urban center amidst a heavily urbanized group of cities. Naval Weapons Station Seal Beach property is surrounded by developments associated with the city of Seal Beach bordering, the installation to the west, southwest, and north. The city of Westminster borders NAVWPNSTA Seal Beach on the northeast, the city of Huntington Beach is south/southeast, and unincorporated county land is located to the south. The Los Angeles-Long Beach Port Complex is the largest in the U.S. and the third largest in the world (Southern California Wetlands Recovery Project [SCWRP] 2001).

Interstate 405 (I-405) parallels the northern boundary of NAVWPNSTA Seal Beach. Westminster Avenue bisects the installation from east to west located between I-405 and the Pacific Ocean. Pacific Coast Highway (State Route 1 [SR-1]) is elevated across the southwestern portion of NAVWPNSTA Seal Beach by a bridge over Anaheim Channel, which feeds the Huntington Harbour Marina. Bolsa Chica Road forms the eastern boundary of the installation and Seal Beach Boulevard forms the western boundary.



Map 1-1. Naval Weapons Station Seal Beach regional location.



Map 1-2. Naval Weapons Station Seal Beach operational areas and facilities.

In the Seal Beach vicinity, land use is medium-density residential. Industry, oil extraction, and aeronautical and space research facilities are distributed throughout this area. The Los Alamitos Joint Forces Training Base (JFTB) is located across I-405 north of NAVWPNSTA Seal Beach. Next to the property on the northwest side, across Seal Beach Boulevard in Seal Beach, is Hellman Ranch, which supports a golf course, some residential use, and oil production. Located at the south side of the installation, in unincorporated Orange County, is Sunset Aquatic Park, a marina with parking facilities, picnic tables, a boat launch, boat slips, a marine repair yard, and a Harbor Patrol office. Directly adjacent, Huntington Harbour is a marine-oriented residential development.

The NAVWPNSTA Seal Beach is a U.S. Navy-owned asset used, along with its detachments, to provide shore-based infrastructure support to the Navy's ordnance mission and other fleet and fleet support activities. The installation achieves its mission through mastery of ordnance management, maintenance, and technical support complemented by highly skilled people, unique resources, and strategic seaward proximity to the Pacific Fleet. Coincident with this mission is the need for land, water, and open space to conduct military activities, including the need for explosive safety buffers for the storage and distribution of ordnance and weapons-related materials.

1.3 Purpose and Need of Proposed Action

The purpose and need for the Proposed Action/Preferred Alternative is to meet statutory requirements under the Sikes Act Improvement Act (SAIA) of 1997 (16 United States Code [U.S.C.] § 670a *et seq.*), as well as the requirements of various United States Department of Defense (DoD) and DoN Instructions. The 1997 SAIA requires the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate this program, the 1997 SAIA amendments require the Secretaries of the military departments to prepare and implement an INRMP for each military installation in the United States. The current INRMP (implemented in 1997) needs to be revised to address recent management concerns and Navy guidelines, consider recent scientific studies and monitoring results, and to reevaluate current natural resource management practices.

Since the 1997 INRMP was completed, an ecosystem management approach to conserving military lands and the military mission has been adopted by the DoD. Implementation of this policy was designed to encourage natural resource managers to determine best management practices (BMPs) based on regional or physiographic delineations rather than on a featured species basis. It was designed to better assess mission impacts on an installation-specific scale, as well as on a more regional or landscape scale. Department of Defense Instruction (DoDINST) 4715.3 (03 May 1996) required that Navy installations incorporate ecosystem management as the basis for land use planning and management. This approach shall take a long-term view of human activities, including military uses, and biological resources as part of the same environment. When Congress authorized the SAIA in 1997, it also adopted this theme, mandating that INRMP goals “shall be to maintain or develop an ecosystem-based conservation program...” The Navy further directs through Naval Operations Instruction [OPNAVINST] 5090.1C CH-1 (July 2011) that ecosystem-based management shall include:

- A shift from single species to multiple species conservation;
- Formation of partnerships necessary to consider and manage ecosystems that cross boundaries; and,

- Use of the best available scientific information in decision-making and adaptive management techniques in natural resource management.

As required by the SAIA, the INRMP must, to the extent appropriate and applicable, provide:

a) Fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation. Fish and wildlife habitat enhancement or modifications;
b) Wetland protection, enhancement, and restoration;
c) Integration of, and consistency among, the various activities conducted under the Plan;
d) Establishment of specific natural resources management objectives and time frames for proposed actions;
e) Sustained use by the public of natural resources for recreation to the extent that such use is consistent with the needs of fish and wildlife management and subject to installation safety and security requirements;
f) Enforcement of natural resources laws and regulations;
g) No net loss in the capability of military lands to support the military mission of the installation; and,
h) Such other activities as the DoD has determined are appropriate.

The 1997 INRMP does not address the conflicting requirements of federally listed and other special status species, such as the burrowing owl (*Athene cunicularia*) or various shorebirds ranked on conservation lists of federal agencies and non-governmental organizations. It also does not fully integrate NAVWPNSTA Seal Beach management planning into natural resource concerns (such as OPNAVINST 5530.14C, Naval Sea Systems [NAVSEA] OP-5) or address climate change. It also lacks a formal mechanism to implement the large-scale projects proposed within it. The 2011 Revised INRMP would provide a better balance of restoration priorities for a range of habitat types and species and management focus areas. The smaller, more fundable projects could be developed by creating an inter-agency mechanism to implement projects. The 1997 INRMP is also outdated with regard to species occurrences, habitat mapping, recent federal listings, new laws and Executive Orders (EO), other legal matters, and mission-related operational investments. (See Sections 1.6, 1.7, Ch. 3, 4.1, 4.3, 4.4, 6.2.1 in the 2011 Revised INRMP for these changes.)

The tasks outlined for current management under the 1997 INRMP are, overall, already completed or outdated. In addition, some topics were not addressed under that INRMP because they were not part of Navy or DoD guidance at that time, nor were they developed topics in Navy, local, or regional plans. These topics include:

- Military mission sustainability and compatibility;
- Climate change;
- DoD ecosystem management;
- Natural Resources Damage Assessment planning for oil spill response;
- Aquatic invasive species; and,
- Integrated baseline and long-term trend monitoring.

1.4 Interagency Working Group

An interdisciplinary working group was established to develop a goal, objectives, and management strategies for the INRMP revision. Led by representatives of the NAVWPNSTA Seal Beach Public Works Department, the working group included other representatives from within the Navy with operations, facilities, natural and cultural resources, and planning expertise. Working group partners from outside the Navy included the U.S. Fish and Wildlife Service (USFWS) – Refuges, USFWS - Ecological Services, California Department of Fish and Game (CDFG), National Marine Fisheries Service (NMFS), U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and the Seal Beach National Wildlife Refuge (SBNWR or Refuge).

1.5 Goal and Objectives of the Revised INRMP

Responding to the direction provided by the guidance documents mentioned above and scoping by the working group, the goal for the Revised INRMP developed by the working group is:

> This INRMP will provide the guidelines, means, and mechanism for assuring long-term sustainability and vitality of both the military mission and ecological health of NAVWPNSTA Seal Beach's natural resources. This will be accomplished such that natural resource protection, restoration, and enhancement can proceed consistent with and unhindered toward internal, National Wildlife Refuge, and regional ecosystem management goals for these lands and waters, without current or future compromise or loss to the military mission. All available Navy and non-Navy resources, the consensus of resource agencies and the public, and effective communication will be employed to secure seamless management across jurisdictions for the benefit of healthy and sustainable land use, habitats, wetlands, and populations of endangered, threatened, and management focus species.

The Revised INRMP contains over 80 objectives, organized by topics at various scales: regional, all NAVWPNSTA Seal Beach property, habitat-level, species-level, and for adaptive management. Resource topics are addressed strategically and conceptually as a way to guide decisions based upon management emphases. A table of the Revised INRMP management objectives can be found in the 2011 Revised INRMP.

This Revised INRMP is not intended as a definitive list of projects that would be automatically funded upon enactment. It provides guidance to resource managers on strategies to employ. The Navy will implement recommendations in the Revised INRMP within the framework of regulatory compliance, national Navy mission obligations, anti-terrorism and force protection limitations, and funding constraints. Any requirement for the obligation of funds for projects in this Revised INRMP shall be subject to the availability of funds appropriated by Congress, and none of the proposed projects shall be interpreted to require obligation or payment of funds in violation of any applicable federal law, including the Anti-Deficiency Act, 31 U.S.C. § 341, *et seq.*

1.6 Decision to Be Made

This EA has been prepared to assess the potential environmental impacts of implementing natural resources management strategies identified in the Revised INRMP and the existing

INRMP. The analysis presented in this EA will be used by decision makers to determine if a Finding of No Significant Impact (FONSI) is appropriate or whether an Environmental Impact Statement (EIS) is needed to implement the Revised INRMP. Should an EIS be deemed not necessary, an alternative from this EA would be selected for implementation based on the environmental knowledge gained by the content of this EA. A course of action will be selected that best addresses the military need, effectiveness of the natural resources management practices, and environmental impact.

1.7 Applicable Laws, Instructions, and Base-wide Plans

This EA has been prepared pursuant to the following:

- NEPA of 1969 (42 U.S.C. §§ 4321-4370h);
- Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] 1500-1508); and,
- DoN Procedures for Implementing NEPA (32 CFR § 775), as described in the Chief of OPNAVINST 5090.1C CH-1.

The DoN has also taken the following legal authorities into account when developing this EA:

- Archeological Resources Protection Act (ARRA) of 1979, 16 U.S.C. §§ 470aa-470mm;
- Clean Air Act (CAA), as amended, 2 U.S.C. §§ 7401-7671p, including 1990 General Conformity Rule;
- Clean Water Act (CWA), 33 U.S.C. §§ 1251-1387;
- Coastal Zone Management Act (CZMA), 16 U.S.C. § 1451;
- Fish and Wildlife Coordination Act, 16 U.S.C. 661-667e; 48 Stat. 401;
- Endangered Species Act (ESA), 16 U.S.C. §§ 1531-1544;
- Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801-1882;
- Migratory Bird Treaty Act (MBTA), 16 U.S.C. §§ 703-712;
- Marine Mammal Protection Act 16 U.S.C. §§ 1361—1362, §§ 1371—1389, §§ 1401—1407;
- Marine Protection, Research and Sanctuaries Act 16 U.S.C. § 1431 *et seq.* and 33 U.S.C. §1401 *et seq.*;
- National Historic Preservation Act (NHPA), 16 U.S.C. §§ 470-470x-6;
- National Wildlife Refuge System Improvement Act of 1966, as amended 1997 (16 U.S.C. 668dd);
- Resource Conservation Recovery Act (RCRA), 42 U.S.C. 6901;
- Rivers and Harbors Act of 1899, 33 U.S.C. § 407;
- Sikes Act as amended, 16 U.S.C. 670a-670o, 74 Stat. 1052;
- Soil and Water Resources conservation Act (16 U.S.C. § 2001);
- EO 11990 - Protection of Wetlands;
- EO 11988 – Floodplain Management;
- EO 12148 – Federal Emergency Management;
- EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations;

- EO 13045 – Protection of Children from Environmental Health Risks and Safety Risks;
- EO 13101 – Greening the Government through Waste Prevention, Recycling, and Federal Acquisition;
- EO 13123 – Greening the Government through Energy Efficient Management;
- EO 13148 – Greening the Government through Leadership in Environmental Management;
- EO 13186 - Responsibility of Federal Agencies to Protect Migratory Birds; and,
- EO 13514 - Federal Leadership in Environmental, Energy and Economic Performance.

Naval instructions also provide guidance for the development of the EA, including:

- OPNAVINST 5530.13B, (Physical Security Instruction for Conventional Arms, Ammunition, and Explosives, 05 July 1994 including CH-1 of 02 June 1999);
- OPNAVINST 5530.14C (Navy Physical Security, 01 May 2001);
- Naval Facilities Instruction (NAVFACINST) 11010.45 Comprehensive Regional Planning Instruction (CRPI); and,
- NAVSEA Command Ordnance Pamphlet 5, Volume 1 “Ammunition and Explosives Safety Ashore Regulations for Handling, Production, Renovation, and Shipping)" (OP-5).

Other guidance is contained in the following documents:

- NAVWPNSTA Seal Beach Instruction 5700.1, 19 April 1996 (established the SBNWR Nature Center and recognized the Friends of SBNWR as a co-sponsor of the Nature Center);
- Navy/Marine Corps Installation Restoration Manual (February 1997);
- General Plan for Use of U.S. Navy Lands and Waters for Wildlife Conservation and Management Purposes, NAVWPNSTA Seal Beach (November 1973);
- Management Plan for SBNWR, May 1974, as amended;
- Fish and Wildlife Management Plan, NAVWPNSTA Seal Beach (December 1964, updated 1969);
- NAVWPNSTA Seal Beach Master Plan Update (1989);
- Final environmental impact statement (1990) and Record of Decision (1991) for the NAVWPNSTA and SBNWR Endangered Species Management and Protection Plan;
- Memorandum of Understanding between the DoD-USFWS to Promote the Conservation of Migratory Birds (2006);
- Installation Appearance Plan (2008);
- Soil and Water Conservation Plan for the Agricultural Outlease Program (2010); and,
- Seal Beach National Wildlife Refuge Comprehensive Conservation Plan (Draft 2010).

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. § 1451) encourages coastal states to be proactive in managing coastal zone uses and resources. CZMA established a voluntary coastal planning program; participating states submit a Coastal Management Plan (CMP) to the National Oceanic and Atmospheric Administration (NOAA) for approval. Under the CZMA, federal agency actions within or outside the coastal zone that affect any land or water use or natural

resource of the coastal zone shall be carried out in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved state management programs. Each state defines its coastal zone in accordance with the CZMA. Excluded from any coastal zone are lands the use of which by law is subject solely to the discretion of the federal government or which is held in trust by the federal government (16 U.S.C. 1453). Accordingly, although NAVWPNSTA Seal Beach land is federal government property and therefore excluded from the coastal zone, the Navy nonetheless conducts an effects test as part of its determination of an action's effects for purposes of federal consistency review under the CZMA, to factually determine whether that action (even if conducted entirely within a federal enclave) would affect any coastal use or resource. As this INRMP revision is a programmatic document, no consultation with the California Coastal Commission is required at this time. There are, however, specific actions/projects discussed within this INRMP revision for possible future implementation that may require additional environmental analysis, per NEPA, prior to being implemented. If and when such projects are to be carried forward, the Navy would engage in consultation with the California Coastal Commission to the extent necessary and appropriate under the CZMA.

While the State of California does not have jurisdiction over the deeded DoD property of NAVWPNSTA Seal Beach, the State is responsible for implementing certain federal laws. NAVWPNSTA Seal Beach falls under the Santa Ana RWQCB. Within the state of California, RWQCBs are responsible for regulating and enforcing water quality of surface and groundwater, as well as federal 401 permits. Authority is delegated to the California Coastal Commission to implement the federal CZMA. Federal agency activities affecting any land use or water use or natural resource of the coastal zone shall be carried out in a manner "which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs" (16 U.S.C. § 1456).

Since the NAVWPNSTA Seal Beach land and nearshore waters are completely owned by the federal government, local laws would generally not be applicable to Navy actions implemented under the Revised INRMP. The Revised INRMP is developed in the context of and seeks consistency with regional Navy plans, national and state wildlife conservation plans, multiple species/habitat conservation programs, and RWQCB policies and plans.

1.8 Public and Agency Involvement

The Navy published a Notice of Availability (NOA) of the Draft EA for three consecutive days in the Orange County Register that described the Proposed Action. It solicited public input and announced that the EA was available for public review at the Mary Wilson Public Library, 707 Electric Avenue, Seal Beach, CA 90740-6103 for 15 days. The Draft EA was also available for public review online (https://www.cnic.navy.mil/cnrsw/index.htm) at the Navy's website. Copies of the Draft EA in CD-ROM format were made available to any interested parties upon request.

A NOA for the Final EA and FONSI, if applicable, would also be published in the Orange County Register and copies of the document would be available for review at the Mary Wilson Public Library, 707 Electric Avenue, Seal Beach, CA 90740-6103 and on the Navy website.

1.9 Organization of Document

This EA is organized as follows: Chapter 1 defines the purpose of and need for the Proposed Action. Chapter 2 describes the alternatives for accomplishing the Proposed Action, including the No Action Alternative, and other alternatives considered. Chapter 3 describes the affected environment and analyzes the possible environmental consequences associated with each alternative. Chapter 4 examines the cumulative impacts of the Proposed Action and other alternatives when added to other past, present, and future projects in the area. Chapter 5 addresses various other considerations required. This is followed by chapters on preparers and their qualifications, persons and agencies contacted, and references.

2.0 Proposed Action and Alternatives

2.1 Introduction

The issues identified during the working group scoping and planning process led to a set of alternatives structured around the natural resources management tools available to accomplish program goals and objectives. This chapter presents an overview of the Proposed Action/Preferred Alternative (implementation of the 2011 Revised INRMP) and three other alternatives.

2.1.1 Alternative Selection Criteria

The alternatives were structured around military mission requirements, the natural resources condition of the property including habitats supporting species protected under the ESA, ecological processes and threats, and the array of management tools available to accomplish program goals and objectives. Land use constraints on the installation laid a foundation for possible alternatives. Potential land use areas were defined using primary functional areas from the 1989 Master Plan (DoN Western Division [WESTDIV] 1989), input from the NAVWPNSTA Seal Beach Facilities and Environmental Security departments, and current land use (Map 2-1). Each possible alternative was screened using certain criteria to be accepted as a reasonable alternative. Each alternative must be compliant with the SAIA and must comply with Navy land use requirements as described in the NAVSEA Command Ordnance Pamphlet 5, Volume 1 “Ammunition and Explosives Safety Ashore Regulations for Handling, Production, Renovation and Shipping", known as "OP-5." Explosives Safety Quantity Distance (ESQD) arcs originate from most of the magazines for the storage and handling of ordnance. Most of the NAVWPNSTA Seal Beach is encumbered by ESQD arcs and land use within this area is controlled by a site approval process that assures compliance with the OP-5 requirements. Also limiting land use possibilities on NAVWPNSTA Seal Beach are requirements (i.e. OPNAVINST 5530.14C: Navy Physical Security, Chapter 6 “Barriers and Openings”) regarding the physical security of any installation that stores and handles ordnance, including restrictions on grounds keeping practices. Security requires a clear zone or “line of sight” buffer area along fence lines where vegetation is managed such that a person lying flat on the ground remains visible.

In addition, all alternatives must:

- Be consistent with the use of the installation for military preparedness;
- Result in no net loss in the capability of the installation’s lands to support the military mission of the installation;
- Conform to all applicable natural resource laws; and,
- Provide ecosystem soundness and sustainability.

2.2 Description of Alternatives

The four alternatives considered in the EA include the Proposed Action/Preferred Alternative (Alternative 1), the No Action Alternative (Alternative 4), and two additional alternatives. The National Environmental Policy Act requires agencies to consider a “No Action” option that often

provides a baseline condition against which the other alternatives may be evaluated. The range of alternatives constitutes an array of the available management interventions that are feasible and effective in the environment of the NAVWPNSTA Seal Beach property, but incorporate various levels of active versus passive management and use of natural resources. The alternatives are:

- Alternative 1—Proposed Action/Preferred Alternative - Implement the Revised INRMP with a mosaic of Management Focus Areas;
- Alternative 2—Implement the Revised INRMP with the distinct emphasis on federally listed species enhancement;
- Alternative 3—Implement the Revised INRMP with the emphasis on restoring coastal grasslands; and,
- Alternative 4—No Action Alternative - Retain the existing INRMP and continue current management levels.

In addition, Table 2-1 provides a thorough comparison of the alternatives by the various resource areas. A number of similarities carry through all or most of the alternatives as well; Section 2.3 lists these elements.

Per Navy policy, all restoration projects that have the potential to enhance endangered species numbers or habitat will be vetted through Navy chain of command and NEPA review prior to implementation to ensure no net loss or future encumbrance to military mission.

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action would adopt the 2011 Revised INRMP and utilize Management Focus Areas for operations and natural resource planning purposes. Management areas would include minimum habitat conditions for addressing the conflicting needs of federally listed species, as well as identified management focus species, in the same physical space.

The Proposed Action includes elements to improve the conditions of natural resources on NAVWPNSTA Seal Beach in the following categories (see Table 2-1 and the NAVWPNSTA Seal Beach Revised INRMP):

- Management Focus Area Designations;
- Outdoor Recreation;
- Fencing and Integrated Buffer Zones;
- Landscaping and Groundskeeping Practices;
- Magazine Area Maintenance;
- Road Maintenance Practices;
- Leases and Outgrants;
- Climate/Climate Change;
- Soil Conservation;
- Water Quality;
- Water Resources;
- Plant Communities and Wildlife Habitats;
- Wetlands;
- Fish and Wildlife Management;

- Federally Listed Wildlife Species Management;
- Agriculture;
- Animal Damage Control;
- Sensitive Plant Populations;
- Long-Term Monitoring;
- Invertebrates;
- Fishes;
- Reptiles and Amphibians;
- Resident Songbirds and Neotropical Migrants;
- Raptors;
- Mammals;
- Invasive Species;
- Public Access;
- Air Quality;
- Improved Mitigation Planning;
- Military Mission Sustainability; and
- Information Management.

The Proposed Action would balance management primarily focused on federally listed species and other sensitive species at risk in coastal southern California, with the military needs, requirements, and mission of NAVWPNSTA Seal Beach. It proposes a habitat restoration and enhancement program that blends salt marsh, intertidal and subtidal special aquatic, freshwater, and coastal grassland habitats. These habitats would create a zoning and buffer system to protect Navy operations and activities, prepare for sea level rise, and de-conflict competing needs of sensitive species, such as the California least tern (*Sterna antillarum browni*), burrowing owl, light-footed clapper rail (*Rallus longirostris levipes*), shorebirds, waterbirds, and nursery functions for fishes. It seeks to maximize the productivity of the coastal ecosystem at NAVWPNSTA Seal Beach for a broad range of declining species, rather than just federally listed species.

Certain non-military land uses could change over time with the Proposed Action. For the short-term, the agricultural lease program would be maintained. The Revised INRMP proposes that the agricultural program make progress towards organic farming and enhanced wildlife compatibility of agricultural practices, focusing on the mountain plover and waterfowl foraging. A long-term result of the Proposed Action could be the loss of some agriculture land, as this acreage could be transitioned to wetlands areas to serve as buffer and sea level rise zones.

The Proposed Action integrates military mission sustainability with natural resources concerns. Through the use of Management Focus Areas, it de-conflicts military mission requirements from those of natural resources by allowing wetland and endangered species enhancements in perimeter areas that are vulnerable to encroachment. The Proposed Action would view climate change as an encroachment to both the military mission and natural resources and make recommendations to address it. It would maintain the primary role of agricultural land as a buffer against encroachment and for income to offset maintenance requirements of the installation. Map 2-2 and Table 2-1 provide additional details about the Proposed Action.

The Proposed Action would establish a long-term planning process for improving public access opportunities to the SBNWR for viewing wildlife.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. This alternative would adopt the 2011 Revised INRMP and emphasize the management and recovery of federal and special listed species occupying Navy lands. It would expand and enhance salt marsh and other marine habitats to late-1800s acreage marsh boundaries and restore coastal grassland uplands suitable to support federally listed species: California least tern, light-footed clapper rail, and western snowy plover (*Charadrius alexandrinus nivosus*) (Map 2-3). However, these expansions may conflict with the needs of shorebirds, waterfowl, coastal upland birds, and other species, including offshore migrants, which depend upon the functions provided by coastal habitats. Additional enhancement of remnant riparian areas could benefit the least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*); however, the most valuable riparian enhancement would conflict with height and spacing security requirements for vegetation on the installation.

While some agricultural acreage would remain, those agriculture leases south of Westminster Avenue (approximately 1,100 acres) would be lost to conversion to native grassland in order to benefit grassland species, such as the San Diego black-tailed jackrabbit (*Lepus californicus bennettii)* and the burrowing owl. However, this expansion may conflict with the needs of the mountain plover (*Charadrius montanus),* which utilizes the structure of the agricultural areas.

Marsh would be expanded in this alternative, allowing for some pre-emptive management against sea level rise. Military mission buffer areas, with and without native habitat, would be specifically designated and mapped, as in the Proposed Action. This alternative would address the encroachment threat from sea level rise with wetland expansion. However, increasing listed species populations beyond the SBNWR boundary may lead to increased conflict with the military mission. The presence of listed species on military lands may cause delays in military decision-making or may reduce flexibility in land use due to the ESA regulatory process. Map 2-3 and Table 2-1 provide additional details about Alternative 2.

This alternative is the same as the Proposed Action with regard to establishing a long-term strategy for improving public access for wildlife viewing.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. This alternative would adopt the 2011 Revised INRMP with the emphasis on restoring coastal grassland uplands (Map 2-4). All agriculture leases, approximately 2,200 acres, would be lost to restored coastal grasslands. This conversion would benefit certain special status species, such as the burrowing owl and San Diego black-tailed jackrabbit, but at the expense of those that benefit from agriculture land (e.g. mountain plover and migrating waterfowl). Marshland would be allowed to expand naturally, without managed enhancement.

This alternative would not incorporate de-conflicting needs of federally listed species or other declining species with the military mission. Nor would it manage the ecosystem-wide concern of future losses of marsh levels. Other than allowing natural marsh expansion, buffer areas to accommodate expected climate change impacts and protect the military lands would not be designated and mapped as in the Proposed Action and Alternative 2. Map 2-4 and Table 2-1 provide additional details about Alternative 3.

This alternative is the same as the Proposed Action with regard to putting in place a long-term strategy for improving public access for wildlife viewing.

D. Alternative 4—No Action to Include Continuing Current Management Levels. The No Action Alternative would continue natural resources management as outlined in the 1997 INRMP (May 1997). Map 2-5 summarizes the footprint of the No Action Alternative. Under this alternative, the population viability of certain special status species, including listed ones, may gradually decline in favor of that of the other listed species or species that prefer deeper-water habitats.

Management of natural resources at NAVWPNSTA Seal Beach is currently guided by the 1997 INRMP and complies with DoD Instruction 4715.3: Environmental Conservation Program, as well as OPNAVINST 5090.1C: Environmental Readiness Program Manual. In addition, a Record of Decision (ROD) on an EIS for an Endangered Species Management and Protection Plan (USFWS–NAVWPNSTA Seal Beach 1991) guides management of the SBNWR. The Navy anticipates the Refuge management will also be supported by a Memorandum of Understanding (MOU) (currently in draft stage) between the USFWS and NAVWPNSTA Seal Beach.

On-going practices used for managing natural resources would continue unchanged. These activities include: predator management for listed species; enforcement of soil and water conservation measures through agricultural leases; inventories of listed species or species groups; burrowing owl management; studies through cooperative agreements with local universities; and using the Environmental Aspects and Requirements Review (EARR) for avoiding and minimizing environmental impacts.

The No Action Alternative would maintain all agricultural leases, which reduce maintenance costs of the installation and are consistent with security requirements.

The No Action Alternative does not explicitly cover military mission compatibility with natural resources, nor does it specifically define mission requirements and sustainability conflicts or threats, especially with regard to sea level rise. At the time the former INRMP was developed, the Sikes Act did not have “no net loss to the military mission” language. The Sikes Act’s reauthorization in 1997 and subsequent Navy guidance changed this and resulted in a mandatory annual reporting metric on the INRMP’s impact to or consistency with the military mission. The result is that military mission plans, as well as other installation plans, are now much more directly addressed in INRMPs for them to be considered fully “integrated” with installation activities. Map 2-5 and Table 2-1 provide additional details about Alternative 4.

This alternative is the same as the Proposed Action with regard to putting in place a long-term strategy for improving public access for wildlife viewing.

2.3 Elements Common among Alternatives

These elements are common to all alternatives because they are covered under existing Navy Instructions or the ROD on the 1991 EIS (USFWS-U.S. Navy 1991). They are implemented regardless of the choice of alternative. Implementation of all elements is dependent on annual funding. The following are from the 1991 ROD:

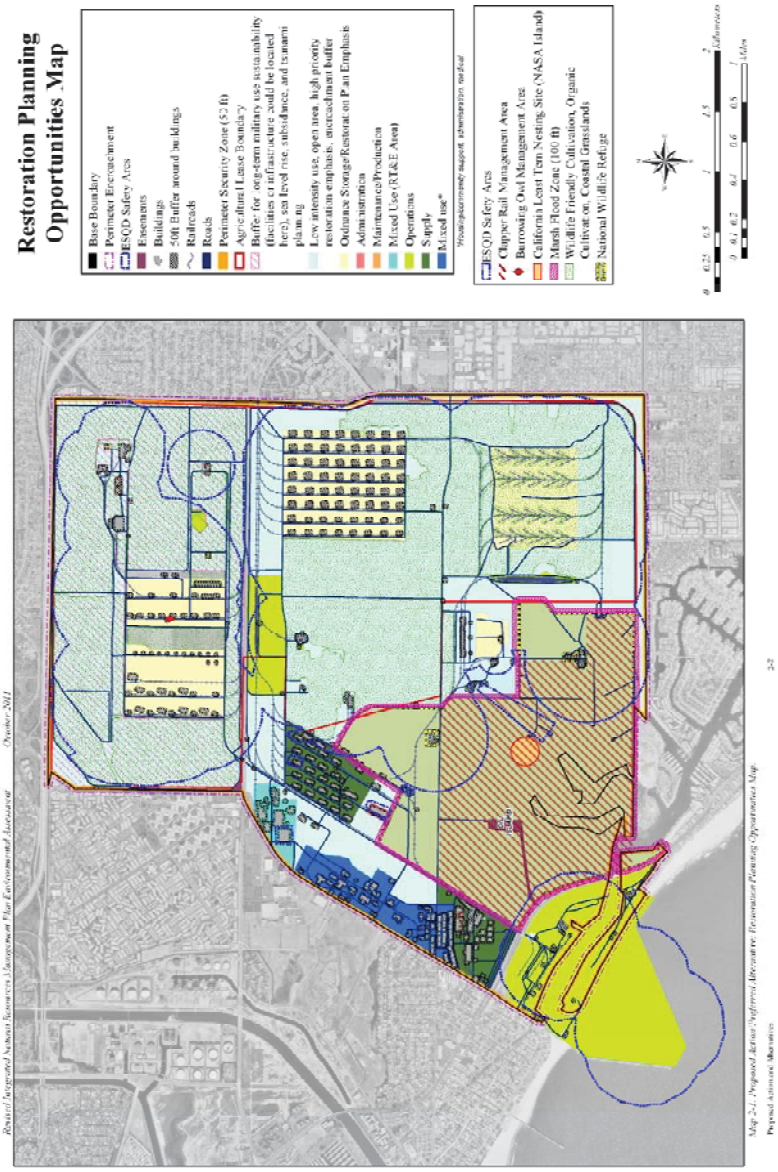
- Population monitoring (night surveys for predators, California least tern, and light-footed clapper rail high tide and call counts);
- Endangered species studies on population dynamics of the least tern and clapper rail;
- Endangered species protection through predator control based on mutual concurrence of the Navy, U.S. Department of Agriculture, USFWS, and CDFG;
- Endangered species habitat management for nesting areas (least tern and clapper rail);
- Habitat restoration and enhancement as funding is available, such as cleanup and restoration of Oil Island and monitoring Port of Long Beach mitigation ponds;
- Monitoring and research on environmental quality by the Installation Restoration (IR) program including a cooperative contaminants study on bioaccumulation with SBNWR;
- Public use and education including public tours at least one day per year and a symposium every other year; and,
- Staffing and funding to achieve the above, as controlled by Congress.

The Proposed Action/Preferred and Alternatives 2 and 3 share common elements of the 2011 Revised INRMP (see Table 2-1 for additional details). These are:

- Outdoor recreation management;
- Landscaping and grounds keeping practices;
- Road maintenance practices;
- Leases and outgrants practices;
- Soil conservation practices;
- Water resources management;
- Long-term monitoring of biological, water quality and habitat-based resources;
- Public access management;
- Information management; and,
- Updated BMPs for subject categories.

2.4 Comparison of Alternatives with Proposed Action

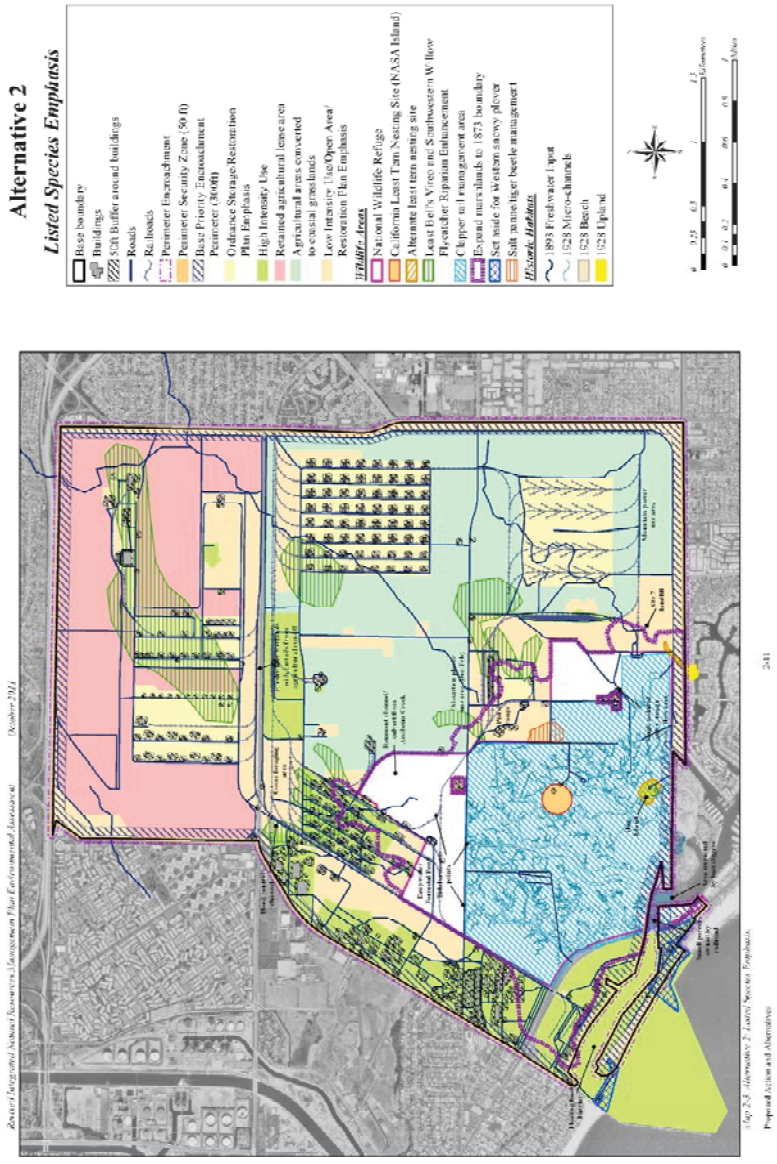
The matrix below (Table 2-1) provides additional details about and differences in the alternatives. See Table 2-2 for potential environmental impacts of the alternatives.



Map 2-1. Proposed Action/Preferred Alternative: Restoration Planning Opportunities Map.

INSERT OVERSIZED MAP

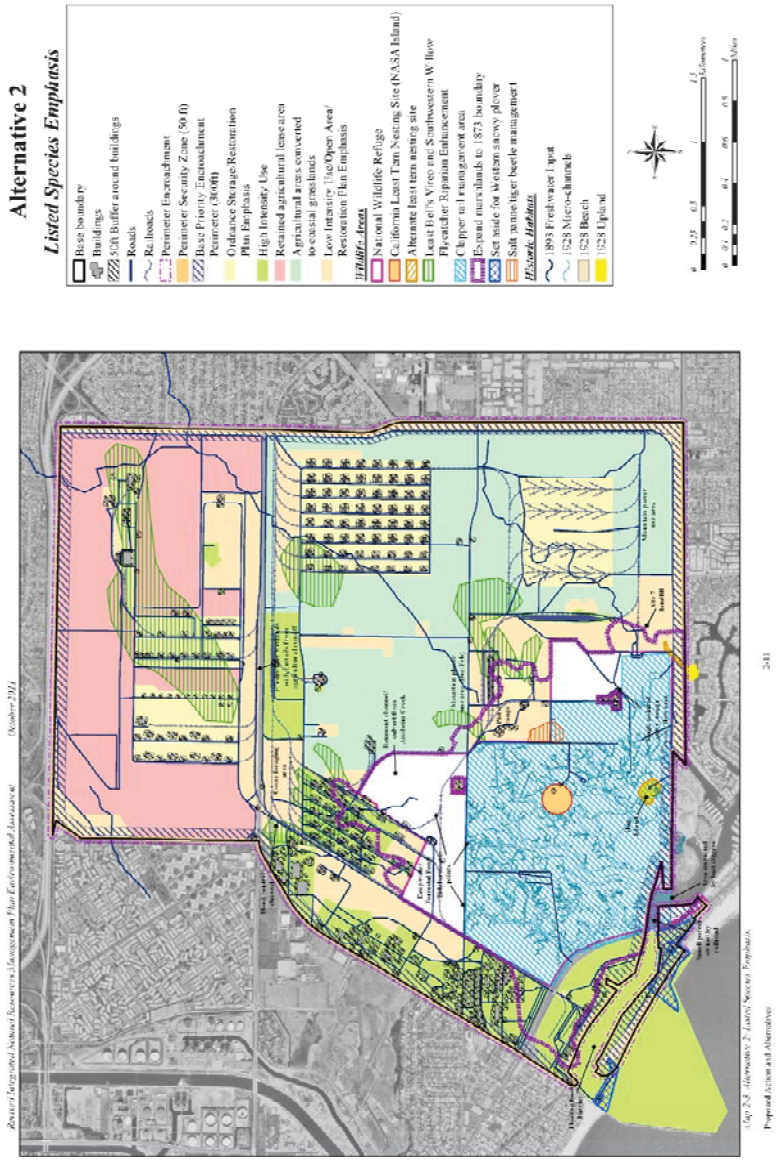
This Page Intentionally Left Blank



Map 2-2. Proposed Action/Preferred Alternative: Restoration Concept Plan.

INSERT OVERSIZED MAP

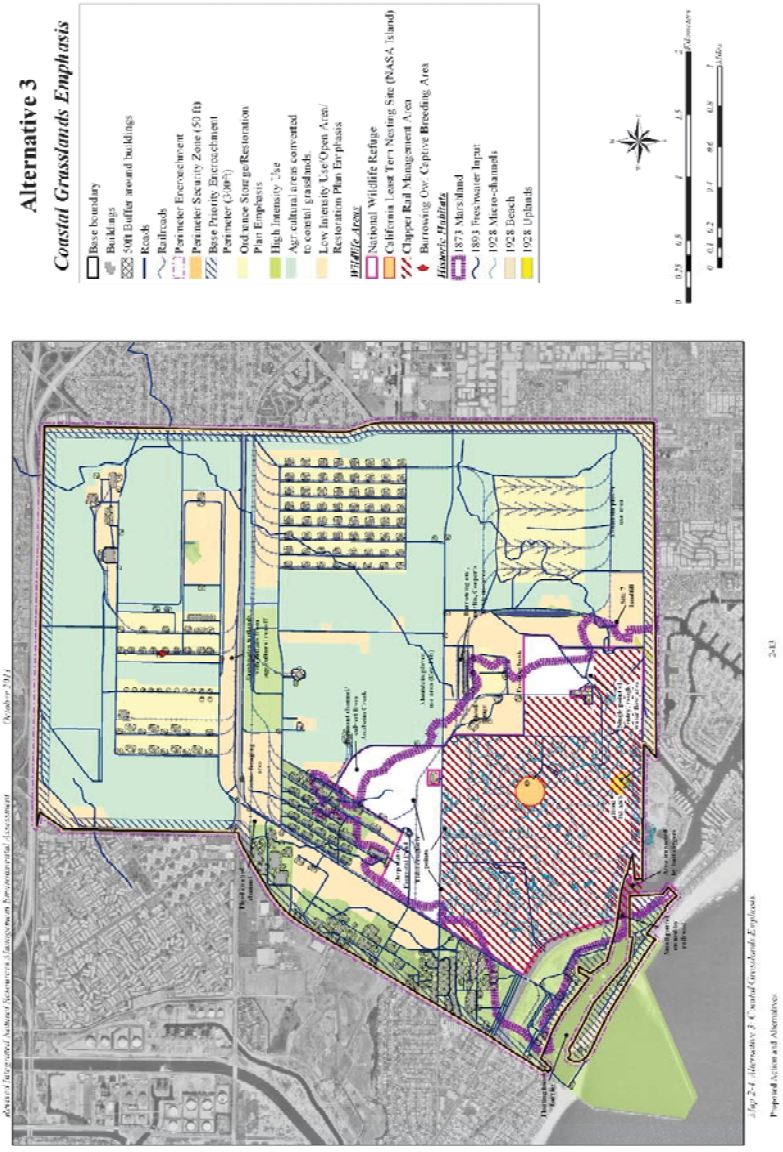
This Page Intentionally Left Blank



Map 2-3. Alternative 2: Emphasis on Management of Listed Species.

INSERT OVERSIZED MAP

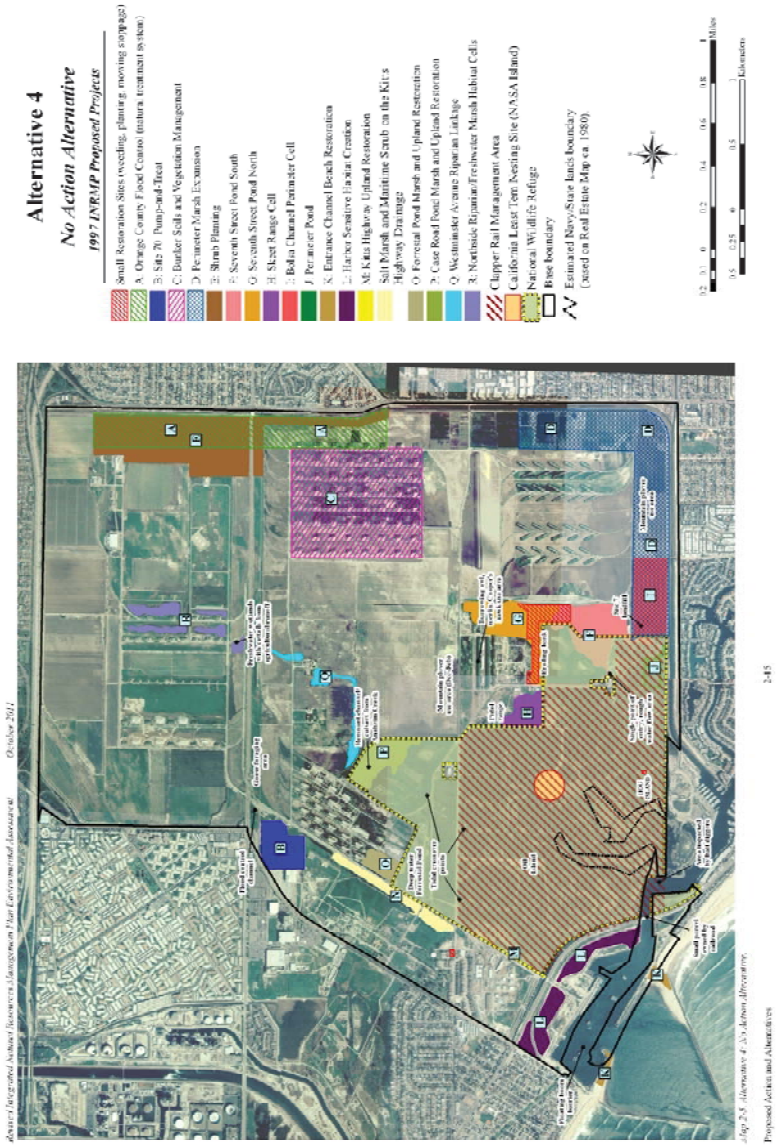
This Page Intentionally Left Blank



Map 2-4. Alternative 3: Emphasis on Restoration of Coastal Grasslands.

INSERT OVERSIZED MAP

This Page Intentionally Left Blank



Map 2-5. Alternative 4: No Action Alternative.

INSERT OVERSIZED MAP

This Page Intentionally Left Blank

Table 2-1. Comparison of approaches for the Proposed Action and alternatives.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Land Use				
Management Focus Area Designations	Planning Use Areas identified (Map 2-1). Improves the ability to anticipate and address land use conflicts in a more timely and cost-effective manner by using the Current Land Use Areas with Explosive Safety Quantity Distance (ESQD) Safety Arcs and Safety/Perimeter Zones (Map 2-3 in the 2011 Revised Integrated Natural Resources Management Plan [INRMP]), land management emphasis areas (Map 4-1 in the Revised INRMP), and the Conceptual Restoration Planning map (Map 4-3 in the Revised INRMP).	Planning Use Areas identified (Map 2-1). Management focus areas identified for listed species, but not identified to de-conflict species requirements and mission support functions.	An adaptation of Planning Use Areas identified. Management focus areas identified for grasslands, but not identified to de-conflict species requirements and mission support functions.	Broad land use conflict resolution guidelines provided but not at specific locations on a map. Contains a Natural Resource Summary Map but management emphasis areas not identified to de-conflict species requirements and mission support functions. Natural resources information outdated.
Outdoor Recreation	Revises outdoor recreation planning. Proposes bringing Oil Island into public access as an interpretive center by initiating an interagency, collaborative effort to close the facility and develop an interpretive center. Proposes a recreational plan revision that includes both military personnel and public components. Interpretive wildlife viewing is encouraged outside ESQD arcs.	Same as Proposed Action.	Same as Proposed Action.	Recreational fishing and hunting prohibited. Safety regulations prohibit jogging, bicycling, or other recreation within ESQD arcs. Maintains opportunities for recreation to be developed as proposed in the Environmental Impact Statement/Record of Decision (EIS/ROD).
Fencing and Integrated Buffer Zones	Integrates security fencing, required clear zones, and safety requirements into designated, multi-purpose buffer zones.	Same as No Action.	Same as No Action.	No fencing plan that is integrated across security, ordnance safety, fire safety, and natural resource values including large wildlife movement. Maintains clear zones along fence lines, 20 feet (ft) on outside and 30 ft on inside (Naval Operations Instruction 5530.14C).

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Landscaping and Groundskeeping Practices	Recommends a revised Landscaping Plan and Instruction that outlines a landscaping and grounds maintenance program consistent with Executive Order (EO) 13123 and EO 13112. Revises irrigation practices for landscaping. Recommends applying herbicides on an as-needed basis only. Recommends coordinating mowing with invasive weed growth. Modifies the Scope of Work for the groundskeeping contract to promote Revised INRMP implementation. Incorporates landscaping into physical barriers surrounding buildings and visual protection barriers between the Naval Weapons Station Seal Beach and the neighboring community. Changes landscaping design to be compatible with conservation and native plants.	Same as Proposed Action.	Same as Proposed Action.	Implements certain projects discussed in the Base Exterior Architecture Plan: use trees to screen undesirable views at several locations including Public Works; plant trees along Seal Beach Boulevard; upgrade the Beach House; and upgrade the Main Gate entry appearance with landscaping and signage.
Magazine Area Maintenance	Conducts a study to consider site stability measures of vegetation condition on magazines: diversity of root depths; a mix of perennial grasses and annual grasses/forbs; at least 70 percent ground cover; fire resistant or low fuels; rough surface (bunchgrasses v. annual plants); minimize bare ground; reduce burrowing animals. Considers means to adjust timing of mowing for weed control.	Same as Proposed Action. Increases cost to maintain magazines due loss of revenue from agriculture.	Same as Proposed Action. Substantially increases cost to maintain magazines due loss of revenue from agriculture.	Vegetation on or around magazines to 50 ft from the toe of the magazine slope shall be kept in a condition such that vegetation does not exceed eight inches.
Road Maintenance Practices	Adopts road maintenance standards. Applies principles of "Integrated Vegetation Management"; controls stormwater pollutants, and provides cultural and natural resource education. Adopts a mowing instruction that provides roadside fire safety and minimizes detrimental effects of mowing. Broadens the range of native vegetation on roadsides and reduces non-natives. Implements an experimental roadside native planting to evaluate mowing practices.	Same as Proposed Action.	Same as Proposed Action.	Mows to 30 feet alongside paved roads to reduce fire spread and threat, maintains safe conditions for road use, and enhances roadsides as habitat and dispersal corridors. Minimum mowing height is three inches for vegetation left behind.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Leases & Outgrants	Improves integration of real estate agreements with Revised INRMP goal and objectives. Soil and Water Conservation plans are reviewed for specific soil erosion control and water quality protection measures when outgrants come up for renewal. Ensures compliance with breeding season restrictions for vegetation maintenance by utility easement holders. Expands the Environmental Quality Evaluation process to include all tenants.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Natural Resources Management				
Climate Change/Sea Level Rise	Identifies sea level rise as an encroachment threat to the military mission and to natural resources based on scenarios ranging from mild to worst case (see Revised INRMP Map 3-1). Expands the marsh into 1932 waterfowl area and creates perimeter wetlands to channel additional sea level rise.	Identifies sea level rise as an encroachment threat to the military mission and to natural resources based on scenarios ranging from mild to worst case. Accommodates sea level rise by expanding the marsh to 1873 boundary and restoring riparian channels.	Identifies sea level rise as an encroachment threat to the military mission and to natural resources based on scenarios ranging from mild to worst case. Allows marsh to expand naturally but does not actively manage it.	Does not address climate change.
Soil Conservation	Adds more specific best management practices (BMPs) during all activities and broadens responsibility for these to real estate tenants. Improves integration with other departments. Assesses stream condition and restoration potential for willows.	Same as Proposed Action.	Same as Proposed Action.	Contains BMPs, but some are outdated. Continues and updates upon renewal Soil and Water Conservation Plans for Agriculture Leases.
Water Quality	Opportunities for treatment of wetlands are open areas along length of flood control channel. Landscaped areas used to manage runoff. Designs stringer wetlands. Incorporates freshwater wetlands into landscaping. High priority to establish freshwater or brackish wetlands to reduce encroachment threat. Plans and implements a strategy to utilize riparian and freshwater wetlands to accept and retain agricultural tailwater and local runoff prior to entering the estuary habitats. Evaluates the partial redirection of periodic flood events in the Anaheim Creek hydrogeographic basin into the estuary. Continues Mussel Watch Program.	Restores riparian areas to help manage runoff. Continues Mussel Watch Program. Landscaped areas used to manage weeds and runoff. Design stringer wetlands. Landscaping species enhance wildlife, wetlands, and upland transition.	Continues Mussel Watch Program. Landscaped areas used to manage weeds and runoff. Design stringer wetlands. Landscaping species enhance wildlife, wetlands, and upland transition.	General guidance for BMPs provided, focusing on livestock exclusion fences for impaired ponds and riparian areas, but no specific locations described. Continues Mussel Watch Program.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Water Resources	Implements no fewer than four separate Water Efficiency Improvement BMPs. Promotes the use of drought-tolerant landscaping into new and replacement plantings using natives and the Installation Appearance Plan (2008). Seeks to keep annual potable water consumption below 100 acre-feet in all years. Continues the grounds maintenance contract requirement to limit the quantity of irrigation water use. Consistent with the Regional Water Quality Control Board (RWQCB) Watershed Management Initiative, develops a groundwater management plan.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action except for no water efficiency improvements.
Plant Communities and Wildlife Habitats	Revises survey information. Expands native habitats, including wetlands, riparian areas, and grasslands.	Updates maps and survey data. Expands salt marsh, marine habitat, and coastal grasslands.	Updates maps and survey data. Expands coastal grasslands. No direct management of threat to marsh losses.	Vegetation maps are based on 1970s information. No direct management of threat to marsh losses.
Wetlands	Updates an earlier wetland delineation that did not include the marsh. Implements monitoring for wetland, plant species composition, and relative cover on an annual basis to ensure no net loss in structure or function. Controls active erosion of streambanks and stream channels. Restores more natural conditions in inactive channels. Standards are identified for well-functioning wetlands.	Updates an earlier wetland delineation that did not include the marsh. Monitors wetland plant species composition and relative cover on an annual basis to ensure no net loss in structure or function. Limited increases to salt marsh and marine habitats. Increases wetlands to historic footprint.	Allow wetlands to expand naturally.	General Wetland Delineation in effect outside the marsh. No monitoring of change in boundaries. No new wetlands, but wetland enhancement in existing Seal Beach National Wildlife Refuge (SBNWR) footprint.
Riparian Enhancement	Does not address riparian areas.	Enhances and restores riparian remnant areas.	Same as Proposed Action.	Restores and enhances some historic riparian areas.
Fish and Wildlife Management	Updates species lists. Identifies preliminary Management Focus Species that are indicators of ecological health or ecological problems. Those species would be highlighted in project evaluations, long-term monitoring, modeling, and research priorities.	Same as Proposed Action, except emphasis on listed species only.	Same as Proposed Action, except expands emphasis on coastal grassland species.	The 1997 INRMP expands the species list through surveys.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Federally Listed Wildlife Species Management	Adopts a map of sensitive species priority management emphasis areas and a system of safety buffer zones to protect habitat areas. Continues implementation of EIS/ROD.	Emphasizes management of listed species: California least tern, light-footed clapper rail, least Bell's vireo, and southwestern willow flycatcher. Continues implementation of EIS/ROD.	Other than continued implementation of EIS/ROD, does not manage for federally listed species.	Monitoring and SBNWR management only, based on EIS/ROD for predator control.
Agriculture	Maintains current agriculture leases. Promotes wildlife-friendly agriculture. Ag lands serve as buffers for military uses. Allows for conversion to native habitats in the long-term consistent with military uses. Leases reduce need of maintenance funds from installation.	Loss of agriculture lands south of Westminster Ave. Loss of some agricultural lands as security and safety buffer and offset to maintenance funds. Encourages wildlife-friendly agriculture for remaining leases.	Loss of all agriculture lands. Loss of agricultural lands as security and safety buffer, and as offset to maintenance funds.	Maintains current agriculture leases. Is consistent with military security requirements.
Animal Damage Control	Maintains consistency with the 1991 EIS/ROD (United States Fish and Wildlife Service [USFWS]-NAVWPNSTA Seal Beach). Controls vertebrate species that pose a nuisance or potential health hazard to tolerable levels. Adds an educational program for residents regarding the feeding and harboring of feral cats and dogs. Ensures all outdoor trash containers are covered and that a sufficient number of them are located around facilities to discourage littering. Uses Nixalite®, owl decoys, and signs prohibiting the feeding of pigeons. Where there are no sensitive species concerns, encourages the presence of natural predators, such as non-poisonous snakes, owls and hawks. Discourages wildlife habitation of occupied buildings through appropriate and biologically acceptable measures. All exclusionary remedies to be installed outside breeding seasons. Controls pest birds (pigeons, barn swallows, starlings, and house sparrows) by applying Nixalite ® or tactile repellents. Controls ground squirrels to acceptable levels while avoiding unintentional take using enclosed bait stations.	Same as Proposed Action, with additional emphasis on predator control for the California least tern. Increased predator control needed because of the management emphasis on listed species.	Same as Proposed Action.	Emphasis on predator control for the California least tern. Continues the EIS/ROD guidelines for predator management, including for night surveys and predator management. Continues Eyes on the Colony. Program ensures that free-roaming pets are not allowed in the natural areas.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Sensitive Plant Populations	Little change from No Action Alternative. Conducts focused surveys for rare plants, targeting other sensitive plants documented within one mile of the NAVWPNSTA Seal Beach. Maintains locations in geographical information system database.	Same as No Action, except may improve salt marsh bird's beak community.	Same as Proposed Action.	Habitat-based program with a focus on maintaining current surveys and self-sustaining populations.
Long-Term Monitoring	Reviews the long-term monitoring program to tailor it more directly to current management questions and improve interpretive power in relation to background variability and to threats (subsidence, sea level rise, invasives, etc.). Adds physical, water quality, biological indicator species and habitat-based monitoring to link cause and effect.	Same as Proposed Action.	Same as Proposed Action.	Long-term monitoring for listed species, burrowing owls and continues monitoring designated in EIS/ROD.
Invertebrates	Determines the baseline abundance and diversity of invertebrate species, emphasizing those that may indicate ecosystem trend or are federally listed. Monitors invertebrates by designing a simple trapping system for a limited number of habitats.	Same as Proposed Action.	Same as Proposed Action.	No invertebrate program.
Fishes	Develops a baseline fish species list. Surveys for sensitive aquatic organisms susceptible to fishing, and provides conservation measures if found. Conducts a regular fish census.	Same as Proposed Action.	Same as Proposed Action.	No fish program.
Reptiles and Amphibians	Conducts baseline inventories for amphibians and reptiles, emphasizing management focus species and including aquatic species. Ensures that military personnel understand policies regarding pets and collecting animals.	Same as Proposed Action.	Same as Proposed Action.	No program for reptiles and amphibians.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Resident Songbirds and Neotropical Migrants	Conducts a baseline inventory of birds targeting Management Focus Species and Partners-In-Flight priority birds. Per the Migratory Bird Treaty Act, restricts access into and disturbance of nesting and breeding grounds during critical periods as part of all projects, scopes of work, contracts, and agreements associated with construction or vegetation manipulations. In compliance with the Federal Insecticide, Fungicide and Rodenticide Act, limits the use of rodenticides and herbicides and removes any dead or dying rodents from a treated area.	Same as Proposed Action.	Same as Proposed Action.	Conducts surveys and avoids breeding season are the primary management measures. No specific management focus species are identified.
Raptors	Installs bird perches outside of sensitive habitat areas. Incorporates updated baseline inventory of raptors, emphasizing Management Focus Species.	Same as Proposed Action.	Same as Proposed Action.	Raptor program consists of surveys only.
Mammals	Conducts baseline inventories and monitoring for terrestrial mammals, targeting bats, San Diego black-tailed jackrabbit, and skunks. Provides guidelines for protecting roosting bats. Uses biologically acceptable measures to discourage wildlife habitation of occupied buildings.	Same as Proposed Action.	Same as Proposed Action.	Uses exclusionary measures to prevent bats from occupying structures occupied by humans.
Invasive Species	Provides standards and guidelines for preventing and eradicating newly arriving terrestrial and aquatic invasive species. Recommends surveys for non-native fish, frogs, invertebrates. Explores means to cost-effectively control or eradicate invasives. Surveys for non-native ants, and develops measures to prevent their spread.	Same as Proposed Action.	Same as Proposed Action.	Implements a Noxious Weed Management Plan and targets numerous invasive weeds for control.
Improved Mitigation Planning	Identifies suitable sites for habitat restoration and other compensatory actions. Uses the sensitive species priority management emphasis area map and the perimeter security zone map to plan these locations.	Same as No Action Alternative.	Same as No Action Alternative.	Guidelines were non-specific to the NAVWPNSTA Seal Beach.

2.5 Resource Areas Considered but Not Carried Forward for Detailed Analysis

The following resource areas were considered but not carried forward for detailed analysis as it is projected that there would only be negligible impacts to them from implementation of the alternatives.

Noise. The noises associated with natural resources management activities are generally negligible. A small amount of noise could come from the short-term use of mechanical equipment, motor vehicles, and an occasional aircraft. Since human noise receptors on NAVWPNSTA Seal Beach would notice little difference between the noise created from these actions and the much louder background noise from the adjacent urban environment, this resource area is not carried forward for detailed analysis.

Transportation and Circulation. Specific access and circulation system components, configurations and relationships permit the efficient and safe organization of ordnance operations at NAVWPNSTA Seal Beach. This system must be capable of responding to significantly changing or increasing demands that might be placed upon it during times of military mobilization. The transportation systems on NAVWPNSTA Seal Beach primarily function to move ordnance to and from its storage facility and people from the main gate to their places of employment. These systems encompass a network of 68 miles of roads and 49 miles of railways and waterways. Public Works is responsible for the construction and maintenance of the roads on NAVWPNSTA Seal Beach. The transportation and circulation system that supports distribution of ordnance and other mission functions is not expected to be affected by any of the alternatives proposed; therefore, this resource area is not carried forward for detailed analysis.

Utilities and Infrastructure. The utilities and infrastructure system that supports distribution of ordnance and other mission functions is not expected to be affected by any of the alternatives proposed; therefore, this resource area is excluded from detailed analysis. The coincident protection of utilities and infrastructure due to managing the flood zone that could expand with sea level rise is addressed under Health and Safety.

Natural Resource Usage in Relation to Adjacent Public and Non-Public Lands and Communities. All alternatives improve the linkage of natural resources on NAVWPNSTA Seal Beach to that on adjacent public and non-public lands and communities by employing an ecosystem approach in all cases. Therefore, this topic is not analyzed separately. The linkage to neighboring restoration work at Bolsa Chica and other southern California wetlands recovery is covered under Designated Land Uses. The loss of agriculture as a natural resource use under Alternatives 2 and 3 is addressed under Socioeconomics.

Public Services. Public services utilized by or within the NAVWPNSTA Seal Beach are minimal because of the small size of the installation and its restricted public access. The public services provided are minimal fire and police protection. As none of the alternatives would affect public services, this resource area is not carried forward for detailed analysis.

Public Health and Safety. The health and safety of the public and personnel are the first concern at an ordnance handling facility. Safety and security regulations are described under

Section 3.1 “Land Use”, since the entire Seal Beach property is essentially a safety and security buffer for ordnance handling. In addition, public access to NAVWPNSTA Seal Beach is highly restricted. Public threat from tsunamis or sea level rise is regional issues and would not be affected by any of the alternatives. For all of these reasons, this resource area is not carried forward for detailed analysis.

Cultural Resources. Cultural resources include prehistoric, historic, and architectural resources. (Paleontology resources are not cultural resources. They are more appropriately classified as geological resources.) The resources may be sites, structures, buildings, or objects. Places that have been important in maintaining the identity of a community for more than 50 years are called traditional cultural places or properties (TCPs), and they fall under the heading of cultural resources. A site, structure, building, or object (or a group of them) or a TCP may be in or eligible for listing in the National Register of Historic Places if it meets one of the National Register criteria for evaluation (36 CFR Part 63). A listed or eligible cultural resource is a "historic property."

Because of the rich history within NAVWPNSTA Seal Beach, a number of cultural sites are scattered throughout the installation. At times, the mandate to manage cultural resources comes in conflict with the mandate to manage natural resources. Currently on NAVWPNSTA Seal Beach, several such conflicts are apparent.

Archaeological evidence indicates human inhabitation of mobile foragers in the Orange County region 11,000-8,500 years ago (DoN 2002). Although evidence of inhabitation on NAVWPNSTA Seal Beach has not been found dating to that time, other evidence suggests utilization of the area during the Milling Stone period (8,000-3,000 before present). Artifacts, including bone, human remains, and middens, have been surveyed in various locations. An archaeological site rests on Hog Island and in separate areas of the agriculture fields. Three of the surveyed sites have been recommended for evaluation in the National Historic Register of Places (DoN 2002). There is also a historic building district present on the installation. Previous management considerations suggest alterations of farming practices, protective structure, and more thorough surveys in order to protect the integrity of archaeological sites (DoN 2002). Finally, bird nesting in and outside of buildings within the historic district has required the modification of the buildings to make them less vulnerable to birds.

Compliance with Section 106 of the NHPA for the NAVWPNSTA Seal Beach INRMP is accomplished through conformance with the 36 CFR 800 process, and is the responsibility of the NAVWPNSTA Seal Beach Command. The potential for effects to historic properties and any future and emergent implementation projects, as outlined in Chapter 2 of the NAVWPNSTA Seal Beach INRMP, are to be considered on an individual basis as separate undertakings and require review by authorized Navy Cultural Resources personnel. Pursuant to 36 CFR 800, such efforts include determining: 1) the area of potential effect (APE), 2) the identification of historic properties within the APE and 3) the effect to historic properties within the APE. Each determination requires consultation with the California State Historic Preservation Officer (CASHPO) and all relevant Native American tribes.

Table 2-2. Summary of potential environmental effects and avoidance and minimization measures.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Land Use	Would benefit land use by decreasing conflicts between military mission requirements and natural resources and by planning for potential sea level rise. Would benefit overall natural habitat land use by enhancing perimeters with wetland and endangered species habitats. Would benefit agricultural land use by maintaining approximately 2600 acres of agricultural leases for short-term (United States Department of the Navy [DoN] 2011). Would potentially benefit natural land use by converting ag. land to coastal grassland in long-term. Would benefit land use by integrating landscaping and grounds maintenance with conservation methods and native plants. Designated management areas would support project planning for avoiding and minimizing environmental conflicts and impacts.	Negative impacts could occur because management areas and buffers would not be identified to de-conflict species requirements and mission support functions. Would benefit natural land use - wetlands, riparian, and coastal grasslands - through gains and enhancements in these habitats. Negative impacts would occur to some agriculture lands (approximately 1600 acres) (DoN 2011) because of their loss. Potential negative impacts on military land use could result as federally listed species expand into military land areas. Would benefit land use by integrating landscaping and grounds maintenance with conservation methods.	Negative impacts could occur because management areas and buffers would not be identified to de-conflict species requirements and mission support functions. Would benefit coastal grassland land use through gain of approximately 2600 acres. Would negatively affect agriculture lands, which are lost to grassland conversion. Would benefit land use by integrating landscaping and grounds maintenance with conservation methods.	Would benefit land use by specifying locations to de-conflict land uses between military mission support and species' needs using broad land use conflict resolution guidelines. Would benefit agriculture lands by maintaining 2600 acres of agricultural leases. Would implement projects that contribute energy efficiency and beautification. Would negatively affect land use by not planning or accommodating for potential sea level rise.
Socioeconomics and Environmental Justice	Would maintain socioeconomic benefits to agriculture lease holders and lower-income agricultural workers.	Would continue socioeconomic benefits to one agriculture leaseholder and some lower-income agriculture workers. Would have negative impacts on one leaseholder and low-income agriculture workers through loss of some ag. lands. Would provide short-term benefits to laborers during restoration work.	Same as Alternative 2 but negative socioeconomics impacts would be slightly greater because all agricultural land would be lost.	Same as Proposed Action.
Outdoor Recreation and Aesthetic Values	Would increase long-term benefits through additional public access to natural resources and wildlife viewing. Would benefit aesthetics through improved landscaping and ground maintenance compatible with native vegetation.	Same as Proposed Action.	Same as Proposed Action.	Would maintain long-term benefits of current public access to natural resources at Seal Beach National Wildlife Refuge.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Geology and Soils	Would benefit soils through implementation of best management practices (BMPs), erosion control in landscaping and magazine maintenance, continued soil conservation measures in ag. leases, and regular sampling of wetland sediment.	Same as Proposed Action.	Same as Proposed Action.	Would benefit soils through implementation of BMPs and soil erosion practices on magazines and unpaved roads and continued implementation of soil conservation measures in ag. leases. Potential negative impacts to soils could occur because some BMPs are outdated.
Water and Hydrologic Resources	Would benefit water resources through improved water quality measures, decreased water consumption (beneficial use standards), monitoring, and increased water efficiency practices. Would contribute to correcting water quality problems originating upstream from the installation that contribute to nearby beach closures and 303d water quality impairment in Anaheim Bay through increased in- and out-flow at the marsh.	Same as Proposed Action, except fewer opportunities for benefits from wetland restoration and enhancement.	Would benefit water resources through improved water quality measures, decreased water consumption (beneficial use standards) and monitoring, increased water efficiency practices. Would benefit water resources through reduction in agriculture water use and pesticide run-off.	Would benefit water resources through water quality measures (runoff enhancement and control) and continued implementation of soil and water conservation plans for ag. leases.
Air Quality and Climate Change	Would contribute minor, short-term negative impacts with release of greenhouse gases (GHGs) and air pollutants through ag. equipment and restoration work. Would continue mitigation measures for dust and odor control. Would provide benefits against potential sea level rise through a buffer area and expanded wetlands.	Same as Proposed Action except that the buffer area against sea level rise would be less than Proposed Action, providing only marsh and riparian links and not perimeters. Emissions from ag. equipment would be less.	Would provide minor benefits against sea level rise through natural expansion of wetlands, but would not provide enhanced buffers or wetlands against sea level rise. Would contribute minor, short-term negative impacts from emissions through restoration work. Loss of agriculture would provide minor benefits to air quality through emissions reduction.	Same as Proposed Action for air quality and GHGs. Restoration projects could provide minor benefits against potential sea level rise through enhanced and expanded wetlands.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Biological Resources				
Plant Communities	Long-term beneficial impacts would include promotion of native plant communities through expansion of native habitats and control of non-native species. Revised survey information on plant communities would provide benefits with potential protection. In the long-term there would be trade-offs between enhanced native plant communities, thus negative impacts to the native plant communities not selected for enhancement.	Same as Proposed Action. Benefits would favor riparian, wetland and coastal grasslands.	Same as Proposed Action. Benefits would favor coastal grasslands. Negative impacts could occur to marsh and transition habitats as there would be no managed or enhanced marsh expansion.	Benefits could occur to wetland plant communities through enhancement and expansion. Long-term negative impacts could occur to all plant communities because of outdated vegetation maps and because projects lack implementability. Long-term negative impacts from continued wetland degradation could occur without enhancement.
Wildlife Populations	Benefits to general populations of fish and wildlife would occur on a habitat basis through habitat improvements, updated surveys and monitoring, enhanced compatibility between natural resources and military operations. Control of vertebrate pests and natural predators would benefit prey species and overall ecosystem function. Avian species would continue to benefit through management pertinent to Migratory Bird Treaty Act.	Same as Proposed Action except for negative impacts on wildlife populations that have conflicting habitats needs with listed-species such as shorebirds, upland species, and ag. species such as mountain plover. Benefits other marine and salt marsh species. Some benefits to coastal grassland species.	Beneficial affects to general fish and wildlife populations that rely on wetland and grassland habitats. Benefits to general fish and wildlife would occur through updated surveys and monitoring, enhanced compatibility between natural resources and military operations. Control of vertebrate pests would benefit prey species. Avian species would continue to benefit through management pertinent to Migratory Bird Treaty Act. Negative impacts on species dependent on agricultural lands.	Beneficial affects to fish and wildlife through inventory and monitoring of populations. Coyote and San Diego black-tailed jackrabbits would benefit through continued focused management. Avian species would continue to benefit through management pertinent to Migratory Bird Treaty Act.

Resource Topic	Alternative 1: Proposed Action/Preferred Alternative	Alternative 2: Endangered Species Emphasis	Alternative 3: Coastal Grassland Emphasis	Alternative 4: No Action
Special Status Species	Benefits to all federally listed species present on the installation, including California least tern, light-footed clapper rail, western snowy plover, green sea turtle, and salt marsh bird's beak through habitat enhancement, restoration, and protection, including long-term habitat planning for sea level rise.	Same as Proposed Action, and federally listed species' habitats would be emphasized for management. Habitat enhancement could also benefit southwestern willow flycatcher and least Bell's vireo. Beneficial affects to grassland species, including San Diego black-tailed jackrabbit and burrowing owl. Potential benefits to burrowing owl and eagle through expanded habitats, but offset by negative impacts because they are predators of federally listed species. Potential negative impacts on federally listed species from an increase in their predators that are grassland-dependent species. More intensive predator management would be required.	Benefits to burrowing owl and San Diego black-tailed jackrabbit from increased grassland habitat. Negative impacts on mountain plover through decreased ag lands. Potential negative impacts on federally listed species from an increase in their predators that are grassland-dependent species. More intensive predator management would be required.	Beneficial affects to California least tern and light-footed clapper rail through predator management and to mountain plover through continued agriculture.
Invasive Species and Animal Damage Control	Negative impacts to invasive terrestrial and aquatic species as management activities prevent their proliferation. Negative impacts on predatory species for listed species through management concurrent with the Environmental Impact Statement/Record of Decision (EIS/ROD). Beneficial affects to natural predators that do not target sensitive species.	Same as Proposed Action.	Same as Proposed Action.	Negative impacts on invasive terrestrial weeds through Noxious Weed Management Plan. Negative impacts on predatory species for listed species through management concurrent with the EIS/ROD.

This Page Intentionally Left Blank

3.0 Affected Environment and Potential Environmental Impacts

This chapter describes the current state of various resources on the installation and the potential effects each alternative would have on these resources. In analyzing the environmental consequences of the alternatives proposed in the EA, several factors are considered for each resource: type of impact, location and footprint, duration of impact, timing (seasonality, for example), and intensity (frequency and severity).

The type of impact describes a relative measure of beneficial or adverse effects on biological or physical systems, cultural resources, or on the social environment. For example, an adverse impact type might be one that degrades the size, integrity, or connectivity of a specific habitat. Conversely, a beneficial impact would reduce a threat or enhance an ecosystem process, native species richness, or native habitat quantity or quality. Effects of natural resource management are likely to occur within multiple time scales as well. Some impact types may last for relatively short time periods while concurrent impact types are longer term. For example on a population scale, the benefits from a change in habitat condition may take a short time for some species and decades for others. An assessment of the impact's intensity is also considered. Environmental effects vary in intensity from small and imperceptible to large and substantial. Measures of intensity consider whether an effect would be negligible, minor, moderate, or major.

3.1 Land Use

A 1944 deed granted 5,000 acres of lands to the U.S. Navy to the Ordinary High Water Mark, which now translates to the Mean High Water Mark, and these boundaries were surveyed out of the deed as a series of straight lines that roughly run along the main tidal channels (Map 1-2). These lands were developed to create NAVWPNSTA Seal Beach. The submerged lands below the surveyed lines are owned in public trust by the State Lands Commission. The jetties that extend seaward are built on lands similarly owned in trust by the State of California.

The primary land uses of NAVWPNSTA Seal Beach involve the storage, inspection, maintenance and distribution of ordnance. Basic infrastructure on the installation includes 220 buildings, 33.2 miles of railroad track (all of which are inactive), 68 miles of paved road, and 98 ammunition magazines (DoN 2011; DoN Commander, Navy Region Southwest [CNRSW] 2002). General development of the ammunition depot after acquisition by the Navy included the reclamation of about 600 acres of the original 2,300-acre wetlands. The installation also contains approximately 2,200 acres of agricultural leases (C. Flores, *pers. comm*., 2011).

Explosive Safety Quantity Distance arcs originate from the ammunition magazines, the wharf, and areas surrounding additional explosives handing operations. General development and other uses of safety arc-encumbered land for non-ordnance related functions are severely limited for safety reasons. This results in de facto protection/non-development of large contiguous areas of native habitat providing an excellent environment for the sustainment of wildlife and plant

communities. The Navy has specific regulations denoting that only essential personnel are allowed within these areas at any given time.

Major landmarks on the installation include Anaheim Bay and associated marshlands, an administrative area, and magazine complexes with rows of magazines. Weapons and ammunition enter and exit the installation via truck and through the harbor at Anaheim Bay. The inner harbor has docking facilities for U.S. Navy vessels, where loading and unloading of ammunition takes place.

On either side of the harbor lie stretches of sandy beach. On the north coast side, the beach is used by U.S. Navy personnel and families for recreational purposes. This beach serves as a barrier between the inner and outer harbor, extending approximately 1,000 feet northwest of the entrance channel to a fence that separates NAVWPNSTA Seal Beach from the oceanfront community of Seal Beach. A much larger 20-acre beach lies outside the U.S. Navy fence on the southeast, providing beachfront for the community of Surfside.

Special land use designations on NAVWPNSTA Seal Beach are associated with the military mission and include the need for secure port access, open space for security and safety buffers, developed facilities in concentrated areas, security "clear" zones in perimeter areas where vegetation is managed, and compliance with all environmental laws including those involving cleanup of hazardous materials. Clear zones along fence lines are mandatory, 20 feet (ft) on the outside and 30 ft on the inside (OPNAVINST 5530.14C). Vegetation on or around magazines is maintained to 50 ft from the toe of the magazine slope and shall be kept in a condition such that vegetation does not exceed eight inches.

Land use possibilities are also limited by physical security requirements of any installation that stores and handles ordnance, including restrictions on grounds-keeping practices. The perimeter road is an integral part of the security program for NAVWPNSTA Seal Beach. It provides an easily accessible location for security personnel to view the installation boundary and for maintaining the perimeter clear zone. Much of the perimeter road is located outside of ESQD arcs and, consequently, is often coveted by outside parties for projects such as road expansions. However, the perimeter road must remain unencumbered for security access and visibility. The agricultural lessees maintain vegetation height restrictions up to the toe of a magazine. Plants may not exceed the height of a crouching person in the agricultural fields. Crops over a certain height are restricted, and in the past, growers have sought or developed special short crop varieties.

In 1972, Congress designated an overlay of the SBNWR for most of the wetland areas within NAVWPNSTA Seal Beach. The Refuge is located on 956 acres in the southwest corner of the Station. The Refuge contains an interpretive center and is open for public visitation.

There is little open space left in the geographic vicinity of NAVWPNSTA Seal Beach as it has been developed by the adjoining cities and is now urban in nature. Because of the limited amount of open space left available to the surrounding communities of NAVWPNSTA Seal Beach, there is a keen interest in the neighboring communities in the management of NAVWPNSTA Seal Beach natural resources. Neighbors of NAVWPNSTA Seal Beach usually interact through the SBNWR Interpretive Center, but also interact with management of the installation's natural resources when activities there begin to influence their quality of life.

The Sikes Act provides for the leasing of Navy land for economic returns and for public access for natural resources purposes (including hunting and fishing) when these are compatible with the military mission. Regarding agricultural leasing opportunities, military lands that meet the following criteria and that are capable of producing agricultural crops or forage for livestock are considered for outleasing when the proposed lease: shall sustain and conserve the property for future military use; shall not interfere with current or planned use of adjacent property; does not represent a hazard to the premises; and a substantial benefit, such as reduced maintenance costs, cash rental for leased property, or improved property management shall accrue to the government (OPNAVINST 5090.1C CH-1). For security reasons the height of agricultural crops is restricted at NAVWPNSTA Seal Beach, so that a person lying prone on the ground could be seen by security personnel. Agriculture leases currently comprise approximately 2,200 acres of installation land use (DoN 2011). The agriculture lease in the northern portion of the installation of approximately 1,100 acres typically supports fresh produce, such as strawberries and bell peppers (C. Flores, *pers. comm.*, 2011). The southern agriculture lease of approximately 1,100 acres supports dry land farming and is typically devoted to livestock crops, such as alfalfa (C. Flores, *pers. comm.*, 2011).

As a federal landowner and in compliance with the ESA, NAVWPNSTA Seal Beach must contribute to the conservation of federally threatened and endangered species. The wetlands at Seal Beach are considered important to maintaining the federally listed light-footed clapper rail populations in southern California. Natural resources planning should continue to support endangered species recovery. In addition, regional, national and international plans for migratory birds identify species at risk, and the DoD participates in the monitoring and conservation of these species through its Partners in Flight program and with its MOU with the USFWS on migratory birds in accordance with EO 13186. See the Wildlife Section for additional information on migratory birds and listed species.

Finally, no net loss of wetlands is a national policy implemented through the CWA, and wetland enhancement is a national policy under EO 11990. All coastal wetlands along the California coast may be impacted in the future by climate change. Wetlands restoration and enhancement at NAVWPNSTA Seal Beach could contribute to regional planning for wetland recovery and clean water. The effectiveness of restoration efforts to the south (Bolsa Chica wetlands) and north (Ballona Creek and other wetlands) can be enhanced by work at NAVWPNSTA Seal Beach. In addition, many of the wildlife species move between one site and another, including those associated with coastal uplands.

3.1.1 Effects on Land Use

NEPA and the Sikes Act require the identification of potential conflicts with local, state, and other federal land use planning, policies and regulations. At NAVWPNSTA Seal Beach, the Navy's Title 10 national security responsibilities to organize, train and equip naval forces for sustained military operations receives first priority.

In the case of the 2011 Revised INRMP, military mission encroachment implications to the conservation program are addressed explicitly to ensure sufficient facilities (magazines) and open space for handling and storing ordnance safely; sufficient open space within ESQD arcs that surround ordnance storage and handling locations; and sufficient buffer space between ESQD arcs and the fence line.

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action is the most extensive with respect to integrating designated local, state, and other federal land use planning, policies and regulations with natural resource conservation planning. It would maintain existing military land use designations and add buffers to them.

By integrating natural resource and encroachment concerns, this alternative would achieve objectives for both. Through use of management emphasis areas, it would de-conflict military mission requirements from those of natural resources. By allowing wetland and endangered species enhancements in perimeter areas that are vulnerable to encroachment, it would help stabilize the military hold on the land. The Proposed Action treats climate change as an encroachment to both the military mission and natural resources and makes recommendations to address it.

The Proposed Action moves closer to the goal of the DoD Instruction on ecosystem management than the other alternatives, where ecosystem management principles become not just special projects isolated from the rest of an installation's environmental program, but rather where they form the basis of decision-making at the installation level. Identification of interagency and regional non-governmental partnerships that are mutually beneficial and support regional conservation objectives, such as wetland and coastal grassland conservation, would be an objective. The continued contribution of NAVWPNSTA Seal Beach to the local agricultural and defense economic sectors would be supported.

The Proposed Action would maintain the primary role of agricultural land as a buffer against encroachment and for income to offset maintenance requirements of the installation. The 2011 Revised INRMP would achieve Navy guidelines by ensuring the long-term viability, land use compatibility, and fair-market value of all leases and outgrants, in conjunction with the military mission, natural resource compliance and best practices for natural and cultural resources. Over time, some or all of these leases could be transferred to habitat restoration projects.

The Proposed Action would integrate its landscaping and grounds maintenance with broader natural resources conservation without changing acreage of this land use. This would result in an improved ability to meet local, regional, and national objectives for invasive species control, low water use, incorporation of native plants in landscaping, and use of landscaping to lower energy requirements. The recommendations consider landscaped areas and stormwater systems as continuous with the wetland system to ensure compatibility with natural resource objectives, such as wetland enhancement, and no delivery of fertilizer or pesticides into the wetlands. It employs the use of windbreaks for wind deflection, dust control and noise suppression. The 2011 Revised INRMP integrates landscape design to help meet force protection needs. Landscaping guidelines are intended to augment goals of force protection by incorporating landscaping into physical barriers surrounding buildings and visual protection barriers between the NAVWPNSTA Seal Beach and the neighboring community.

The Proposed Action would have overall beneficial effects on land use as the proposed projects would enhance and protect natural resources and the military mission. The Proposed Action would have no significant impacts on designated land uses.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. In this alternative, the marsh would be expanded to the 1873 boundary and native grassland restoration would occur, contributing to the regional recovery of wetlands and listed species. Yet management emphasis

areas and buffers would not be identified to de-conflict species requirements and mission support functions. Increases in endangered species abundance outside the Refuge may lead to increased conflict with the military mission and potential negative impacts on military land use because their presence could impede the decision-making process and reduce flexibility in land use due to ESA regulatory processes. However, security and height requirements for vegetation on the installation would impede some types of restoration and reduce the likelihood of listed species on certain parts of the installation. These potential conflicts would not be significant.

The loss of approximately 1,100 acres of agriculture leases south of Westminster Road would remove less than 1,100 of dry land crops, primarily alfalfa. This is a minor impact to agriculture use as this amount of crop cultivation could be accommodated elsewhere in Southern or Central California. The conversion to grassland may support native and sensitive species of a declining habitat. Therefore, the trade-off would be long-term benefits to grasslands with long-term negative impacts to agricultural lands. In addition, the cost of installation maintenance would increase due to additional installation maintenance requirements that would have been done by the farmer as well, as loss of lease revenue to the installation.

Integration of landscaping and grounds maintenance activities would be the same as the Proposed Action.

Overall, the trade-offs in land use under this alternative include: potential negative impacts to military lands through a loss of buffer areas, flexibility of use, and increased maintenance demands; potential negative impacts to agriculture lands through its loss; and potential beneficial impacts to coastal grasslands through their gain. This alternative would not result in significant impacts to land use.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. Under this alternative, all agriculture leases on the installation (approximately 2,200 acres) (DoN 2011) would be converted to native grassland habitat. This would provide long-term benefits to grasslands and long-term negative impacts to agriculture. Management areas and buffers would not be identified to de-conflict species requirements and mission support functions, and all agricultural lands that now serve as a buffer against encroachment would be gone. The loss of approximately 2,200 acres of agriculture leases south of Westminster Road would remove less than 1,100 of dry land crops, primarily alfalfa, and approximately 195 acres of food crops in the leases north of Westminster Road (DoN 2009). This is a minor impact to agriculture use as this amount of crop cultivation can be accommodated elsewhere in southern or central California. The conversion to grassland may support native and sensitive species in a habitat that is in decline. In addition, the cost of installation maintenance would increase due to additional installation maintenance requirements that would have been done by the farmer, as well as loss of lease revenue to the installation.

Integration of landscaping and grounds maintenance activities would be the same as the Proposed Action.

The overall trade-offs in land use under this alternative would be: potential negative impacts to military lands through a loss of buffer areas and increased maintenance demands; potential negative impacts to agriculture lands through its loss; and potential beneficial impacts to coastal grasslands through their gain. It would result in no significant impacts.

D. Alternative 4—No Action to Include Continuing Current Management Levels. The 1997 INRMP contains broad land use conflict resolution guidelines but not at specific locations. It contains a Natural Resources Summary Map, but management emphasis areas are not identified to de-conflict species requirements and mission support functions. The information used is outdated. It contains no fencing or mowing plan integrated across security, ordnance safety, and natural resource values including large wildlife movement. The 1997 INRMP provides little management direction for leases and outgrants.

All agricultural leases would continue, benefitting this land use and offsetting current levels of maintenance costs. Potential land uses could change based upon proposed restoration projects, including small wetland, riparian, and upland areas, but without affecting the military mission.

The 1997 INRMP proposes certain projects that had been developed in the Base Exterior Architecture Plan that contribute to energy efficiency and beautification, but planning as a whole would not be as linked to encroachment, natural resource conservation, low water use, or energy sustainability. Landscape planning is not integrated in the 1997 INRMP.

This alternative would have no significant impacts on designated land uses.

3.2 Socioeconomics and Environmental Justice

Socioeconomics typically includes an evaluation of the basic attributes and resources associated with the human environment, particularly population, and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth. Impacts on these fundamental socioeconomic components influence other issues such as housing availability and provision of public services. Environmental justice refers to activities affecting minority and low income populations.

The NAVWPNSTA Seal Beach is a loading installation for missiles, torpedoes, guns, ammunition, and decoys ordnance. There are approximately 2,200 acres of agricultural production under lease, a portion of which includes labor-intensive crops such as strawberries and provides at least seasonal employment for local or migrant labor (DoN 2011). The installation also contains approximately 25 acres of military family housing and provides recreational activities through the Morale, Welfare, and Recreation (MWR) department. The NAVWPNSTA Seal Beach is located in a heavily populated urban area offering a variety of terrestrial and marine recreational opportunities. Seal Beach is accessible from the greater Los Angeles, Long Beach, and Orange County metropolitan areas via I-405 and the Pacific Coast Highway (SR-1).

The Seal Beach vicinity is primarily medium-density residential, primarily consisting of single-family units on individual lots, with apartments and condominiums in the Westminster-Garden Grove area. Leisure World retirement community is nearby on Seal Beach Boulevard. Industry and oil extraction sites are scattered throughout this area. Aeronautical and space research facilities are long-time members of the local community that sometimes use NAVWPNSTA Seal Beach property. The Boeing facility borders NAVWPNSTA Seal Beach to the west. Sunset Aquatic Park, immediately south of the installation, includes boat slips, a marine repair yard, a boat launch ramp, public picnic areas, and a Harbor Patrol office. The Los Alamitos Armed Forces Reserve Center is

located across I-405 north of NAVWPNSTA Seal Beach; the U.S. Navy operates a golf course on U.S. Army land there under permit number DACA09-4-81-87, issued in 1981.

Based on the U.S. census which is conducted every ten years, the city of Seal Beach population in 2000 was 24,157, and in 2008 was only a little higher – 25,986 people. Projections for the near future stabilize around 27,000 inhabitants (2010 – 26,626; 2020 – 27,444; 2030 – 27,777). This reflects that the community is nearly completely built out (Center for Demographic Research [CDR] 2008).

According to the 2000 U.S. Census, housing stock for Orange County was 969,484 homes. That figure is expected to increase by 2010 to 1,073,751. By 2030, 1,144,314 homes are expected.

The Orange County unemployment rate was 8.5 percent in April 2009 in a diversified economy (State of California, Employment Development Department [EDD] 2009). The rate at that time was the same as the national average, but lower than the state of California, which was in April 2009 at 11.5 percent unemployment. Near Seal Beach, unemployment is less than 7 percent. The County's employment total (November 2008, CDR December 2008) is about 1,471,900, and is projected to increase by 2030 to 1,960,633. The projected increase in employment for Seal Beach is much less than that, generally due to it being built-out.

In the 1990s, Orange County underwent a major shift in industry composition. As overall Defense/Aerospace employment declined, Business and Professional Services employment surged, catering to the regional economy, high-tech industries, and financial services. The NAVWPNSTA Seal Beach contributes to military jobs and supports the local defense/aerospace industry. The natural resources/agricultural work sector has also declined locally (Orange County Workforce Investment Board [OCWIB] 2008).

Environmental Justice (EO 12898)

Executive Order 12898, 59 Federal Register 7629, Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations, signed in February 1994, directs federal agencies "...to make achieving environmental justice part of its mission by identifying and addressing...disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority population and low-income population in the [U.S.]." The aim of the EO is to prevent low-income and minority communities from being subjected to disproportionately adverse environmental effects.

The community near NAVWPNSTA Seal Beach is predominantly white (84%), with 6.4 percent Hispanic, 5.8 percent Asian/Pacific Islander, 1.4 percent Black, and all other races 2.1 percent (CDR 2008). According to the 2008 County of Orange Workforce Indicators Report, the percentage of Senior Citizens in Orange County is projected to increase while the percentage of working age adults will decrease. Latino plurality is expected by 2020 and majority by 2050. Thus, the minority or disadvantaged populations in the vicinity of NAVWPNSTA Seal Beach that could be affected by management decisions are small.

3.2.1 Effects on Socioeconomics and Environmental Justice

The NEPA considers "impacts to the human environment" to include any effects of federal actions on the social and economic well-being of communities and individuals.

The economic impact for economic sectors are identified through creating numerical values that summarize how investment spent in a sector produces an economic impact throughout the rest of the local economy. These values are "multipliers." For example, if the manufacturing sector of the local Orange County economy has an economic multiplier of 2.29, then for every 10 employees hired in manufacturing a total of 23 jobs are produced throughout the entire Orange County economy. The economic multiplier for agriculture for California is 1.8. Because multipliers tend to be higher in urban areas, the agricultural multiplier for Orange County may be slightly higher than 1.8 (California Economic Strategy Panel 2009).

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action would not generate new jobs or income within the local community. Some temporary work may be available to assist with restoration projects and other work, but this beneficial impact would be minor to communities surrounding the NAVWPNSTA Seal Beach. Agricultural work would continue with its approximate multiplier effect of 1.8, as the Proposed Action would maintain the agricultural leases on the property. Agricultural work also preferentially benefits low-income workers. Therefore, the Proposed Action would continue to benefit the local economy through jobs provided in agriculture as well as other sectors.

The Proposed Action would have beneficial effects on socioeconomic and environmental justice. None of the socioeconomic and environmental justice impacts would be significant.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. This alternative reduces one agricultural lease holding of approximately 1,100 acres south of Westminster Road. It would have a negative impact on one leaseholder and approximately 25 permanent and temporary employees (R. Schallmann, *pers. comm.* 2011). The impact would be minor on the community, and other farming opportunities for the leaseholder and employees exist throughout central and southern California. Some temporary work may be available to assist with restoration projects and other work, but this beneficial impact would be minor to communities surrounding the NAVWPNSTA Seal Beach.

Because of the limited number of people that would be affected if Alternative 2 were implemented, this alternative would not result in significant impacts on socioeconomic and environmental justice issues.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. This alternative eliminates the agricultural lease holdings; therefore, having a negative impact on the two leaseholders and those seasonally and permanently employed by the leaseholders. Up 25 permanent employees would be impacted from southern lease, while 50-150 seasonal employees from northern lease (R. Schallmann, *pers. comm.* 2011). The impacts on permanent employees would be minor on the community, and other farming opportunities for the leaseholder and employees exist throughout Central and Southern California. Because the seasonal employees are migrant workers, these impacts would be short-term as they are employed for only a short time and because they could likely find temporary work in another, regional agriculture market. Some temporary work may be available to assist with restoration projects and other work, but this beneficial impact would be minor to communities surrounding the NAVWPNSTA Seal Beach.

Because of the limited number of people that would be permanently affected if Alternative 3 were implemented, this alternative would not result in significant impacts on socioeconomic and environmental justice issues.

D. Alternative 4—No Action to Include Continuing Current Management Levels. The effect of the No Action Alternative on socioeconomics and environmental justice is beneficial because it maintains the agricultural economy on the installation, per the Final EA and FONSI for the 1997 INRMP for the installation. There would be no significant impacts to socioeconomics or environmental justice from implementation of the No Action Alternative.

3.3 Recreational and Aesthetic Values

The installation offers a variety of outdoor recreational opportunities for on-site employees and the public. The scenic, diverse landscape and abundance of wildlife lend themselves to interpretive wildlife viewing. However, the site's mission as an ordnance handling and storage facility is the primary circumscription to recreational use of its lands. Security and safety regulations prohibit access to the majority of the installation by the public. Magazines are off-limits to everyone except mission-related workers and non-magazine areas are off-limits to visitors. There are a few areas of the installation set aside for recreational activities.

Bunker 33 Recreation Center

The Athletics Division offers a gymnasium, fitness center, outdoor equipment rental, racquetball courts, tennis courts, softball fields, picnic and BBQ area, and a running course. The fitness center includes a cardiovascular room, weight room, aerobic/karate room, sauna and locker rooms with showers. Intramural sports, fitness program, facility and equipment rentals, aerobic classes, martial arts classes and free exercise video check out are also included in the Fitness Center.

Barney's Beach House

Barney's Beach House has its own shaded patio, barbecue pits and a private beach for all recreational needs. Utility hookups, equipment rentals, a restroom facility with showers, a lifeguard and coordinator are available.

Additional Recreation

Fishing is allowed for installation personnel and their dependents in portions of the inner harbor, and occasional canoeing occurs there (USFWS and U.S. Navy 1990).

There are two stretches of beach on either side of the bay's mouth; the one on the north coast side (Barney's Beach) is used by Navy personnel and their families as described above. The south coast beach is not used for recreation.

The MWR also manages a recreational vehicle campground near the U.S. Marine lease area in the vicinity of the eucalyptus grove. The park serves retired or reserve military families. There is interest in integrating a nature trail into the design of the facility.

Neighboring Sunset Aquatic Park is the main recreational area in the estuary. Adjoining the southern boundary of the installation, this 63-acre county-operated facility has a 286-slip marina,

public boat launching ramp, and picnic area. About two-thirds of the land remains undeveloped, but plans call for expansion of the marina and launching ramp, a recreational vehicle camping facility, and a least tern nesting site (USFWS and U.S. Navy 1990).

Golf Course at Los Alamitos

The Navy Golf Course, located ten minutes driving time from the installation at Los Alamitos, is a PGA-rated gold course with an 18-hole Destroyer course, nine-hole Cruiser course, driving range, putting green, Pro Shop, Eagles Nest restaurant and catering facilities. The Navy turned the land over to the Army for its use as the JFTB. In return, the Navy was granted an unlimited lease at no cost for the golf course, making it a $2.5 million operation.

The golf course is open to the public, covers 294 acres (Permit DACA09-4-81-87), and has 13 lakes in which sterile carp are used to eat algae in the lakes. There is no fishing allowed due to liability concerns. Orange County bird counts are conducted at the golf course every year. American white pelicans use the course lakes as an annual stopover and are present for approximately two weeks.

Public Uses

The SAIA requires that installations provide public access for natural resource uses to the extent that it is appropriate and consistent with the military mission, safety and security. However, due to the military's mission of storing and handling ordnance, access to the NAVWPNSTA Seal Beach for the general public and base personnel is restricted. Restricted public access is available through the SBNWR and the Friends of the Seal Beach NWR (National Wildlife Refuge) during monthly tours and volunteer events at the Refuge. The Friends also coordinate the Pelican Van that makes off-site educational programs to local schools.

3.3.1 Effects on Outdoor Recreation and Aesthetic Values

A. Alternative 1—Proposed Action/Preferred Alternative. Outdoor recreation elements promoted in the 2011 Revised INRMP enhance quality of life for military personnel, while conserving natural resources, and without compromising Fleet readiness. Opportunities are limited for public access for reasons that include general security, safety, and liability concerns, and the presence of federally endangered and threatened species. Hunting, for reasons of security and safety, remains prohibited. The preparation of a recreational plan for NAVWPNSTA Seal Beach includes a long-term goal of establishing a nature center on Oil Island once operations at the facility on the island have ceased. Public access to pre-defined wildlife viewing areas for a public nature interpretive program is proposed. An Adopt-A-Burrowing-Owl program is also proposed.

Where possible and compatible with the mission, development and enhancement of fishing and outdoor uses of natural resources for the disabled are encouraged. In keeping with EO 12962, federal agencies shall improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities by restoring degraded habitat, fostering conservation, providing access and awareness of opportunities for recreational fishing (OPNAVINST 5090.1C CH-1).

The 2011 Revised INRMP also seeks to improve outreach and build relationships with the community, through organized local groups such as the Aquarium of the Pacific at Long Beach.

Volunteer partnerships and activities, such as the Friends of Seal Beach NWR, regular marsh cleanups, "Eyes on the Colony" program, and maintenance of the native plant garden would continue. Public events, including Arbor Day celebration and monthly wildlife viewing tours would also persist.

Finally, the 2011 Revised INRMP improves, through landscape planning, the visual and aesthetic environment for both civilian and military personnel living, working, or visiting NAVWPNSTA Seal Beach, while avoiding the introduction of invasive exotic species, decreasing water use, improving drought tolerance of plant communities, and maintaining the integrity and character of cultural resources. It employs trees and shrubs to block all undesirable views, noise, and lights and provide privacy.

Through additional recreational programs, public access and beautification projects, the Proposed Action would provide beneficial impacts to recreational and aesthetic values. There would be no significant impacts.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. The effects of this alternative on outdoor recreation would be the same as the Proposed Action.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. The effects of this alternative on outdoor recreation would be the same as the Proposed Action.

D. Alternative 4—No Action to Include Continuing Current Management Levels. Under the 1997 INRMP, recreational fishing and hunting are prohibited. Safety regulations prohibit jogging, bicycling, or other recreation within ESQD arcs. Volunteer programs are coordinated with the Friends of Seal Beach National Wildlife Refuge, and school field trips for youth occur regularly on the SBNWR. In addition, the EIS/ROD establishes the possibility for developing Oil Island for recreational purposes, but without defining those uses. These programs would continue to benefit outdoor recreation.

Because there would be no change in recreational and aesthetic values, there would be no significant impact from the No Action Alternative.

3.4 Natural Resources

3.4.1 Geology and Soils

The shape of the California coastline is a result of heavy tectonic activity and erosion. Two geomorphic provinces, the Transverse Ranges and the Peninsular Ranges, form a natural amphitheater in the coast (SCWRP 2001) creating an island separate from the rest of the United States. The NAVWPNSTA Seal Beach is situated within the western margin of the Peninsular Ranges Geomorphic Province and near the southwestern margin of the Los Angeles Basin and coastal flood plain. It sits on a southwest facing coastline in an alluvial basin (Los Angeles Basin) bordered on the southeast by the San Joaquin Hills, the east by the Santa Ana Mountains, the northeast by the San Gabriel Mountains, and the northwest by the Santa Monica Mountains. The physiographic area where the property sits is known as the Sunset Gap, which is bordered by Landing Hill to the northwest and Bolsa Chica mesa to the southeast.

The Newport-Inglewood Fault Zone (NIFZ) runs through the SBNWR portion of NAVWPNSTA Seal Beach, and the Palos Verdes fault zone lies about eight and a half miles offshore to the southwest; both faults are classified as active (Coastal Geotechnical Inc. 2001). The proximity of faults is considered a serious earthquake hazard. Emergency response for earthquakes and any other natural or manmade disaster is guided by NAVWPNSTA Seal Beach INST 3440.1E on emergency management programs. NAVWPNSTA Seal Beach is identified in the Emergency Program Manual as a relocation site for evacuated personnel during a natural or manmade emergency.

The Orange County Soil Survey shows five soil types on NAVWPNSTA Seal Beach. Bolsa silt loam or Bolsa silty clay loam form the major soil groups on the installation, except for portions along Seal Beach Boulevard. These soils have slight erosion hazards (United States Department of Agriculture [USDA] Soil Conservation Service [SCS] 1978).

Soils of the tidal marsh within the Refuge are predominantly fine, silty sands, clayey silts, and silty clays, and are not rated with an erosion hazard by the USDA SCS (1978). Layers of peat up to 18 feet thick lie along the edges of the Alamitos Gap and at the south edge of Landing Hill within the installation. Thinner layers of peat are located under the salt marsh; lagoonal-alluvial deposits of the salt marsh are 35 to 50 feet thick (DoN 2011).

A narrow beach comprised of sand and gravelly cobble borders the southwestern perimeter of the installation. It reaches a maximum elevation of 10 to 15 feet above sea level and extends inland approximately 800 feet. It acts as a barrier to the ocean, but occasionally heavy winter storm waves can break over its top (USFWS and DoN 1990). These soils are highly erodible (USDA SCS 1978).

Moderately erodible Alo clays lie beneath the administration and residential buildings on the central western portion of the installation. Moderately erodible Myford sandy loam soils lie beneath additional buildings on the southwest corner of the installation (USDA SCS 1978).

Areas along Westminster Avenue and Bolsa Chica Avenue filled with material dredged from Anaheim Bay and the Port of Long Beach mitigation ponds comprise the remainder. The dredged materials are not mapped in the soil survey, nor rated with an erosion hazard.

3.4.1.1 Oil Production

In Los Angeles and Orange counties, many oil extraction facilities have been constructed in the coastal wetlands, causing impacts ranging from disturbance to habitat destruction (SCWRP 2001). In Seal Beach, the oil field is situated under NAVWPNSTA Seal Beach about one-half mile inland from the coast. A portion of the field was discovered in 1927 and a portion in 1979 (Hesson and Olilang 1990). Both oil and natural gas are extracted with the ratio managed to avoid depletion of the resource. The oil wells on Oil Island have been in operation since 1954 and have exceeded their original life expectancy of 15 years.

3.4.1.2 Subsidence

Both subsidence and rebound of NAVWPNSTA Seal Beach lands have been documented in monitoring studies between 1968 and 1994 (RBF/Sholders & Sanford 1994). These studies were conducted due to concern over saltwater intrusion into the SBNWR, as well as other possible damage to habitat. On all monitoring plots, general subsidence trends were similar. The most dramatic change occurred between 1968 and 1985 with subsidence of 0.2 ft to 0.5 ft The period

from 1985 to 1994 showed fluctuations of less than 0.1 ft, and rebound of approximately 0.02 ft to 0.08 ft was indicated for all areas.

Subsidence of shallow marine sediments can be due to groundwater extraction, oil extraction, or tectonic activity. Oil extraction appears to be the cause of subsidence in the Long Beach area between 1937 and 1958 (U.S. Navy 1988 [cited in USFWS and U.S. Navy 1990]). Groundwater extraction could easily be the cause of local subsidence. It is not known what combination of or the relative importance of these three factors contribute to subsidence trends at Seal Beach.

3.4.1.3 Coastal Processes and Shoreline Erosion

Reardon (1981) concluded that erosion processes have predominated over depositional processes over the last 100 years within Anaheim Bay, although signs of both processes are evident. Biota, hydrology, tidal channel geometry, and geologic structure all contribute to sediment type and distribution within Anaheim Bay. Two major seed plants found within the marsh, *Salicornia* and *Spartina* affect drainage patterns in the Bay. *Salicornia* has extensive root systems that create soil resistance beneath the plant, but also contribute to channel migration through undercutting, which adds sediments to the channel for redistribution. *Spartina* plants, which develop at lower elevations, trap sediments, helping to develop tidal flats. Hydrologic data indicates that quantities of suspended sediments in peak ebb flows is greater than in peak flood flows, indicating an overall movement of sediment out of the marsh. These findings are supported by aerial photo analysis as well as indicating that the modifications made to the drainage systems by humans have significantly altered the internal geometry of the salt marsh by blocking the western tributary outlet to the ocean and destroying the eastern section during construction of the Huntington Harbour marina and residential complex. Reardon's investigation also points to geologic uplift as a possible contributor to erosion.

3.4.1.4 Effects on Geologic and Soil Resources

A. Alternative 1—Proposed Action/Preferred Alternative. The SAIA, the Soil and Water Conservation Act, OPNAVINST 5090.1C CH-1, and DoDINST 4715.03 require BMPs for soil and water resources on federal lands. Implementation of programs and projects called for within INRMPs is a means of fulfilling this requirement, including studies or projects for erosion control. Considering soil conservation is a requirement in all site feasibility studies and project planning, design and construction. Federal agencies must conduct surveys and implement soil conservation measures (OPNAVINST 5090.1C CH-1). Major Claimants and intermediate commands must ensure that state BMPs for nonpoint source pollution are incorporated into all proposals that may affect natural resources (OPNAVINST 5090.1C CH-1).

The 2011 Revised INRMP adds more specific BMPs for erosion prevention and control during all activities and broadens responsibility for these to real estate tenants, such as agricultural producers under lease. It improves integration with operations and other departments. It identifies standards for the use of proven best practices for controlling soil erosion from construction and landscaping sites, based on the California Stormwater Best Management Practices Handbook (State of California Department of Transportation 2002).

The 2011 Revised INRMP establishes protocols for emergency repair of infrastructure so that human life, health and safety are given precedence, but sensitive resources are also protected.

Emergency repairs need to be anticipated so environmental damage, which is typically worse in an emergency than during a planned repair, can be reduced.

Other recommendations include:

- Develop a 5–10 year long-term maintenance plan that improves the way road shoulders are managed, such as managing the timing of mowing with respect to migratory birds and ensuring storm water is managed to protect wetlands. This should result in obtaining a five-year regional permit for all routine maintenance practices;
- Improve the ecological condition of roadsides to enhance biodiversity, reduce non-natives, control stormwater pollutants, and provide cultural and natural resource education. Conduct an experimental roadside planting that includes an array of natives, such as perennial bunchgrasses, to see if mowing requirements can remain the same or be reduced with a higher percentage of native species. Experiment with timing of mowing to favor natives over exotics;
- Improve record keeping on infrastructure to facilitate environmental documentation, permitting and mitigation planning;
- Control erosion and weeds on magazines in compliance with all safety and maintenance regulations. The Revised INRMP supplies an approach to revegetating magazines so that they contribute to habitat value and do not degrade with weeds and sedimentation. Conduct an experimental study to determine best management practices, using an integrated bioengineering approach, to improve management of vegetation on the magazines without additional long-term cost. Incorporate a range of magazine types into the stratified-random block design. Identify a target plant palette for the magazines, and test it for mowing requirements and erosion control;
- Adopt a mowing instruction for both magazines and roadsides. Mowing should not occur within 500 ft of burrowing owls during nesting season;
- Experiment with improved ground squirrel control adjacent to the blast wall on the magazines, for example by armoring this area with rolled erosion control fabric such as that used in stream bank erosion control;
- Compare soil stabilization cost-effectiveness with the use of Mountain Grout® soil stabilizer, a soil binder (hydrophobic polyurethane liquid) currently used by Public Works for this purpose. Because it is not visible after application, national parks use it on walkways and in the desert on road crossings where flash flooding is expected;
- Establish seed mixtures of native species collected from NAVWPNSTA Seal Beach; if native seeds are not available on the installation, seeds should be collected locally;
- Continue to practice soil and natural resource conservation measures through the agricultural leases. Dust created by agricultural operations must stay on installation lands;
- Pre-identify local, beneficial uses for dredge material with as much specificity about what is needed. This could include for endangered species nesting site enhancement, western snowy plover site enhancement, levees, beach nourishment, intertidal shelf for cordgrass, and opportunities for hauling off site or for local community need immediately adjacent to the installation. Where possible, wetland soils should be salvaged and stockpiled for use in restored wetlands; and,

- Soil (sediment) samples should be taken along a vegetation transect covering an elevation range where vegetation is expected to change. These are routine sampling procedures used in contemporary studies of west coast wetlands.

Overall, the Proposed Action would benefit soil and geologic resources through additional erosion control measures and soil protection practices. There would be no significant impacts to soil and geologic resources under the Proposed Action.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. The effect of this alternative on geology and soils would be the same as the Proposed Action.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. The effect of this alternative on geology and soils would be the same as the Proposed Action.

D. Alternative 4—No Action to Include Continuing Current Management Levels. The 1997 INRMP contains best practices, although some are outdated. It would enforce a maximum mowing height of three inches, as stated in the grounds maintenance contract. Alternative 4 provides little guidance on the standards or location details outside of proposed restoration projects.

This alternative would result in beneficial effects to geology and soils. There would be no significant impact from this alternative.

3.4.2 Water and Hydrologic Resources

The rivers that used to wander across the coastal plain are now confined by detention dams and concrete-lined channels. Channelizing of the Santa Ana River (construction of levees in place of riverbanks, Prado Dam, and other flood control structures) has reduced, and in many cases eliminated, the floodplain leading to the loss of hundreds of acres of wetland and riparian habitat. Sediment flows have been blocked by dams and grade control structures, exacerbating channel erosion that has led in turn to increased armoring of the river channel. This prevents the river from filling its natural role of seasonal flooding to the marshes, or any other beneficial use derived from wetland and riparian habitat.

In addition to removing valuable riparian habitat along the Santa Ana River, these channel modifications and dam constructions have had a negative effect on water quality and aquifer recharge by removing this natural filtering system (Santa Ana River Watershed Profile 2002). Surface flows from the Santa Ana River end at approximately 17th Street in Santa Ana, the end of the forebay/recharge area, at which point the Orange County Water District essentially diverts all dry-weather flows for groundwater recharge. The area between this location and the Pacific Ocean and entry into Anaheim Bay-Huntington Harbour is a normally dry, flood control facility, presently being expanded. Santa Ana River flows are now effluent-dominated, a rare circumstance outside the southwest. Nitrate concentrations approach the drinking water standard limit established by the State Water Resources Control Board (SWRCB). However, water quality has improved steadily, due largely to the efforts of wastewater dischargers within the watershed acting in response to the requirements of the Santa Ana RWQCB. Total hardness is an additional problem in the Santa Ana River, especially in the lower portions. Many pollutants can alter the hardness, raising or lowering it excessively. These extremes in pH have an adverse impact on aquatic biota and corrode pipes and concrete (Santa Ana River Watershed Profile 2002).

The current watershed area for Anaheim Bay is between 48,000 and 50,000 acres (U.S. Navy 1995) (see Figure 3-3 and Map 3-1). Drainage from the Bolsa Chica and Wintersburg basins enters the Anaheim-Huntington Harbour complex through two flood control channels, with the main storm drain being the Bolsa Chica Channel, which enters in the areas between Sunset Aquatic Park and Huntington Harbour. Its flow is mainly storm runoff, amounting to less than 100 acre-feet per month. A severe storm in December 1974 caused the Wintersburg Channel to overflow in several locations. A catastrophic flood such as in 1938 could still occur in the region, and regional flood control planning continues.

3.4.2.1 Tidal Circulation, Temperature, Turbidity and Salinity

Tidal waters enter and exit the Anaheim wetland complex through one opening under the Pacific Coast Highway Bridge. Water from this entrance feeds three major tidal channels, the east, middle, and west arms. At high tide, the marsh is almost completely submerged with only patches of cordgrass showing above the level of the water. When the tide is extremely low, this scene is replaced by mudflats with only a small trickle of water in the upper arms in the tidal slough. The volume of water in the main channel is reduced by 40 to 50 percent during low tides (Chan and Lane 1975).

The marked reduction in area of the Bay from its historical dimensions has reduced the volume of the tidal prism. It is probably this reduction combined with increased depth that has reduced the flushing rate. Besides the reduction in the Bay's size, tidewaters are also restricted between the Outer and Inner Anaheim Bay by the 600-ft shipping channel that connects them, as well as construction at the Pacific Coast Highway Bridge. Tidal flow is further restricted in the Refuge by roads, culverts, and tidal gates, with the overall effect of dampening the tidal regime especially in the upper reaches of the marsh.

The negative influence of roads on tidal flows currently restricts inundation of at least 250 acres of marsh situated north of Bolsa Avenue and east of Case Road, as well as an additional 120 acres with water movement restricted by roads to Oil Island. The east arm is prevented from draining into the southeast section of the Refuge by the tide gates at Case Road. At two other locations, tidewaters flow in and out of the northern portion of Refuge through culverts under Bolsa Avenue, which have been poorly maintained. This has resulted in corrosion and sediment clogging, allowing only partial flow of water into the north side of the marsh. These waters are prevented from draining out of the marsh and at low tide form a semi-permanent 15-acre pond. With the exception of the water trapped in the northern portion of the marsh, tidal waters exchange themselves almost entirely with the turn of each tide in Anaheim Bay and the outer Bolsa Channel (USFWS and CDFG 1976). This tidal exchange exerts control over the flushing of contaminants, transport of aquatic larvae, salt and heat balance, and residence time of water.

3.4.2.2 Water Supply and Water Rights

Water is currently purchased from the city of Seal Beach, and is comprised of approximately 60 percent groundwater and 40 percent water from the Metropolitan Water District. This water is tested regularly for drinking water standards. There is a Drinking Water Plan for NAVWPNSTA Seal Beach. The Orange County Department of Health Services monitors the quality of these wells.

A water conservation program on NAVWPNSTA Seal Beach is implemented by the installation's public works department as part of its grounds maintenance program. As a region,

the area uses about twice as much water as is available from local sources (RWQCB 1995). This results in a serious water supply problem for all of the government entities in the region. The installation's neighbor to the north, the city of Long Beach, has developed a new method of desalinizing water that is 20 to 30 percent less costly than traditional methods. While the technology is still pending a patent, area residents may benefit from the reverse osmosis system. The Long Beach Water Department hopes to supply 10 percent of its total demand through the new desalinization process by 2015 (Long Beach Water Department website 2009). In a public sector partnership with the Los Angeles Department of Water & Power and the U.S. Bureau of Reclamation, Long Beach Water has constructed a 300,000 gallon-per-day prototype desalination facility, the largest seawater desalination research and development facility of its kind in the United States. It includes a seawater intake system below the ocean floor to prevent environmental impacts.

3.4.2.3 Groundwater

About 60 percent of the water consumed on NAVWPNSTA Seal Beach is provided by groundwater in the Santa Ana River watershed (Santa Ana River Watershed Profile 2002). The Newport-Inglewood Fault zone helped create the groundwater conditions that allow this extraction. Ground surface uplift along the Newport-Inglewood Fault created four mesas along the southwestern boundary of the Orange County groundwater basin. Historic meandering of the Santa Ana River carved notches throughout the uplifted area and left behind sand and gravel-filled deposits beneath the lowland areas between the mesas, known as gaps. Groundwater in the shallow aquifers within the gaps is susceptible to seawater intrusion, which resulted in the construction of two seawater intrusion barriers in the Talbert and Alamitos gaps. Except for areas seaward of the main branches of the Newport Inglewood Fault, the mesas are also underlain by aquifers that are part of the Orange County groundwater basin (Santa Ana River Watershed Profile 2002).

Over the past 50 years, groundwater levels have changed considerably. In 1950, the upper basin in the watershed was relatively full, with groundwater levels near the surface in several areas. At the same time, the water level in the lower portions of the Santa Ana River watershed was very low. Near the coast, the groundwater level was below sea level, which caused some seawater intrusion. Continued overdrafting has historically occurred in both basins causing a significant drop in the groundwater level. However, because of an extensive water replenishment program in the lower basin, the groundwater level is now rising. The Orange County Water District (OCWD) imports water from the California Water Project and discharges this water just above Prado Reservoir for downstream water replenishment (Santa Ana River Watershed Profile 2002).

The RWQCB designates the groundwater subbasin under NAVWPNSTA Seal Beach and the Los Alamitos JTFB (location of the golf course) as the Santa Ana Pressure Subbasin. Its identified water quality issues are related to a fuel plume and landfills (RWQCB 1995). Groundwater underlies NAVWPNSTA Seal Beach at levels from five to fifteen feet below the surface, rising to even shallower depths during heavy rain years.

The OCWD monitors the intrusion of salt water into groundwater. There is a line of injection wells maintained along the coast to prevent intrusion of salt water through use of treated water to get the water to standard. They also monitor aquifer levels approximately quarterly in test wells, including one of the Navy wells and one at the corner of Bolsa and Westminster Avenues.

Agricultural water is supplied by separate wells.

3.4.2.4 Stormwater

Stormwater runoff from industrial facilities discharging off NAVWPNSTA Seal Beach flows through the stormwater conveyance system, which includes overland flow and man-made drainage ditches. Impervious areas consist mainly of buildings and paved areas, consisting of about 340 acres or six percent of the total area (Naval Weapons Station Seal Beach 2001).

The U.S. Navy's stormwater pollution protection program is outlined in OPNAVINST 5090.1C CH-1, which directs all commands and activities to comply with all requirements as stipulated in permits under which the activities are covered. To comply with this policy and federal and state regulations, Naval Engineering Facilities Command Southwest (NAVFAC SW) developed a program for naval activities in their purview, including southern California. The program began in 1992 when the Navy filed Notices of Intent with the SWRCB to gain coverage for specific naval activities under California's National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000001 for Discharges of Storm Water Associated With Industrial Activities.

The original Stormwater Discharge Management Plan (SWDMP) for many of the installations and activities under U.S. Navy Southwest Division's area of influence was completed in 1993. The NAVFAC SW SWDMP is a complete and comprehensive compliance document, developed to meet California requirements. It established policy, responsibilities, procedures, and technical guidance on the prevention and reduction of pollution of stormwater runoff from industrial areas. NAVWPNSTA Seal Beach demonstrated its intent to comply with the NPDES General Permit by submitting a Notice of Intent (NOI) to the SWRCB in May 1992 and an abbreviated NOI in July 1997. Since then, NAVWPNSTA Seal Beach has complied with the requirements of the NPDES General Permit, as reported in each Annual Report submitted to the RWQCB by July 1 of each year. The original SWDMP for NAVWPNSTA Seal Beach was completed in 1993, and has been revised to reflect changes in both operations and changes to the NPDES General Permit. The SWDMP contains a Non-storm Water Discharge Elimination and Prevention Program, a Storm Water Pollution Prevention Plan (SWPPP), and a Monitoring and Reporting Program Plan.

3.4.2.5 Anaheim Bay

Anaheim Bay is linked by waterway to the 63 acres comprising Sunset Aquatic Regional Park owned by Orange County and 900 acres that comprise the privately owned Huntington Harbour, a marine-oriented residential community. In January of 2000, the controlling depths in Anaheim Bay were 35 ft in the entrance channel to the turning basin, thence 33 ft to the basin (NOAA National Ocean Service U.S. Coast Pilot 7, 2000).

There has been an ongoing problem of floating trash entering the Anaheim Bay marsh. Much of the floating trash originates in Huntington Harbour, entering the system from boats or adjacent areas. A more rigid enforcement of laws prohibiting deposition of refuse in state waters as well as a program of collecting refuse is one possible solution to this problem. Installation of a trash boom to keep trash out of the marsh was proposed, however this proposal was rejected.

3.4.2.6 Wetlands

All INRMPs must address the protection, enhancement, and restoration of wetlands (OPNAVINST 5090.1C CH-1 18 July 2011). The protection of wetlands is facilitated through EO 11990, Protection of Wetlands; CWA, Section 404; and the "no net loss" goal outlined by the White House Office on Environmental Policy in 1993. EO 11990 requires that leadership is

provided by involved agencies' methods to enhance wetlands and minimize their destruction, loss, or degradation. Directors Order 77-1 and Procedural Manual 77-1 provide the procedural structure in which EO 11990 may be implemented. Section 10 of the Rivers and Harbors Act and Section 404 of the CWA authorize the USACE to grant permits for construction and disposal of dredged material in Waters of the United States.

The greater the size of a biotic community and the stronger its links to neighboring communities, the more valuable it is to the integrity and maintenance of essential biotic processes. Although specific natural resource or restoration activities may result in short-term fragmentation and the disassociation of communities from each other, these same actions may result in long-term ecological benefits. An adverse impact to wetlands occurs when it degrades the size, integrity, or connectivity of wetlands. A beneficial effect occurs when a wetland is enhanced hydrologically for its biological functions, native species richness or diversity, or native habitat quantity and quality. A short-term effect lasts less than 10 years, whereas a long-term effect lasts longer than or appears after 10 years.

3.4.2.7 Jurisdictional Wetlands

A regulatory jurisdictional determination (Merkel & Associates 2006) was conducted on NAVWPNSTA Seal Beach in 2005 to identify regions on which expulsions of dredged and fill materials could be subjected to regulation under section 404 of the CWA (Federal Water Pollution Control Act Public Law 92-500, as amended. 33 U.S.C. 1344). Merkel & Associates (2006) identified nine types of wetland and non-wetland water environments. A total of 1,373 acres of Jurisdictional Wetlands were delineated, comprised of the six distinct wetland types. An additional 11 acres were mapped as Non-Jurisdictional Wetlands.

3.4.2.8 Effects on Water and Hydrologic Resources

Water resources, watershed, and soils are interrelated in their reactions to the treatments proposed by the alternatives. Due to these relationships, the analysis was done on them as a group. Effects upon soils and watersheds are assessed by considering the likely footprint of the effect—whether all or part of the watershed slope (ridge, mid-slope, bottom)—and as a result, the likely effect upon water yield, peak flows, sediment yield, nutrient yield, filtering and cleaning of sediment and pollutants, and/or drainage system response.

Being at the downslope end of the watershed, NAVWPNSTA Seal Beach is impacted by some of the water quality problems that are generated upstream in this intensely urbanized region.

Soil impacts can manifest themselves in changes of soil physical, chemical, and biological properties. These include breakdown in soil structure, reduced moisture retention and holding capacity, development of water repellency, changes in nutrient pools and cycling rates, atmospheric losses of elements, offsite sedimentation losses, and reduction or loss of soil organic matter.

For water quality, an effect is considered beneficial if trends in watershed function, such as water storage and ecological habitat support, are up, or if the quality of water leaving NAVWPNSTA Seal Beach is better than that entering the property.

Integrated Natural Resources Management Plans are to be used as a primary tool for identifying nonpoint source pollution problem areas, specifying corrective measures, and coordinating

nonpoint source compliance planning with state coastal and nonpoint source programs when addressing land management issues. Therefore, it is expected that all alternatives would provide a net benefit for this topic. Since a restored marsh will have better pollutant functions than unrestored due to tidal flushing, improved circulation within the marsh, and denser vegetation increases contact with pollutants, all alternatives provide some benefit. Improved salt marsh performance will likely reduce total suspended solids, total phosphorus, soluble phosphorus, total nitrogen, nitrate, lead, copper, and zinc.

With respect to any projects or other actions under each Alternative discussed herein, the Navy would consult with USACE and obtain any required permits from USACE to the extent required by applicable legal requirements.

A. Alternative 1—Proposed Action/Preferred Alternative. Concepts introduced in the 1997 INRMP (see No Action Alternative below) were carried over into the 2011 Revised INRMP. The Proposed Action builds on these past recommendations and has the potential for the most benefit. Other elements of the Proposed Action that would be considered benefits to water resources include:

- Participates in watershed coordination partnerships. The Conservation Program Manager will be situated to make better or more cost-effective natural resource choices by participating in inter-agency regional planning processes for which the installation is a stakeholder. NAVWPNSTA Seal Beach will support RWQCB priority projects for Anaheim Bay/Huntington Harbour/Bolsa Chica, which are designed to integrate various surface and ground water regulatory programs while promoting cooperative and collaborative efforts. These priorities are also designed to focus limited resources on key issues;
- Implements irrigation best practices for water use in landscaping and for tenants and leaseholders;
- Establishes a qualitative standard for water quality functions of the marsh; sediments will settle in quiescent areas, any new contaminants such as oil and grease will adsorb to these sediments and vegetation and will undergo biodegradation under mostly aerobic conditions;
- Adds tracking of bacteria levels to relate to 303(d) impairment to help ensure accountability for pollutants from off-site sources. Collects quarterly water quality data at two locations that are also sampled for benthos and fishes at the same time. If poor water quality conditions are noted, especially in comparison to neighbors or the region, more intensive sampling may be employed to determine the extent and duration of poor conditions;
- Initiates best practices to prevent or treat non-point source pollution, initially focusing on shoreline/streamside areas, and maintenance operations, roads, construction, and farming activities;
- Monitors water quality using regionally consistent methods at the bay and inlet for biota (macroinvertebrate) and sediment. Includes tides and tidal inlet maintenance and monitoring to ensure that the habitat distribution of the wetlands is maintained and marsh organisms do not suffer from flooding or anoxic conditions. Models nearshore/tidal currents at marsh and estuary inlets to understand pollutant transport patterns;
- Sets up an objective to maintain or improve access for tidewaters and marine organisms to and from the marsh. Information on water levels in the inlet should be used in

conjunction with bathymetric data to evaluate and to make management decisions such as the need for maintenance dredging. Tidal curves would be generated from tide gauge data to be correlated with bathymetric data to correlate with desired elevation and acreage for the saltwater wetlands and to determine if the tidal ebb and flow is impeded or inlet blockage is indicated; and,

- Includes reporting on an improved strategy for oil spill response and Natural Resources Damage Assessment data collection after an oil spill. The 2011 Revised INRMP provides protection priorities in the case of an oil spill, and makes other recommendations for enhanced preparedness to protect natural resources.

The 2011 Revised INRMP provides a more implementable framework for protecting, restoring, and enhancing wetlands at NAVWPNSTA Seal Beach than has been proposed in the past. It also provides specific objectives for a more diverse marsh, the full gradient of elevations and habitat subtypes that were present historically, and improved connection to coastal grassland uplands.

In addition, the 2011 Revised INRMP facilitates improved wetland conditions through water quality improvement. It seeks to attain or maintain the appropriate water quality standards for the "Beneficial Use" standards under the Santa Ana Basin Plan. In the wetlands, this means maintaining the dissolved oxygen levels above five parts per million (ppm) in all water areas; assuring seasonal fluctuations in salinities to promote salt marsh plant diversity; minimizing pollutant input from urban runoff into the salt marsh and Anaheim Bay; and protecting the wetland system from accidental spills in the Refuge, Anaheim Bay, or the adjacent ocean. Therefore, this alternative is the most beneficial for wetlands.

Programs to protect and enhance water quality throughout the installation, especially targeting the wetlands, under the Proposed Action would create beneficial effects to water and hydrologic resources. There would no significant impacts on water or hydrologic resources with the implementation of the Proposed Action.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. The watershed, soil erosion, water quality, and wetland benefits that would result from this alternative are the same as those from the Proposed Action except that there would be fewer opportunities in this alternative for using restoration work, particularly of freshwater and brackish wetlands, to enhance watershed and water quality conditions. This alternative would implement BMPs for landscaping and water efficiency, enhance saline wetland function, and emphasize increasing wetlands to their historic footprint.

Overall, there would be beneficial impacts on water and hydrologic resources. There would be no significant impacts from implementation of Alternative 2.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. The watershed, soil erosion, water quality, and wetland potential benefits of this alternative would be the same as those in Alternative 2.

Overall, there would be beneficial impacts on water and hydrologic resources. There would be no significant impacts from implementation of Alternative 3.

D. Alternative 4—No Action to Include Continuing Current Management Levels. The following concepts were initially developed in the 1997 INRMP and would be considered benefits to water resources:

- *Runoff Enhancement and Control.* Plan and implement a strategy to utilize riparian and freshwater wetlands to accept and retain agricultural tailwater and local storm water runoff prior to entering the estuary habitats. Review existing storm drains and field drainage facilities to determine whether runoff currently diverted directly into the bay can be redirected into freshwater wetland systems that either discharge into the inner estuary or percolate and recharge groundwater. Specific proposals were to excavate shallow runoff catchment swales on either side of Westminster Street just east of Eighth Street, and plant with native riparian tree and shrub species to provide habitat continuity with wetland areas to the north across Westminster Avenue. An additional runoff catchment swale was proposed south of the southern terminus of Alpha Road, and be planted with native riparian tree and shrub species to provide habitat continuity with restored and existing riparian habitat areas to the south across Westminster Avenue;
- *Develop a groundwater management plan.* Review existing storm drains and field drainage facilities to determine whether local storm runoff currently diverted directly into the bay can be redirected into restored freshwater wetland systems that either discharge into the inner estuary or percolate and recharge groundwater. Consistent with the RWQCB Watershed Management Initiative, develop a groundwater management plan. Plan effective uses of brown fields that protect groundwater quality, if appropriate. Support protection of groundwater sources including ephemeral streams, meadows, and vernal pools;
- *Implement riparian runoff buffers.* Restore local runoff swales, drainage courses, and ponded areas on the installation wherever feasible to support native wetland and riparian vegetation, in order to buffer nutrient and sediment transport into the estuary and provide filtration of agricultural and urban pollutants; and,
- *The Navy shall encourage research and development efforts to address nonpoint sources of pollution to identify and understand Navy impacts on the coastal and marine environment (OPNAVINST 5090.1C CH-1).*

The 1997 INRMP also contains an element to conduct a general wetland delineation outside the marsh, excluding the marsh itself. No proposals were made to address threats to wetlands under this alternative; however, many restoration proposals were put forward that would expand and enhance marsh conditions and indirectly address some of these threats. None of these elements in the 1997 INRMP has been implemented to date.

Implementation of the 1997 INRMP would have a beneficial effect on water and hydrologic resources. There would be no significant impact from implementation of this alternative.

3.4.3 Plant Communities

The vegetation communities described here were mapped for the INRMP developed for the installation in 1997, with some adjustments. Vegetation community descriptions are based on Holland (1986) with supplemental information from Sawyer and Keeler-Wolf (1995). The salt marsh descriptions parallel those described in Zedler, Norby and Kus (1992). Plant nomenclature is from The Jepson Manual (Hickman 1993).

Upland Communities

Uplands consist of native and non-native grasslands, agricultural areas, ruderal fields, dredge spoil, natural and man-made islands, several inactive landfills, and maintained landscape and structures. Some riparian pockets of willows and sycamores are scattered sparsely within the uplands. Some overlap of vegetation types occurs as salt marsh/upland mix in a transition zone in several areas along the salt marsh fringe.

Grasslands

Non-native grasslands are dominated by several species of the genus *Bromus*, along with *Avena* spp., rattail fescue (*Vulpia myuros)*, and several other non-native annual grasses and annual forbs. Native grasses such as needlegrass (*Nassella* sp.) can also be found in varying densities within predominantly non-native grasslands. Mature native grasslands dominated by *Nassella* sp. and with relatively few non-natives occur in patches. Grasslands may contain some woody vegetation, but cover is predominantly herbaceous. Close to 580 acres on NAVWPNSTA Seal Beach may be mapped as annual grassland.

A mesic phase of grassland occurs near wetland edges, and is dominated by native salt grass (*Distichlis spicata*).

Ruderal

Further from the marsh edge, past and current disturbance of the land has led to the proliferation of weedy introduced plants in the fields, in dredge spoil deposits, and along levees and road edges. Common and locally dominant species include tumbleweed (*Salsola iberica*), mustards (*Brassica* ssp.), and, most abundant in terms of total cover and distribution, exotic annual grasses. The grasses include ripgut grass (*Bromus diandrus*), foxtail chess (*Bromus rubens*), soft chess (*Bromus hordeaceus*), barleys (*Hordeum* ssp.), fescues (*Festuca* spp.), and wild oats (*Avena* spp.). Additional species of regular occurrence include telegraph weed (*Heterotheca grandiflora*), sow thistle (*Sonchus oleraceous*), sweet clovers (*Melilotus indicus* and *Melilotus albus*), filaree (*Erodium cicutarium*), wild radish (*Raphanus sativus*), milk thistle (*Silybum marianum*), pigweed (*Chenopodium album*), curly dock (*Rumex crispus*), and London-rocket (*Sisymbrium irio*). A small number of native species, other than the salt marsh elements, are conspicuous for their local abundance, stature, or color. These natives include Emory's mulefat (*Baccharis emoryi*), lupine (*Lupinus* spp.), and fiddleneck (*Amsinckia intermedia*) (DoN NAVFAC SW 1997).

Eucalyptus Grove

Eucalyptus woodland is a tree community composed of >50 percent *Eucalyptus* spp., ranging from single species thickets, with little or no understory, to scattered trees with a well-developed understory of herbaceous perennials and annual grasses. Often planted by early settlers for windbreaks or hardwood production, eucalyptus grow quickly and prohibit understory growth through allelopathic chemicals in the leaf litter. The genus *Eucalyptus* is adapted to an environment of frequent fires and recovers quickly from disturbance (McArthur 1962). *Eucalyptus*, once established, will exclude most other plant species and tends to be a relatively "sterile" environment where even common rodents are scarce (McArthur 1962; Smith 1976).

Eucalyptus groves are used by raptors for roosting, nesting and perching. Many raptors such as red-shouldered hawks (*Buteo lineatus*) and red-tailed hawks (*Buteo jamaicensis*) perch in the tops of

these trees and search for prey in the surrounding marsh and grasslands. Pellets from barn owls (*Tyto alba*) are often found below roosting locations in eucalyptus trees, and often these trees are the only ones large enough to support the nests of large raptors such as golden eagles (*Aquila chrysaetos*).

Four acres of eucalyptus grove are found in the developed western portion of the installation near the administrative center.

Riparian Woodland

There are six small pockets of riparian habitat on the installation, which consist of willows or willows and sycamores in combination. The most extensive of these is located just to the north of the northern most boundary of the SBNWR. The entire stand covers less than an acre and is most conspicuous with approximately 24 arroyo willows. About half of the trees attain heights approaching 25 feet. A few small stands of mulefat (*Baccharis glutinosa*) occur on one edge among scattered trees. Arroyo willow and mulefat are the dominant components of the other stands as well. The understory and edges of these stands consist mostly of ruderal field elements.

The riparian patches at NAVWPNSTA Seal Beach most closely resemble two communities as defined by Sawyer and Keeler-Wolf (1995). The Southern Willow Scrub community is defined by the presence of three willow species: Goodding's willow *(Salix gooddingii),* red willow *(Salix laevigata),* and arroyo willow *(Salix lasiolepis),* as well as mulefat *(Baccharis salicifolia).* It occurs in areas with seasonal fresh water flooding or saturation along low-gradient depositions along rivers and streams (Sawyer and Keeler-Wolf 1995). This community is represented on NAVWPNSTA Seal Beach by small, deteriorated remnant patches (DoN NAVFAC SW 1997) with a high percentage of exotic species.

Two acres of sycamore trees *(Platanus racemosa)* planted in a row on the northeastern edge of the installation are not considered a sycamore riparian community (Sawyer and Keeler-Wolf 1995) because they lack other riparian elements that make up this community, including riparian geomorphology. Typically, such a community would be composed of widely spaced California sycamore trees sometimes interspersed with willows, oaks and cottonwoods in corridors where the alluvial, cobbly, or rocky soils are permanently saturated at depth with fresh water.

Southern Foredune and Sandy Beaches

Seaward from coastal strand habitats, foredunes are situated closest to the seashore and are subject to the greater degrees of salt stress, wind, and wave action. Primary foredune species are sand verbena *(Abronia maritima* and *A. umbellata),* Watson saltbush *(Atriplex watsonii),* and sea rocket (*Cakile maritima*). Within the foredune, plant diversity tends to increase with distance from the beach, with less salt tolerant species becoming more abundant, particularly species of *Artemisia, Baccharis, Ericameria, Eriogonum, Lotus, Lupinus,* and *Salvia* (Holland and Keil 1995). The NAVWPNSTA Seal Beach has 21 acres of foredunes.

Human disturbance of coastal strand and foredune habitat has resulted in the decline of some native species, such as lemonade berry shrub *(Rhus integrifolia),* while several exotics, such as hottentot fig *(Carpobrotus edulis),* sea rocket, Australian saltbush *(Atriplex semibaccata),* and ice plant (*Mesembryanthemum* spp.) have become more common.

The 21 acres of southern foredunes on NAVWPNSTA Seal Beach and their adjacent beaches have the potential to support specialized invertebrate fauna, such as the wandering skipper (*Panoquina errans*), tiger beetles (*Cincedela* spp.), globose dune beetle (*Coelus globusus*), sand spiders, robber flies, kelp flies, and ants. In addition, beaches serve as important habitat for nesting, roosting, and foraging birds, including the federally endangered California least tern and federally threatened western snowy plover. The plover also uses coastal dunes for roosting outside of nesting season. Belding's savannah sparrow (*Passerculus sandwichensis beldingii*) feeds on dune and beach insects. Other sensitive plant and animal species that have the potential to inhabit dune and beach areas of NAVWPNSTA Seal Beach include coast woolly-heads (*Nemacaulis denudata* var. *denudata*), coast horned lizard (*Phrynosoma coronatum blainvillei*), San Diego black-tailed jackrabbit, and coast horned lark (*Eremophila alpestris*). Dunes also provide habitat for the silvery legless lizard (*Anniella nigra argentea =Anniella pulchra pulchra*) (DoN NAVFAC SW 1997).

Coastal Freshwater/Brackish Marsh

The NAVWPNSTA Seal Beach contains about ten acres of non-tidal freshwater marsh. They are generally contiguous with the upland side of the salt marshes and are occupied by southern cattail *(Typha domingensis),* mulefat, and prairie bulrush *(Scirpus robustus).* Freshwater marshes and their associated upstream riparian have been severely impacted both by development and from reduced fresh water input from rivers and creeks.

Upland Transition Marsh

Near the edge of the marsh, salt-laden fields contain vegetation typical of a salt flat or lower transition zone with an additional ruderal weed component. Common plants found in these areas include pickleweed (*Salicornia virginica* and *Salicornia subterminalis*) and the higher marsh grasses, along with *Bassia hyssopifolia, Gasoul nodiflorum, Gasoul crystallinum,* and Australian saltbush.

In other areas, the upland transition represents a gradient between the upper marsh and coastal scrub community (Zedler *et al.* 1992). The lower end of the transitional zone is characterized by glasswort, salt grass, shore grass, alkali heath (*Frankenia grandifolia*), and alkali weed (*Cressa truxillensis*), while the upper transition zone is characterized by Australian saltbush, California buckwheat *(Eriogonum fasciculatum),* laurel sumac (*Rhus laurina*), lemonadeberry and sage (*Salvia* and *Artemisia* species) (Zedler *et al.*1992; Holland and Keil 1995).

Coastal Salt Marsh

The distribution of different vegetation and habitat types within the estuary is a result of balance of geomorphic processes such as sea level rise, sediment inputs, protection from wave energy, scour of tidal flow, etc. (Callaway *et al.* 2001, in Zedler 2001). In order for marshes to develop, there must be a relative balance between sediment accretion and relative sea level rise, which is equal to sea level rise plus local changes due to subsidence or tectonic processes. Under conditions of relative balance of these factors, intertidal salt marshes tend to develop a flat marsh plain near the Mean High Water (Myrick and Leopold 1963; Pestrong 1965; Redfield 1972; Zedler *et al.* 1999).

Coastal salt marsh assemblages comprise the majority of habitat found within the SBNWR. About 739 acres of the Refuge's 911 acres are subject to regular tidal influence, creating a salt marsh environs that includes about 565 acres of salt marsh vegetation (USFWS and U.S. Navy 1990).

Nineteen species of vascular plants regularly occur in the salt marsh (Baker 1975) with 12 of these comprising the majority of the vegetation (Massey and Zembal 1980). Most of the lower marsh within the regularly inundated tidal zone is heavily dominated by cordgrass (*Spartina foliosa*) and pickleweed. Also present is saltwort (*Batis maritima*) and annual pickleweed (*Salicornia bigelovii*).

Intact salt marsh habitat provides nesting, feeding, and a high water escape area for many species of birds, as well as food and cover for fish and invertebrates. The California state endangered Belding's savannah sparrow nests in patches of pickleweed or boxthorn in some areas, and forages in salt marsh and intertidal flats. The federally endangered light-footed clapper rail depends entirely on salt marsh habitat for feeding, resting, and nesting, especially in cordgrass thickets.

Tidal Channels and Intertidal Mudflats

The intertidal habitat encompasses the area between high and low tides and is subject to varying degrees of tidal submergence. About 60 acres of mudflats are regularly exposed at lower tides, with about 114 acres of tidal channels and open water (USFWS and U.S. Navy 1990). The principal vegetation here is mat algae.

Intertidal flats occur between the highest high and lowest low tide zones, or otherwise between the lowest cordgrass (beginning of the salt marsh) and highest eelgrass, approximately 3 to 0 ft (1 to 0 meters [m]) mean lower low water mark. A well-developed mudflat is anaerobic within the sediment due to a lack of significant wave action. Sand flats remain aerobic and typically experience more turbulence from waves, preventing development of permanent burrows. Tidal channel networks play an important role in the distribution of marsh species as small differences (e.g. 10 centimeters [cm]) in elevation can greatly influence the duration of tidal inundation and potentially stress salt marsh plants.

Mudflats contain abundant organic matter and microorganisms, but typically less so than eelgrass beds or salt marsh. Normally devoid of flowering plants, these flats may be covered with algae. Toward the uppermost elevations, green algae such as *Enteromorpha* sp., *Cladophora* sp. and *Ulva* spp. may form extensive mats (Mudie 1970). Burrows and siphon-holes of benthic invertebrates, tiny invertebrates that live among the grains of substrate (meiofauna), and algae and detritus fill the sediment with hidden activity and form an important component of the marsh's food chain. Snails, crabs and polychaete worms (deposit feeders) glean the surface for detrital bits and algae. Filter feeders such as clams, mussels, and small crustacean isopods and amphipods collect plankton, algae, and detritus as tides ebb and flow.

When the tide flows, numerous fishes, sharks, and rays move in to take advantage of the productivity of the flats. While most mudflat fishes are tidal visitors, and some remain at low tide in shallow drainage channels, a short list of species are full-time residents. These commonly live in the burrows of marine invertebrates (Moyle and Cech 1982). Other fishes are seasonal visitors during juvenile life stages. Studies on tidal flats elsewhere have demonstrated that it is frequently only the juvenile decapod crustaceans such as shrimp, as well as demersal fish, which forage on tidal flats while the adults and pelagic larvae stay offshore. The tidal flats function as nurseries for the resident juveniles and the subadults, which migrate to the subtidal area to avoid low tide conditions on the flats. While relatively constant salinities and temperatures in offshore waters benefit larval development, these larvae eventually drift onto tidal flats so that the juvenile stages

of these fish may take advantage of high temperatures, abundant food, and absence of large predators (Reise 1985). The tidal channels support important nurseries for several species of sport and commercial fish like the corbina (*Menticirrhus undulatus*) and California halibut (*Paralichthys californicus*), which are important links in a much larger food chain that includes humans.

When the tide recedes, shorebirds congregate to consume invertebrate prey. Each species specializes in a certain zone, evident by the length of its bill and feeding behaviors that help access the different lifestyles and niches of mud-dwelling species. Shorebirds are the most visible species depending upon intertidal habitat for feeding, roosting, and resting. Boland (1981) consistently found the highest densities of nearly all shorebirds in intertidal flats and channels; likewise, Kus and Ashfield (1989) working in southern California observed that the majority of large and small waders seen during low-tide surveys occurred in those habitats (citations from Zedler *et al.* 1992).

Man-made Landforms within the Marsh

Oil, NASA, and Hog Islands

When the Navy acquired lands for the installation, the former owner, the Alamitos Land Company, retained the mineral rights. In 1954, Hancock Oil Company began extracting oil under the marsh from the 6.5-acre "oil island." The island is connected to both Pacific Coast Highway and Bolsa Avenue (on Navy land) by roads built atop fills through the marsh. The Island is completely developed with very little vegetation occurring only along the access levees. Nonetheless, there are plans for reclaiming the site, once operations at the facility on the island have ceased, as an additional least tern nesting site.

From 1963 through 1974, a 40-acre section of the installation was granted to the National Aeronautics and Space Administration (NASA) for design and manufacture of the second stage of the Saturn V rocket as part of the Apollo program. The massive rocket stages were assembled in special extant multi-story structures currently utilized by the installation.

As part of the NASA program, the 2.9 acre NASA Island was built in the marsh for rocket testing and remained until 1977, when it was turned over to the USFWS for conversion to a nesting site for California least terns. Leveling and sand capping of NASA Island resulted in a nesting site safe from development, consistent with the California Least Tern Recovery Plan (USFWS 1985). A mix of sand and shells, similar to that found on southern California beaches, was used to cover the site. California least terns first nested on NASA Island in 1979 after about five percent of the island was capped with sand. Full capping was eventually completed, and in 1996 an additional 3,000 cubic yards of sand from Shellmaker Island in Newport Beach, California, was used to enhance 2.6 acres of the island. Nesting has occurred annually since 1979.

Hog Island is the only natural island in the marsh. It contains a plant community reminiscent of upland transition marsh with elements of coastal sage scrub. There have been efforts to control exotics on Hog Island, which is an archeological site.

Port of Long Beach Mitigation Ponds

In the early 1990s, the Port of Long Beach (POLB) restored 116 acres of wetland habitat within the SBNWR as mitigation for the construction of the 147-acre Pier J Landfill in a protected, deep-water area of Long Beach Harbor. The new wetland habitat consisted of four tidal basins,

with tidal channel connections to Anaheim Bay, constructed from upland and former wetland areas with little to no marine influence. A small salt marsh area present before development was retained in one of the ponds. The ponds were completed in March–April 1990. For three of the sites, culverts were constructed through existing roadbeds to provide tidal flushing. Their design was documented in an MOU between the Board of Commissioners of the city of Long Beach, CDFG, NMFS, and USFWS (MEC Analytical Systems 1995).

The four ponds placed around the marsh perimeter are described as follows (MEC Analytical Systems 1995):

- Forrestal (14.4 acres) - Surrounded on three sides by roads, has a flat upland field on the northern boundary, no islands;
- Case Road (52.4 acres) - Three artificial islands, each with several higher mound areas. Pre-development pickleweed marsh retained on west side. Upland on northeast side. Construction involved excavating a channel to provide tidal flow to both this site and Forrestal;
- Seventh Street (41.3 acres) - Three artificial islands with several mounds on each; and,
- Perimeter Road (7.5 acres) - Surrounded on all sides natural, pickleweed salt marsh. Perimeter and Seventh Street ponds are connected to tidal flow by a common, man-made channel that joins a natural channel.

Eelgrass Beds

Eelgrass beds share many species with higher-elevation marsh habitats and are recognized as key areas that provide subtidal refugia and foraging. Eelgrass is present subtidally in channels and in all the POLB mitigation ponds. The modern eelgrass beds associated with Anaheim Bay are programmed for survey and mapping.

Artificial Hard Substrate (Shoreline Structures)

The waterways of inner and outer Anaheim Bay, as well as Huntington Harbour, are fully bulkheaded or riprapped. The Inner Bay contains a 1,000-foot wharf and its maintenance buildings are situated on the northeast embankment. The Outer Bay is created and protected from wave action by two rock jetties that extend 2,800 feet out into the ocean and angle toward each other, leaving a 600 feet wide opening for boat passage. The rock is granite and the jetties are 100 feet wide at their base and 15 feet wide above water. Neighboring Huntington Harbour is also dredged, channelized, 95 percent bulkheaded, and devoted exclusively to marine-oriented living and recreation (USFWS and CDFG 1976).

While no surveys have been conducted, certain riprap areas are used by cormorants and other sea birds. Other use by wildlife is not documented, but it is evident that certain hard structures are used differentially by wildlife for unknown reasons (J. Johnson, *pers. comm.* 2002).

All of the man-made structures support invertebrates and seaweeds, including, certain exotic species. Native and non-native lobster, crabs, worms, mussels, barnacles, echinoderms (starfish, sea urchins), sponges, sea anemones, and tunicates (sea squirts) are all known to inhabit artificial structures. These areas may also provide refuge and feeding areas for certain juvenile and predator fishes, such as perches, basses, dogfish, opaleye, and croaker. A hardened shoreline typically produces a very steep shore profile that can provide elevated roosting sites for waterbirds to

conserve energy and avoid harsh weather conditions (Ogden 1995). Floating structures in shallow water, which are relatively undisturbed by human activity, are used for roosting and foraging by waterbirds such as brown pelicans, cormorants, and gulls (Ogden 1995).

The Southern California Coastal Waters Research program (SCCWRP) is currently documenting the coastal zone within the Southern California Bight to identify coastal type, such as rocky, sandy, vegetated or armored, and structures, such as seawalls, jetties, groins, breakwaters, and piers. This inventory will be used as baseline data for the current condition of the shoreline, and will be compared with a 1977 inventory completed by the Department of Navigation and Ocean Development to assess how coastal management and development has evolved with respect to shoreline change over the last twenty years.

3.4.3.1 Effects on Plant Communities

The alternatives are evaluated by the examination of structure and composition of the plant communities. An adverse impact moves the system outside of or away from the range of variability for vegetation to retain its structure, composition, and variability in biomass. A beneficial effect would move the system inside of or toward this range of variability (resilience), so the plant community can heal or regulate itself with expected stresses on it.

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action would revise survey information on plant communities and wildlife habitats. It would also provide for the expansion of native habitats, both a wide variety of wetland and coastal grassland types and accommodate wildlife in agricultural and operational areas through best practices. It proposes a means to improve the ratio of native to non-native plants in all areas of the installation, including operational areas. This alternative identifies threats to existing plant community structure and diversity from land subsidence, climate change, and invasion by non-native species, and sets up the means to address them through restoration work that is more refined and targeted in terms of habitat subtypes than the 1997 INRMP. Finally, trade-offs in future choices made for restoration work are identified to support the Conservation Program Manager's decisions.

Through long-term planning, restoration, and enhancement, the Proposed Action would have beneficial effects on plant communities. There would be no significant impacts from the implementation of this alternative.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. This alternative would revise survey information on plant communities and wildlife habitats. It would also provide for the expansion and enhancement of native habitats, including wetland, coastal grassland and riparian types.

Through long-term planning, restoration, and enhancement, this alternative would have beneficial effects on plant communities. There would be no significant impact from the implementation of this alternative.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. The effect of this alternative on plant communities and wildlife habitat is more beneficial than the Proposed Action, especially for coastal grassland plants and the habitat condition of mudflats, middle marsh, and high marsh. This is because native plant communities and habitats would be

expanded, including those that are greatly reduced in acreage from their natural extent, and contain rare species. Maps and survey data would also be updated.

Through long-term planning, restoration, and enhancement, this alternative would have beneficial effects on plant communities. There would be no significant impact from the implementation of this alternative.

D. Alternative 4—No Action/Baseline to Include Continuing Current Management Levels. The 1997 INRMP contains vegetation maps that are based on outdated 1970s information. No direct management of expected degradation of the marsh through subsidence and sea level rise is proposed. However, an expansion of wetland areas was proposed that could address some of these threats.

This alternative would have beneficial effects on plant communities. There would be no significant impact from the implementation of this alternative.

3.4.4 Wildlife Populations

3.4.4.1 Terrestrial Invertebrates

Several surveys have been performed in the last thirty years to investigate the invertebrate communities of the Anaheim Bay/salt marsh area of NAVWPNSTA Seal Beach. These were: a survey that resulted in an annotated checklist of 116 species found in Anaheim Bay (Reish *et al.* 1975), a general survey of natural resources in Anaheim Bay (USFWS and CDFG 1976), a general survey of the invertebrates of the salt marsh habitats on NAVWPNSTA Seal Beach (Griffis 1987), and an analysis of the benthic invertebrate communities of the POLB's mitigation ponds in the salt marsh (MEC 1995). Two master's theses contributed analyses of the fly (Diptera) and beetle (Coleopteran) communities of the SBNWR (Assis de Moraes 1977; Minnesang 1980).

Assis de Moraes (1977) found a total of 11 insect orders and 93 families on the SBNWR, and estimated these to represent 202 species. The most numerous of the insects in the SBNWR are the coleoptera (beetles), diptera (flies), lepidoptera (butterflies and moths), hymenoptera (ants, wasps, and bees), and homoptera (hoppers, aphids, scales, and allies) (USFWS and CDFG, 1976 in USFWS and U.S. Navy 1990). The mainly carnivorous beetle families Carabidae (predaceous ground beetles) and Staphylinidae (rove beetles) represent the most species on the SBNWR together with the mainly herbivorous fly families Dolichopodidae (long-legged flies) and Ephydridae (shore flies) (Powell and Hogue 1979; Morris *et al.*1980; Nagano and Hogue 1982, in USFWS and U.S. Navy 1990).

The wandering skipper occurs within the SBNWR living in close association with its larval host plant salt grass *(Distichlis spicata)* (Wells *et al.* 1980 in USFWS and U.S. Navy 1990). It is thought that the larvae are only able to utilize salt grass that is subject to tidal action, and therefore is limited to marshes that have retained waterways to the ocean. Its range has been restricted to the coastal region from Goleta in the north to the Cape Region of Baja California. The pygmy blue butterfly *(Brephidium exilis)* is found on NAVWPNSTA Seal Beach and SBNWR feeding on pigweed and saltbush (*Atriplex* spp.) (USFWS and U.S. Navy 1990).

The salt marsh mosquito *(Aedes taeniorhynchus)* also lives within the SBNWR. Females lay eggs in the mud, and these hatch when moistened by tidal action and exposed to proper temperatures. Their

larvae and pupae are a food source for the marsh fish, but the adults are considered a pest for which their populations are monitored and controlled within SBNWR (USFWS and U.S. Navy 1990).

The sandy beaches and dunes have the potential to support specialized invertebrate fauna, such as the globose dune beetle, sand spiders, robber flies, kelp flies, and ants. Four species of tiger beetles have been recorded on NAVWPNSTA Seal Beach, including the sensitive Gabb's tiger beetle (*Cicindela gabbii)* and the sandy beach tiger beetle *(Cicindela latesignata latesignata).* Adult tiger beetles are terrestrial predators that are built for hunting and stalking smaller arthropods while their larvae inhabit vertical burrows in the ground. NAVWPNSTA Seal Beach contains some of the few remaining populations in the United States of the mudflat tiger beetle *(Cicindela trifasciata sigmoidea),* Frost's tiger beetle *(Cicindela senilis frosti),* Gabb's tiger beetle, and the sandy beach tiger beetle. Tiger beetle populations have declined in range due to habitat destruction, off-road vehicle use, insecticide use and human foot traffic.

3.4.4.2 Marine Invertebrates

Surveys of the salt marsh and outer bay areas have recorded 152 species of invertebrates (Reich, 1975 in USFWS and U.S. Navy 1990). These organisms serve many purposes within the Bay and the marsh, including scavenging, filter feeding, detritus feeding, etc. (Morris *et al.*1980).

Between 1990 and 1995, in an effort associated with the POLB mitigation ponds, data were collected bimonthly at 10 stations from September 1990–July 1992 and September 1994–July 1995. The most abundant subtidal and intertidal species were worms (polychaetes, oligochaetes, and nematodes) and crustaceans (amphipods, ostracods, and copepods).

Polychaetes

Many polychaetes are deposit feeders, living in and on the sediment and reaching high densities (Griffis 1987). At least eight polychaete species occurring in the area were unknown from any other bay or harbor in southern California at the time of Reish's 1975 survey: *Glycera convoluta, Glycera robusta, Lumbrinereis zonata, Protodorvillea gracilis, Rhynocospio arenicola, Dasybranchus lumbricoides, Notamastus magnus,* and *Nichomache personata. Rhynocospio arenicola* is a rare species found in the Refuge thought to be restricted to natural conditions (Reish 1975).

Kauwling and Reish (1975) found that natural channels in Anaheim Bay primarily contain three species of polychaetes: *Cossura candida, Streblospio benedicti,* and *Capitita ambiseta.* Based on total numbers, *Cossura candida* was the most common species in the marsh, comprising almost one third of all polychaetes in the area.

Mollusks

Mollusk communities in southern California salt marshes are commonly dominated by *Cerithidea californica, Melampus olivaceous,* and *Assiminea californica,* which are all epifaunal surface feeders (Zedler 1982, in USFWS and U.S. Navy 1990). The more common mollusks are detritus and filter feeders, grazers, and to a lesser extent, predators or scavengers (Zedler 1982; Griffis 1987). The California hornsnail *(Cerithidia californica),* which serves as food for species such as crabs and birds, is common in the Refuge (USFWS and U.S. Navy 1990).

Crustaceans

Eighteen species of crustaceans have been identified in Anaheim Bay. In their larval form, they are an important food source for birds and fish. Crabs are conspicuous and are found foraging on mud flats when they are not hidden in their burrows. Amphipods, Ostracods and Copepods were found in abundance in the subtidal and intertidal areas. Amphipods *(Orchestia traskiana* and *O. californica)* and isopods can be found under debris near the upper fringes of the marsh. Ghost shrimp *(Callianassa californiensis)* are found in the muddy sediments of the Refuge, and are often used as bait for catching several species of saltwater fish. California brackish water snails *(Tryonia imitator)* are found within the Refuge and have previously been candidates for federal listing (USFWS and U.S. Navy 1990).

3.4.4.3 Fishes

Williams and Desmond 2001, in Zedler 2001 stated that:

> Typically, more species and families of nektonic fishes and invertebrates occur where subtidal habitats (open impoundments, embayments, canals, etc.) have continuous connections to tidal marsh habitats at all tidal stages (Kneib 1997). The high species richness in these habitats is due primarily to the number of marine transients. However, the most abundant fish species in many subtidal estuarine habitats are seasonal residents (e.g. schooling baitfish such as atherinids, engraulids, and clupeids), which migrate offshore during the winter, and resident species (e.g. cyprinodontids), which spend their entire life in the estuary (Horn and Allen 1985); Able et al. 1996; Kneib 1997).

Constructed subtidal basins are readily populated by fishes of some species or adult life history stages, but lack essential functions for species and life history stages that depend on shallow marsh habitat (Ruiz *et al.* 1993; Baltz *et al.* 1993, cited in Williams and Desmond 2001). Killifish are found to benefit from sporadic foraging on marsh in bioenergetics work conducted by Sharook Madon (cited in Williams and Desmond 2001).

At least six fish species spawn in the bay, and in its juvenile stages the California halibut is dependent on these waters (CDFG and USFWS 1976). Various aspects of the biology of marine fishes have been subject of special studies by California State University Long Beach graduate students. Fifty one species of fish have been recorded in Anaheim Bay (MEC 1995; USFWS and U.S. Navy 1990); fish fauna is similar to that of Upper Newport Bay (Bane 1968). An intensive survey of fish fauna was performed in the Seal Beach area during 1969, 1970 and 1971, which used seines, trawls, and gill nets (Klingbeil *et al.* 1975). Marine Biological Consultants have conducted trawl and diving surveys in neighboring Huntington Harbour (1972), and fish surveys were completed to characterize the species assemblage of the POLB mitigation ponds (MEC 1995).

Species composition in Anaheim Bay is dominated by topsmelt, anchovy, shiner surfperch, gobies, silversides, croakers, diamond turbot, and California halibut, which use the Bay as a nursery area. The federally endangered tidewater goby (*Eucyclogobius newberryi*) has potential to occur in Anaheim Bay. Feeding on planktonic foods, invertebrates, detritus, and plants, these fish provide an important food source for birds living in and visiting the SBNWR (Zedler 1982).

Between 1990 and 1995, data were collected bimonthly at 10 stations from September 1990-July 1992, and September 1994-July 1995. Data confirm the list of species above that dominate the bay, adding the deep body anchovy (*Anchoa compressa*) as among the most commonly captured fish from May to November. This species seems to spawn in the Bay. Also common were

killifish, grunion, and pipefish. The most commonly captured elasmobranch was the round stingray (*Urolophus halleri*).

Fish numbers are highest in the spring and summer months, while diversity is highest in the winter and spring months. Within the Bay, diversity is greatest throughout all seasons towards the mouth as compared with the head (Klingbeil *et al.* 1975). Anaheim Bay is thought to be an area of high productivity and growth rates for fish (Lane and Hill 1975).

Some of the fish in Anaheim Bay's diverse species assemblage are commercially valuable, such as the longjaw mudsucker (*Gillichthys mirabilis*), a baitfish, and the California halibut, a target for anglers. Anaheim Bay is used as a nursery by the halibut, which are born in the shallower waters, and are thought to grow there to be about eight inches in length before leaving for the deeper waters of the open ocean. A tagging/recapture experiment performed by Frey (1971) showed little movement of the fish before emigration to the open ocean. Adults generally return from the deeper waters to the Bay to spawn in the spring and return to the deep water afterwards (Clark 1930a, 1930b), but Klingbeil *et al*. (1975) captured them all year throughout the bay.

3.4.4.4 Reptiles and Amphibians

Since reptiles and amphibians do not represent a significant part of the faunal community of salt marshes in general, their species richness on NAVWPNSTA Seal Beach is quite low. Five species of reptiles are known to occur on the installation: the legless lizard (*Anniella pulchra pulchra*), the western fence lizard (*Scheloperus occidentalis*), the side-blotched lizard (*Uta stansburiana*), the southern alligator lizard (*Gerrhonotus multicarinatus*) and the gopher snake (*Pituophis melanoleucus*). The EIS reports that the San Diego horned lizard (*Phrynosoma coronatum blainvillii*), a California Species of Concern, has been found on the installation in the past, but its presence has not been confirmed in recent years. The Pacific tree frog (*Hyla regilla*) and western toad (*Bufo boreas*) are the only representatives of the amphibians on NAVWPNSTA Seal Beach. They mainly feed on insects, and are prey to a variety of birds and the gopher snake.

Lizards mainly consume invertebrates, while the gopher snake consumes small mammals, birds and bird eggs, as well as amphibians and other reptiles. Snakes are prey to carnivorous mammals and raptors such as the red-tailed hawk.

3.4.4.5 Mammals

Nineteen species of mammals have been documented on NAVWPNSTA Seal Beach. Most are native, while others, such as the red fox *(Vulpes vulpes)* and feral cat, were introduced by humans. The majority of mammal species are associated with the uplands of the installation and the upper salt marsh elevations of the Refuge. They forage in the salt marsh during low and moderate tides. Mammals that reside or forage in the marsh have successfully adapted to conditions of regular flooding by periodic high tides. The small mammals of the marsh are mostly herbivores and granivores. House mice *(Mus musculus)* are omnivorous and harvest mice *(Reithrodontomys megalotis longicaudus)* eat primarily seeds and fruits; these are the two most numerous species (Ingles 1965). The California ground squirrel is a primarily upland species that enters the marsh fringe and forages along the interface between the marsh and uplands. This squirrel feeds on annual forbs and grasses, seeds, and small amounts of invertebrates (Schitoskey and Woodmansee 1978).

With the rapid and extensive urbanization of the area surrounding NAVWPNSTA Seal Beach, many habitat areas and corridors on which mammals depend for migration, food, and shelter have disappeared or been degraded. In the early 1970s, coyotes *(Canis latrans)* were the dominant predators on NAVWPNSTA Seal Beach. The coyote population disappeared on the installation until the early 1990s, and in its lull, other predators, such as the non-native red fox and the feral cat, filled in the gap to occupy a dominant predator role. This is known as mesopredator release and has resulted in smaller omnivore and predator population explosions, sometimes four to 10 times normal (Eisenberg *et al.* 1979; Terborgh and Winter 1980; Glanz 1982; Emmons 1984). This change in the predator community has caused a reduction in available prey for the native predators and incurred major impacts to sensitive and endangered species of the installation. These impacts have necessitated intervention by USFWS biologists and managers to control the level of damage caused by red foxes, which are now eradicated from NAVWPNSTA Seal Beach.

Other mammalian predators identified at NAVWPNSTA Seal Beach are the Virginia opossum *(Didelphis virginiana),* long-tailed weasel *(Mustela frenata),* and the striped skunk *(Mephitis mephitis),* the only abundant native terrestrial predator. The opossum and the striped skunk hunt in the uplands and down into the edge of the marsh. Because of smaller territory requirements than that of the coyote and prolific breeding capabilities, these smaller size predators are capable of existing on the installation in great numbers. The North American badger *(Taxidea taxus)* and the gray fox *(Urocyon cinereoargenteus)* have historically occurred on NAVWPNSTA Seal Beach, and it is a possibility that they could occur here again. The badger has not been observed on the property since the 1960s (USFWS and U.S. Navy 1990).

The upland portions of NAVWPNSTA Seal Beach provide the main habitat for small mammals, such as rabbits and rodents, although some extend their foraging into the upper reaches of the salt marsh. Common species include Botta pocket gopher *(Thomomys bottae),* black-tailed jackrabbit (*Lepus californicus bennettii*), Audubon's cottontail *(Sylvilagus audubonii),* California meadow mouse *(Microtus californicus),* house mouse, western harvest mouse, and Beechey's ground squirrel *(Spermophilus beecheyi nudipes).*

One mammal species, the San Diego black-tailed jackrabbit is the only one considered sensitive, a California Species of Concern. The San Diego black-tailed jackrabbit and ground squirrels are known to inhabit the barren area near the wharf at NAVWPNSTA Seal Beach, which is maintained by mowing.

3.4.4.6 Effects on Fish and Wildlife Populations, General

Natural resources conservation actions affect the structure, distribution, and diversity of wildlife and wildlife habitats. Doing nothing can result in degradation of populations, because threats such as invasion by non-natives, encroachment of urban interfaces, non-point source pollution, and sea level rise-related floods are not provided for. As there are successions of species and age classes of plants that occur between disturbances or catastrophes, there are successions of animal species that are favored or disfavored as habitats change. The effects of disturbance, including planned restoration activities, on wildlife populations are either "direct" or "indirect." Direct effects include injury and mortality due to direct exposure to the disturbance. Indirect effects are caused by the alteration or destruction of habitat utilized by wildlife within the perimeter of the disturbance. Most animals are able to escape the lethal effects of catastrophic disturbance by selecting an insulated microenvironment (burrows, riparian areas) or by rapidly emigrating from

the area. Therefore the majority of the effects are indirect, a result of alterations in the vegetation structure and temporary loss of habitat. These alterations include the removal of favorable nesting sites, disappearance of host and forage plants, and loss of protective vegetation cover. Additionally, the loss of vegetation results in changes to biophysical conditions, altering temperature, wind, incident radiation, and soil moisture among other parameters that make up a microhabitat. Restoration and habitat maintenance activities can inadvertently and adversely affect wildlife through direct disturbance of animals and habitats, even though both activities are designed to benefit habitat condition in the end.

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action would update baseline inventories, invasive species control practices, habitat improvement and expansion, and identify management focus species to be indicators of ecological health or ecological problems. These would be highlighted for establishing restoration priorities, project evaluations, long-term monitoring, modeling, and setting research priorities. It would adopt a map of sensitive species priority management emphasis areas and a system of safety buffer zones to protect habitat areas. Improved conservation measures would allow for enhanced compatibility between natural resources and both military operations and agricultural activities, benefitting species such as the burrowing owl and mountain plover.

The Proposed Action would control vertebrate species that pose a nuisance or health hazard to tolerable levels, without jeopardizing the survival of the pest species if it is a sensitive native species consistent with the 1991 ROD (USFWS and U.S. Navy 1991), or any incidental take of non-target wildlife, while complying with all applicable laws. It would add an educational program for residents regarding the feeding and harboring of feral cats and dogs. It would also add other best management measures, such as ensuring the covering of all outdoor trash containers and that a sufficient number of them are located around facilities to discourage littering, using Nixalite®, owl decoys, and signs to prohibit feeding of pigeons. It controls ground squirrels to acceptable levels while avoiding unintentional take using enclosed bait stations.

Therefore, the Proposed Action would benefit fish and wildlife populations, mostly on a habitat rather than population basis. There would be no significant impacts to wildlife populations from the implementation of the Proposed Action.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. The effects on fish and wildlife are similar to the Proposed Action; however; the emphasis on only listed species would likely result in negative impacts on certain populations. Some examples are shorebirds or tiger beetles that require mudflats, and terrestrial birds and species needing more transitional marsh habitats. Fish and wildlife that have compatible requirements to the listed species, and for which resources may be shared, would benefit. Species that are known predators of federally listed species, such as skunks, may also experience minor negative impacts. An increase in listed species management would also require an increase in predator management, affecting small numbers of individual predators rather than entire populations.

Alternative 2 would have overall beneficial effects to fish and wildlife. There would be no significant impacts to wildlife populations under this alternative.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. Alternative 3 would expand coastal grassland habitats far beyond those currently present. In this way, the entire

installation is able to support a range of habitat subtypes, as well as buffer the threats of non-native species invasion (aquatic and terrestrial). Impacts on some predators of listed species that utilize grasslands could be negative, as the need for their management would also increase; however, these impacts would be to limited numbers of predators whose status is not sensitive.

The beneficial impacts to certain wildlife populations under Alternative 3 would be substantial. There would be no significant impacts on wildlife populations.

D. Alternative 4—No Action/Baseline to Include Continuing Current Management Levels. The 1997 INRMP would expand the species list through surveys. It would also propose habitat expansion. Therefore, this alternative would benefit fish and wildlife populations, similar to the Proposed Action. However, the No Action Alternative would not include a mechanism for generating partnerships to complete restoration work.

There would be some beneficial impacts to wildlife populations under this alternative. There would be no significant impacts with the implementation of the No Action Alternative.

3.4.4.7 Effects on Migration Corridors of Native Plants and Wildlife

A. Alternative 1—Proposed Action/Preferred Alternative. Migration corridors for native plants and wildlife would benefit by the Proposed Action. General restoration and expansion of wetlands benefit migration corridors. This would include the work proposed to improve the riparian linkage with golf course wetlands northeast of the I-405 freeway and conservation measures for grasslands.

The Proposed Action would have beneficial impacts on migration corridors through the expansion and protection of corridors. There would be no significant impacts.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. This alternative is beneficial to migration corridors for federally listed species in particular and those species that have compatible requirements with listed species.

Implementation of this alternative would have beneficial impacts on migration corridors. There would be no significant impacts on migration corridors under Alternative 2.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. This alternative, which offers the maximum expansion of wetlands and coastal grassland opportunity, is the most beneficial of all the alternatives for migration corridors for native plants and wildlife.

Implementation of this alternative would have beneficial impacts on migration corridors. There would be no significant impacts on migration corridors under Alternative 3.

D. Alternative 4—No Action/Baseline to Include Continuing Current Management Levels. Migration corridors for native plants and wildlife are not specifically addressed in the 1997 INRMP. However, general restoration of wetlands, including the riparian work proposed in that INRMP and conservation measures for uplands do generally benefit such corridors.

Therefore, this alternative would benefit migration corridors but less so than all the other alternatives. Retaining the No Action alternative would not have significant impacts on migration corridors.

3.4.4.8 Migratory Birds

The SBNWR has been a popular bird watching location for years and is recognized as part of the Orange Coast Wetland's Important Bird Area by the Audubon Society (California Audubon Society 2010). On NAVWPNSTA Seal Beach, over 250 bird species have been recorded, the majority of which have been observed in the SBNWR. Peak diversity can be found during spring and fall migrations though several species are year-round residents. The highly productive wetlands are the habitat most frequently used by birds, but the surrounding uplands are also utilized.

Currently, 46 species of birds observed on the installation are considered sensitive by the USFWS, CDFG, or other organizations. A list of migratory birds that have been identified as declining or of concern by government agencies and non-governmental organizations and documented in or near the project area is provided in Table 3-1. This list includes Federal Species of Concern, State of California Endangered, California Special Concern species, and CDFG fully protected species. The list also contains species on the watch lists for Birds of Conservation Concern (USFWS 2008) and the U.S. Shorebird Conservation Plan (Brown *et al.* 2001).

Shorebirds. Fourteen shorebird species occurring on NAVWPNSTA Seal Beach are ranked by the U.S. Shorebird Conservation Plan (Brown *et al.* 2001) as High Concern (HC) or Highly Imperiled (HI).

Seabirds. Fifteen seabirds that have been documented in NAVWPNSTA Seal Beach nearshore areas, including the offshore jetties, are used by foraging and breeding sea birds. Migratory sea birds utilize the productive offshore waters associated with the California current to forage during wintering and migratory movements. Although the importance of the Southern California Bight waters and Channel Islands is well described, current specific locations of bird species (aside from some island nesting populations), population estimates, and the effect of natural resource activities on these species is not well known.

Terrestrial Resident Breeding Birds. The California horned lark and the white-tailed kite are examples of terrestrial birds that benefit from an open vegetation condition, including partially cleared areas. Seventeen terrestrial migratory birds are considered special status in Table 3-1.

The SBNWR is an important stopover and wintering location for many migratory birds, especially waterfowl, shorebirds, and seabirds. Spring migration occurs from February through May for species moving north. In late summer, migratory birds heading south begin arriving at the SBNWR and many species will remain in the region through the winter. Peak bird abundances are typically found November through February. In contrast to the December abundance peak in broad categories of migratory birds, censuses conducted at the Tijuana Estuary (Kus and Ashfield 1989) and throughout the Pacific Flyway (Page *et al.* 1990) have documented that the number of migratory waterbirds peaks in the fall and is an order of magnitude greater than the number present in the spring, by which time most birds have departed for breeding grounds. Of the migratory birds documented on NAVWPNSTA Seal Beach and identified in Table 3-1 of Chapter 3 by government agencies and non-governmental organizations as sensitive, most have only transient use of NAVWPNSTA Seal Beach land and waters.

Anaheim Bay and adjacent wetlands provide highly productive feeding grounds for waterfowl (ducks and geese), shorebirds (plovers, dowitchers, sanderlings, etc.), gulls, terns, grebes, cormorants, pelicans, and herons. The bay also provides important shelter for seabirds (petrels, shearwaters, fulmars, etc.) during storms. Waterbirds that have nested on NAVWPNSTA Seal Beach and the SBNWR include the American avocet, black-necked stilt, killdeer, mallard, and black skimmer.

A diversity of habitats provides numerous feeding opportunities for a wide variety of birds. Shorebirds feed primarily on invertebrates in the wetlands and beaches. Gulls, terns, cormorants, grebes, and pelicans feed mostly on fish in the open waters. Dabbling ducks feed on plant material or invertebrates in shallower areas, whereas diving ducks will take invertebrates or small fish in deeper waters. Canada geese *(Branta canadensis)* forage on grasses, seeds, and sprouts in uplands and use the marsh as a resting area. Over 3,300 geese were counted in 2004.

Table 3-1. Special status avian species documented in the INRMP project area.

Common Name *(Scientific Name)*	Status*	Use on NAVWPNSTA Seal Beach
Aleutian Canada goose *(Branta canadensis leucopareia)*	FSC (delisted/recovered)	Transient
American merlin *(Falco columbiarus columbiarus)*	CSC	Winter resident Transient
American peregrine falcon *(Falco peregrinus anatum)*	Recovered, BCC, CE, CFP	Winter resident Transient
American white pelican *(Pelecanus erythrorynchos)*	CSC	Transient
bald eagle *(Haliaeetus leucocephalus)*	Recovered FT, BEPA	Transient
Belding's savannah sparrow *(Passerculus sandwichensis beldingi)*	CE	Breeding
black oystercatcher *(Haematopus bachmani)*	BCC, HC	Breeding
black skimmer *(Rynchops niger niger)*	BCC, CSC	Transient
black storm-petrel *(Oceanodroma melania)*	CSC	Transient
black turnstone *(Arenaria melanocephala)*	HC	Winter resident Transient
black-vented shearwater *(Puffinus opisthomelas)*	BCC	Transient
burrowing owl *(Athene cunicularia hypugaea)*	BCC, CSC	Breeding resident
California brown pelican *(Pelecanus occidentalis californicus)*	Monitored for post-delisting	Transient
California gull *(Larus californicus californicus)*	CSC, USBC	Winter resident
California horned lark *(Eremophila alpestris actia)*	CSC	Breeding
California least tern *(Sterna antillarum browni)*	FE	Breeding
Cassin's auklet *(Ptychoramphus aleuticus)*	BCC	Transient
common loon *(Gavia immer)*	CSC	Winter resident
common yellowthroat *(Geothlypis trichas)*	BCC	Transient
Costa's hummingbird *(Calypte costae)*	BCC	Transient
double-crested cormorant *(Phalacrocorax auritus)*	CSC	Breeding
dunlin *(Calidris alpine arcticola/pacifica)*	HC	Transient
elegant tern *(Sterna elegans)*	BCC, CSC	Transient
ferruginous hawk *(Buteo regalis)*	CSC	Transient
golden eagle *(Aquila chrysaetos canadensis)*	BEPA	Transient
Lawrence's goldfinch *(Carduelis lawrencei)*	BCC	Transient

Common Name *(Scientific Name)*	Status*	Use on NAVWPNSTA Seal Beach
light-footed clapper rail *(Rallus longirostris levipes)*	CE, FE, CFP	Breeding
long-billed curlew *(Numenius americanus)*	BCC, CSC, HI	Transient
marbled godwit *(Limosa fedoa fedoa)*	BCC, HC	Transient
mountain plover *(Charadrius montanus)*	BCC, CSC	Transient
northern harrier *(Circus cyaneus hudsonius)*	CSC	Winter resident Transient
osprey *(Pandion haliaetus carolinensis)*	CSC	Transient
pink-footed shearwater *(Puffinus creatopus)*	BCC	Transient
prairie falcon *(Falco mexicanus)*	BCC, CSC	Transient
red knot *(Calidris canutus roselaari)*	BCC, HC	Transient
ruddy turnstone *(Arenaria interpres)*	HC	Winter resident Transient
sanderling *(Calidris alba)*	HC	Winter resident Transient
sharp-shinned hawk *(Accipiter striatus velox)*	CSC	Winter resident, transient
short-billed dowitcher *(Limnodromus griseus)*	BCC, HC	Transient
short-eared owl *(Asio flammeus flammeus)*	CSC	Winter resident Transient
Swainson's hawk *(Buteo swainsoni)*	CT	Transient
Vaux's swift *(Chaetura vauxi vauxi)*	CSC	Transient
western sandpiper *(Calidris mauri)*	HC	Transient
western snowy plover *(Charadrius alexandrinus nivosus)*	FT, CSC, HI	Winter resident Rare breeding
whimbrel *(Numenius phaeopus hudsonicus)*	BCC, HC	Winter resident Transient
white-faced ibis *(Plegadis chihi)*	CSC	Transient
white-tailed kite *(Elanus leucurus)*	CFP	Breeding Winter resident Transient
Wilson's phalarope *(Phalaropus tricolor)*	HC	Transient

* Status derived from the CDFG Special Animals Lists, 2009.

FE=Federal Endangered; FT=Federal Threatened; C=Candidate (USFWS); FSC = USFWS Federal Species of Concern; BEPA=Bald Eagle Protection Act; CE=State Endangered; CT=California Threatened; CSC=California Special Concern Species; CFP=CDFG fully protected=Species may not be taken without permit from Fish and Game Commission; BCC watch list= Birds of Conservation Concern for California region (USFWS 2008); US Shorebird Conservation Plan (2004) High Priority Shorebirds: HC = High Concern, HI = Highly Imperiled

3.4.4.9 Effects on Migratory Birds

The MBTA of 1918 (16 U.S.C. 703-711) is legislation that covers species protected under four international treaties. These treaties are agreements between the U.S., Canada, Mexico, Japan, and Russia and protect most species of birds. The MBTA prohibits the taking or pursuing of migratory birds, their eggs, feathers, or nests. Game birds are listed and protected except where specific seasons, bag limits, and other factors govern their hunting. Exceptions are also made for some nuisance pests, which have standing federal depredation orders (e.g. yellow-headed, red-winged, tri-colored, Rusty and Brewer's blackbirds, cowbirds, all grackles, crows, magpies, rock doves, European starlings, and house sparrows).

The DoD policy states that migratory bird programs shall be established in support of and consistent with the military mission. The natural resources management activities that constitute the 2011 Revised INRMP fall under a MOU between the USFWS and DoD on Migratory Birds. This is in contrast to the Migratory Bird Rule, which covers military readiness activities and is guidance that addresses past conflicts arising between military readiness activities and the MBTA. The USFWS issued the final rule on, "Migratory Bird Permits: Take of Migratory Birds by the Armed Forces" (50 CFR Part 21 in the February 28, 2007 Federal Register, pages 8931-8950). The Migratory Bird Rule authorizes the military to "take" migratory birds during military readiness exercises under the MBTA without a permit, but if the military determines that the activity will significantly affect a population of migratory birds, they must work with the USFWS to implement conservation measures to minimize and/or mitigate the effects.

The USFWS/DoD MOU (Federal Register 30 August 2006) cited above evolved out of the requirements of the 2001 EO 13186, Responsibilities of Federal Agencies To Protect Migratory Birds, and addresses the conservation of migratory birds on military lands in relation to all activities except readiness. The action proposed in the 2011 Revised INRMP fall under this MOU. In addition, the EO required NEPA evaluations to include effects on migratory birds and that advance notice or annual reports are required to the USFWS concerning actions that result in the taking of migratory birds. The EO also required agencies to control the establishment of exotic species that may endanger migratory birds and their habitat.

The MOU is a guidance document on how the DoD will conserve migratory birds and does not authorize any take. In April 2007, further guidance was issued by the Under Secretary of Defense for Acquisition, Technology and Logistics on implementing the MOU to Promote the Conservation of Migratory Birds between the USFWS and DoD in accordance with EO 13186 (DoD 2007). This guidance covers all activities at NAVWPNSTA Seal Beach, including natural resources management, routine maintenance and construction, industrial activities, and hazardous waste cleanups. The guidance emphasizes interdisciplinary collaboration in framework of recognized Bird Conservation Regions, collaborative inventory, and long-term monitoring.

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action would propose a number of beneficial management actions for migratory birds, focusing on establishing objectives for habitat subtypes. Expansion and enhancement of marshland and wildlife-friendly agriculture would provide numerous opportunities for migratory birds.

The Proposed Action would benefit migratory birds. There would be no significant impacts with the implementation of the Proposed Action.

B. Alternative 2—Emphasis on and Federally Listed Species Enhancement. This alternative would allow for the expansion and enhancement of marsh (to the 1873 boundary within the perimeter of the installation), so would provide some benefits to migratory birds of the lower marsh, such as those with similar requirements of the light-footed clapper rail. Enhancement of riparian areas would also provide benefits to listed species, including least Bell’s vireo and southwestern willow flycatcher. The emphasis on federally listed species may conflict with requirements for shorebirds, waterfowl, coastal upland birds, the mountain plover, and other species, including offshore migrants, which depend upon the functions provided by coastal habitats. This alternative could conflict with requirements for burrowing owls, bald and golden eagles, and other migratory birds that have different requirements from federally listed birds.

Overall, this alternative would offer a blend of beneficial and negative impacts to migratory birds. There would be no significant impacts under this alternative.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. Alternative 3 would expand coastal grasslands and improve the connectivity and acreage of habitat subtypes, thus providing foraging for migratory birds that utilize grasslands. However, because it has no specific plan for the expected flooding of wetlands, losses of shallow or transitional components of the marsh could potentially negative impacts to migratory birds that utilize those zones.

Overall, this alternative could provide both beneficial and negative impacts to migratory birds. It would not result in significant impacts to migratory birds.

D. Alternative 4—No Action to Include Continuing Current Management Levels. All birds are managed through the 1997 INRMP, including, at a minimum, baseline inventory and regular monitoring. All are also managed through the project site approval process through which avoidance and minimization measures are communicated to those working on a project site. Migratory birds are typically managed through measures to avoid the breeding season, and routinely checking for nests before undertaking actions that may affect nesting birds. Migratory birds also benefit incidentally from the threatened and endangered species conservation. These include feral cat and rat control and predator management. Finally, the invasive plant control program helps keep habitat in its natural condition, and this benefits use by native birds.

Therefore, the No Action Alternative would benefit migratory birds although it is out of date and less-fully developed. There would be no significant impacts to migratory birds under this alternative.

3.4.5 Special Status Wildlife and Plants

3.4.5.1 Federally Listed Species

As noted above, the following federally listed species are known to occur on the installation:

- California least tern – federally endangered;
- Light-footed clapper rail – federally endangered ; and,
- Western snowy plover – federally threatened.

Of these three listed species, two (light-footed clapper rail and western snowy plover) are potentially present year-round at NAVWPNSTA Seal Beach, and one (California least tern) is a migrant present during the spring and summer for breeding. A fourth, federally endangered species, the salt marsh bird's beak *(Cordylanthus maritimus* ssp. *maritimus),* has not been sighted in recent years. A fifth, federally threatened species, the eastern Pacific green sea turtle (*Chelonia mydas),* has been observed in the area but is not known to utilize the wetlands of SBNWR or the Anaheim Bay.

Light-Footed Clapper Rail

The light-footed clapper rail is a federal and state endangered species and a CDFG Fully Protected Species under California Fish and Game Code, Section 3511. It currently occurs from

Santa Barbara County to San Quentin, Baja California. It is a brown marsh bird with long legs, a short, upturned tail, a long bill, and barred flanks (CDFG 2000).

This species lives, nests, and forages entirely within its preferred habitat of large estuaries with salt marsh dominated by cordgrass and pickleweed (Jorgensen 1975). It is not a strong flyer and does not seasonally migrate. Clapper rails require cordgrass of the lower marsh habitat for nesting and an abundance of intertidal marine invertebrates for their food supply (Massey *et al.* 1984; Zedler 1993).

The light-footed clapper rail is an opportunistic omnivore that eats a variety of foods within marsh ecosystems, including small fish, crabs, snails, insects and other marsh invertebrates; their primary method for capturing prey is by gleaning and shallow probing (Zembal and Fancher 1988). Light-footed clapper rails tether their nests with cordgrass so that they do not wash away or become inundated during high tide (Massey and Zembal 1979). Clapper rails have also been documented utilizing cattails for nesting habitat. Cordgrass also is used to form a canopy over the nest to hide it (Massey *et al.* 1984; Zedler 1993). A second nest is constructed after the eggs have hatched for brooding. These nests are almost identical to incubation nest except for their lack of a canopy. Adjacent middle and upper marsh and upland transition habitat is important as a safe area during very high tides, large storms, or as a temporary refuge if lower marsh habitats become degraded (Zembal 1993).

Light-footed clapper rails declined dramatically in recent decades due to destruction of salt marsh habitat (Garrett and Dunn 1981; Macdonald *et al.* 1990). In the late 1970s, the U.S. population was estimated at approximately 300 individuals. In 1985, the southern California population crashed from an estimate of 277 pairs in 1984 to 142 pairs, partly due to tidal closure of the Tijuana Estuary (Zedler 1992b). In 1988, sixty-five percent (116 pairs) of all pairs detected (177 pairs) during spring call counts throughout the state were counted in nearby Upper Newport Bay Marsh. In 1996, statewide, only an estimated 325 light-footed clapper rail pairs nesting in fourteen wetlands were known to exist (USFWS data). Tidal inundation, which can carry off or drown eggs, and predation by raptors and mammals are the main causes of nest failure (Macdonald *et al.* 1990). Large storm events may destroy nests and make the habitat unsuitable for clapper rail use (Zedler 1993). Lower marsh habitats can also be damaged from watershed runoff and made unsuitable for nesting (Zembal 1993).

Seal Beach is important to the maintenance of the federally listed light-footed clapper rail populations in southern California. A study funded by the CDFG conducted in 1996 determined that at that time the 52 nesting pairs inhabiting the SBNWR represented the third largest population of light-footed clapper rails throughout its range (Zembal *et al.* 1996). While intensive management efforts to shield the population from predation by the non-native red fox was accompanied by a dramatic increase in the number of clapper rails up until the mid-1990s, the reason for the more recent population declines of the late 1990s remain unclear.

California Least Tern

The California least tern is a federal and state endangered species that has been listed since 1970. It is also a CDFG Fully Protected Species. Currently, California least terns nest on a peninsula named NASA Island within the SBNWR. The nesting site is about three acres in size. NASA Island was prepared for terns between 1977 and 1979 by the USFWS. Another major nesting site nearby was at

Sunset Aquatic Park, immediately adjacent to the SBNWR and the installation. The terns abandoned it after 1972 and it is now overgrown with vegetation. Terns began nesting on NASA Island in 1979. Since then, their population on the Refuge has fluctuated, but by the 1988 nesting season, the colony had grown to 82 nesting pairs (6.5 percent of the state total) that produced about 65 fledged young (5.8 percent of the state total). In 1989, the SBNWR breeding colony of 97 nesting pairs (7.8 percent of the state total) fledged about 109 young (14.3 percent of the state total).

The SBNWR was established primarily to protect habitat and manage for endangered species, thus maximizing opportunities for these species and facilitating their recovery. In 1987, 15 colonies in California contained 20 or more pairs, whereas only four colonies met productivity goals for that year. Securing all of these sites from human disturbance and predation is the focus of the recovery needs for this species. Predation is usually the cause for low rates of fledging. However, fledgling production can also be related to foraging success and the ability of adults to provide their young with sufficient amounts of food (Atwood and Kelly 1984).

California least terns migrate yearly between California and Central and South America. The usually arrive in California by late April and complete their breeding cycle by the end of August. Their discontinuous breeding range in the United States extends from the Mexican border to San Francisco Bay. The majority of these terns nest in southern California. Unfrequented sandy beaches close to estuaries and coastal embayments have traditionally served as nesting sites for California least terns. Recreational, residential, and industrial development on and near beaches has severely diminished the availability of suitable nesting areas. In recent years, least terns have successfully nested on a number of non-beach sandy surfaces in coastal areas (Massey and Atwood 1979-1985).

Western Snowy Plover

The western snowy plover is a federally threatened bird species that nests in colonies on sandy beaches along the west coast of the United States and into southern Baja California (Page *et al*. 1995). Adults and chicks feed on terrestrial and aquatic invertebrates such as amphipods, sand hoppers, and flies (Cramp and Simmons 1983). Kelp wrack provides an abundant food source of the invertebrates that frequent these kelp piles. Mudflats are also used for foraging (Powell, *pers. comm.*).

The snowy plover's federal threatened status appears not to have resulted in much direct management intervention since projects are uncommon in its primary foraging locations. However, because western snowy plover nesting nearly completely overlaps that of the California least tern, it has benefited from intensive management for terns in some locations. The species, and suitable nesting habitat, is uncommon on the Refuge (USFWS and U.S. Navy 1990).

Monitoring of population levels of endangered species on the SBNWR and NAVWPNSTA Seal Beach is conducted on a regular basis by the USFWS. Adult populations and breeding success of the SBNWR's endangered species are monitored and the data filed at the Refuge complex headquarters.

Raptors, water-associated birds, and predatory mammals are generally monitored once a month for abundance and population trends. USFWS biologists conduct nocturnal surveys once a month by driving installation roads to identify and count nocturnal animals using the roadside count method (Allen and Sargeant 1975; Frederickson 1979). Two observers in a vehicle look for

animals while driving at about 15 miles per hour. A high intensity light is shone from each side of the vehicle to find each animal, and identification is aided by binoculars and spotting scopes. Identification and recording of each observation is done while the vehicle is stopped. These surveys are able to track population trends of red foxes and other nocturnal species.

Eastern Pacific Green Sea Turtle

While the green sea turtle is federally listed as threatened under the ESA generally, the Florida and eastern Pacific stock, with a breeding population off the Pacific coast of Mexico, is listed as endangered (NMFS and USFWS and U.S. Navy 1990). The species is imperiled throughout its world range. The worldwide population is estimated at 88,520 nesting females (Spotila 2004). Currently, between 200 and 1,000 green sea turtles nest on beaches in the continental United States. No green sea turtles have been documented nesting on the West coast (DoN 2011). Green sea turtles are capable of transoceanic migrations, but use coastal and open ocean waters within several hundred to one thousand kilometers of nesting grounds. In the eastern North Pacific, green turtles have been sighted from Baja California to southern Alaska, but most commonly occur from San Diego south (NMFS 2008). Occasionally, green sea turtles have been found offshore of Orange County and Los Angeles County and one has been sighted within the SWNWR, north of the more common southerly range limit, likely during El Niño periods, when warmer waters spread into this range (LSA Associates, Inc. 2009). In Mexico, the breeding population is declining, suffering as much as a 94 percent decrease in annual nesting female subpopulation size over the past three turtle generations, or since 1873 (International Union of Conservation of Nature Marine Turtle Specialist Group [IUCN MTSG] 2004). Due to declining populations, an east Pacific green sea turtle recovery plan was prepared (NMFS and USFWS 1998). The number of turtles using Anaheim Bay is uncertain, and there is limited information about their movements or behavior (DoN 2011).

3.4.5.2 Effects on Federally Listed Species

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action would adopt a map of sensitive species priority management emphasis areas and a system of safety buffer zones. These areas would protect habitat areas and help de-conflict competitive species pressures, such as by limiting predator-prey interactions.

It would pursue expanding California least tern nesting opportunities by identifying for funding a feasibility study to increase NASA Island's carrying capacity to house nesting terns and add a second colony site. It would also continue the protection and intensive management afforded by the 1991 EIS and ROD, and then improve this management through partnerships and adaptive planning for expected future impacts from climate change and land subsidence. The marsh expansion may contribute to least tern foraging success, and a study is proposed on the tern's primary food sources, including topsmelt, Pacific saury and anchovy.

This alternative would propose for the western snowy plover remnant dune areas for enhancement as nest sites in areas that can be protected from human disturbance and predators during nesting season. Invasive species control on the dunes also would improve conditions for the western snowy plover.

Protection would continue for the light-footed clapper rail and its nesting, foraging, and high tide refuge areas. Habitat enhancements would include improving cordgrass sustainability where erosion threatens it, improving tidal flushing of the 7th Street Pond, and experimenting with fresh

water injection to improve cordgrass growth. Continued upgrading and maintenance of the artificial rafts on the SBNWR is crucial to the protection of the wintering rails and success of the breeding rails.

The green sea turtle currently has access to the wetlands, including eelgrass areas. Surveys are recommended for funding, and conditions are improved for use of the wetlands by cleaning culverts, improving conditions at the tidal inlet, and general expansion of the wetlands.

The federally listed salt marsh bird's beak was once confirmed on the installation, but has not been observed in recent years. Conditions of the upper marsh are depauperate, as are links of this area to high quality uplands that can be a source of pollinators for salt marsh bird's beak and other species. The Proposed Action would recommend the recovery of the salt marsh bird's beak population through habitat protection and reintroduction.

Through protection and habitat restoration and enhancement, the Proposed Action would provide multiple benefits to the recovery of federally listed species. This alternative would have no significant impacts.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. Under Alternative 2, the current emphasis on listed species would expand beyond the Refuge boundary in order to support recovery of these species. Allowing for the expansion of marsh (to the 1873 boundary), it would provide a benefit to the light-footed clapper rail and potentially for least tern foraging. The western snowy plover protection area would also be expanded and an elevated California least tern nesting site developed on Hog Island. Enhancement of riparian areas would also provide potential benefits to the least Bell's vireo and southwestern willow flycatcher (although these species are not known to occur on NAVWPNSTA Seal Beach). The partial expansion of grasslands would benefit federally listed species, as it would create some natural buffers for habitat upon which the listed species occurring on the installation depend. Potential negative impacts of increased grasslands on listed species is the potential for increased predators of listed species that utilize grasslands (e.g. burrowing owl and eagle); therefore, development and implementation of appropriate guidelines for increased predator control of these species would be necessary. However, these increases are expected to be minor. Expansion and enhancement of the marsh would accommodate sea level rise and create wetland transition habitats, upon which listed species, namely light-footed clapper rail and least tern, depend.

This alternative is beneficial with regard to federally listed species, creating increased and enhanced habitat and protection. This alternative would have no significant impacts on federally listed species.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. Expanding the coastal grasslands would benefit federally listed species as it would create natural buffers for and links between habitats upon which the listed species occurring on the installation depend. To a greater extent than in Alternative 2, additional potential negative impacts on listed species would be from increased predators and increased grassland habitat. These potential impacts would need to be matched by increases in predator management. The lack of planned marsh enhancement and expansion and of planning and management against sea level rise could potentially cause losses to nesting and foraging areas of the clapper rail and least tern, therefore creating negative impacts on limited individuals. However, the impacts would not rise to a level of significance.

This alternative could create more potentially negative than beneficial impacts to federally listed species overall. There would be significant impacts to listed species.

D. Alternative 4—No Action to Include Continuing Current Management Levels. The No Action Alternative, through the 1997 INRMP, benefits federally listed species by continuing the existing management emphasis in the SBNWR. Regular surveys and predator control would be conducted. Nest enhancement in cordgrass would be implemented for light-footed clapper rails. Substrate enhancement and site preparation occurs each year for the least tern. No work is conducted for salt marsh bird's beak, and the green sea turtle is an incidental beneficiary of protection provided by the SBNWR.

This alternative would have beneficial effects on federally listed species. It would not result in significant impacts.

3.4.5.3 Other Special Status Species

Other special status species include California Native Plant Society (CNPS) rare species and California Species of Concern (Table 3-2). Non-federally threatened or endangered special status species are considered in management to prevent a future listing under the ESA. To promote ecosystem management, DoN encourages cooperation with state protection programs (OPNAVINST 5090.1C CH-1), and NAVWPNSTA Seal Beach implements appropriate strategies to protect special status species and habitat once they are identified on U.S. Navy lands.

California Brown Pelican

The migratory California brown pelican *(Pelicanus occidentalis californicus)* was delisted as federally threatened in 2009 and is no longer a California-listed species. However, a post-delisting monitoring plan proposes to monitor the continued recovery of the species for 10 years (USFWS 2009). Up to 85 percent of California's brown pelican breeding population of about 7,000 pairs (Small 1994) nests on the Coronado Islands (Schoenherr 1992). Others breed and nest in Mexico. Brown pelicans roost primarily on tire dikes and other artificial structures, seldom roosting on natural structures (USFWS 1995a). As many as 20,000 brown pelicans migrate from Mexico northward, following food associated with migrating ocean currents from about mid-May to November (Small 1994). Populations at NAVWPNSTA Seal Beach are at their lowest level around February.

Brown pelicans use the outer harbor, nearshore water, and rock jetties of the installation more often than the Refuge. They are most abundant at the SBNWR in late summer and fall when they can be observed fishing the open water in or roosting on mud flats, fence posts, or in the marsh. The highest count of brown pelicans at the Refuge and adjacent waters was 112 individuals observed in September 1970 (Romero 1976).

Table 3-2. Special status species other than birds that have been documented in the INRMP project area.

Common Name *(Scientific Name)*	Status*
Plants	
Coast woolly heads *(Nemacaulis denudata* var. *denudata)*	CNPS List 2
Coulter's goldfields *(Lasthenia glabrata* ssp. *coulteri)*	CNPS 1B
Estuary seablite *(Suaeda esteroa)*	CNPS List 1B

Common Name *(Scientific Name)*	Status*
Lewis's evening primrose *(Cammisonia lewisii)*	CNPS List 3
Red sand verbena *(Abronia maritima)*	CNPS List 4
Seaside calandrinia *(Calandrinia maritima)*	CNPS List 4
Southern tarplant *(Hemizonia parryi* var. *australis)*	CNPS List 1
Reptiles	
San Diego horned lizard *(Phrynosoma coronatum blainvillii)*	CSC
Silvery California legless lizard *(Anniella pulchra pulchra)*	CSC
Mammal	
San Diego black-tailed jackrabbit *(Lepus californicus bennettii)*	CSC
* Status derived from the CDFG Special Animals Lists, 2009. CSC=California Special Concern Species; CNPS=California Native Plant Society rarity rating	

Other potentially present but undocumented special plants were searched for and not found during 1996 surveys by RECON Environmental (DoN NAVFAC SW 1997): small spikerush (*Eleocharis parvula);* southwestern spiny rush *(Juncus acutus* ssp. *leopoldii);* California spineflower *(Mucronea californica);* coast woolly heads (*Nemacaulis denudata* var. *denudata);* and woolly seablite *(Suaeda taxifolia).*

State Listed Species

Belding's Savannah Sparrow

Belding's savannah sparrow **(*Passerculus sandwichensis beldingi*)** is a resident breeder occurring on NAVWPNSTA Seal Beach in the SBNWR designated as endangered by CDFG. This species is strictly associated with salt marsh habitats and is a state-listed endangered species. The rarity of this salt marsh resident has been attributed to loss and degradation of habitat. The Belding's race of savannah sparrows ranges from Goleta Slough in Santa Barbara County, California, south to El Rosario in Baja California, Mexico (Grinnel and Miller 1944; Van Rossen 1947; American Ornithologist's Union 1983).

In southern California, development surrounding coastal marshes has influenced the high-marsh habitat because it typically is dry most of the year and may not have been delineated as "wetland" prior to the establishment of recent guidelines. Thus, Belding's savannah sparrow habitat has been restricted not only in overall availability, but also within the high marsh. This creates a tradeoff for the sparrows. Nests that are located away from potential tidal inundation are closer to the wetland edge, where the effects of predation and human disturbance may be higher. The edges of most salt marsh remnants in this region are "hard", abutting urban landscape features such as roads, flood-control channels, airport runways, and residential lawns.

Federal and California Species of Concern

Burrowing Owl

The burrowing owl *(Athene cunicularia hypugaea)* is a Federal and California Species of Concern that is declining in number throughout its range, especially the coastal populations. It is included here because of its precipitous decline in number on NAVWPNSTA Seal Beach and the potential for improved management on the installation. Throughout their range, burrowing owls

are threatened by habitat loss, predation, vehicle impacts, and control programs for ground squirrels (Kaufman 1996). Burrowing owls form loose colonies, with both resident and migratory components (E. Copper, *pers. comm.).* Eggs are produced from late March to mid-June, and fledglings are active through August (Unitt 1984).

At one time, there were 50 pairs of burrowing owls in the ordnance magazine area in the northeast portion of NAVWPNSTA Seal Beach's south parcel (south of Winchester Road). Now, the best guess is that there are probably no more than eight individuals, based on recent banding (Schallmann, *pers. comm.* 2004). Breeding burrowing owls have been missing from the south side for at least four years. Still, this is the largest remaining nesting population left in Orange County. The population faltered on NAVWPNSTA Seal Beach in the late 1990s, but had almost rebounded by 2000. The Navy is currently developing a Burrowing Owl Management Plan. The NAVWPNSTA Seal Beach is at this time the only breeding location in Orange County, and a relocation and release program is ongoing (R. Schallmann, *pers. comm.* 2006).

There are no more than 30 pairs of owls between Ventura County and the Mexican border (Bloom, *pers. comm*. 2004). NAVWPNSTA Seal Beach may be the only coastal site where the owls can have a stronghold between Ventura and the Tijuana River.

San Diego Black-Tailed Jackrabbit

San Diego black-tailed jackrabbits *(Lepus californicus bennettii)* are a California Species of Special Concern that prefer open areas such as scrub, agricultural fields, or grassland with some shrub cover for concealing themselves and their young; they have a strictly herbaceous diet, feeding on forbs and grasses (CDFG 1999). They can reach speeds up to thirty-five miles per hour and can leap up to twenty feet. They are most active at night when temperatures are low. Body heat is controlled by regulating blood flow to their large ears. They are herbivores whose natural enemies include foxes, coyotes, eagles, bobcats, great horned owls, hawks, and snakes. The mating season is year-round if the quantity and quality of food is adequate. The female can bear more than one litter per year.

Mountain Plover

The mountain plover (*Charadrius montanus*) is a Federal and California Species of Special Concern. It was proposed for federal threatened species status in 1999 and in September 2003, with the proposal being withdrawn each time. However, in 2010, it was again proposed for listing as a threatened species. Local declines have been reported for wintering populations in southern California (Garrett and Dunn 1981). Mountain plovers historically wintered on dry plains between Los Angeles and the Pacific Ocean (Coues 1874).

The mountain plover is a large member of the shorebird family (21-23.5 cm). It is drab colored in the non-breeding season, lacking black breast bands that mark other species of plover. The mountain plover utilizes agricultural fields, foraging for large insects on the ground. It has been declining due to disturbance at nesting sites by farming equipment, pesticide contamination, and degradation of habitat through the removal of primary native grazers such as bison, prairie dogs, and pronghorns (Knopf 1996).

The mountain plover is a transient, non-nesting species present during the winter months at NAVWPNSTA Seal Beach. The open grass fields and areas of bare ground are wintering habitat for the mountain plover, which are found in the agriculturally leased area of the property.

Farming of this area is managed by two leases that contain the following conservation and maintenance work:

- Agricultural management compatible with a NWR;
- Efficient water conservation irrigation practices;
- Minimum or low tillage combined with incorporating crop residues ;
- Pest management with minimal effects on wildlife;
- Fire prevention and control; and,
- Hazardous waste management.

3.4.5.4 Effects on Other Special Status Species

Like most wildlife, special status animal species are resilient to a range of habitat conditions. Complete absence of any restoration work could result in densification and structural simplification of wetland habitats at NAVWPNSTA Seal Beach, as well as incapacity to cope with long-term trends in climate change and land subsidence. This affects special status species by altering habitat and placing these species and their habitats at risk of catastrophic displacement. Even management actions designed to benefit habitat, such as restoration work, can have inadvertent adverse effects on special-status species.

An adverse impact would likely result in an unnatural change in or threat to the abundance, distribution, or viability of a special-status species. This could occur through direct disturbance or mortality or through destruction or alteration of habitat. It may also lead to increased competition by both native and non-native species, or reduce or prevent reproduction. In contrast, a beneficial impact would likely protect or restore the abundance, distribution, or viability of a special-status species. This would occur through protecting and restoring the structure, succession, and distribution of appropriate habitat subtypes, including eliminating competition from more generalist species.

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action proposes a number of actions to benefit special-status species that are not federally listed, mostly through focusing on specific habitat subtypes that are missing, degraded, or at risk. The following are benefits to special status species that are not federally listed that would result from implementation of the Proposed Action:

- Conduct focused surveys for rare plants, targeting species considered sensitive by CNPS and documented within one mile of NAVWPNSTA Seal Beach in the California Natural Diversity Database (CNDDB) system; and
- Conserve all sensitive plant species and their respective habitats as a proactive strategy to help prevent future federal listings. This includes coast woolly heads (CNPS List 2); Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri;* CNPS 1B); estuary seablite *(Suaeda esteroa;* CNPS List 1B); Lewis's evening primrose (*Cammisonia lewisii;* CNPS List 3); red sand verbena (CNPS List 4); seaside calandrinia (*Calandrinia maritime;* CNPS List 4); and southern tarplant *(Hemizonia parryi* ssp. *australis).*

These are habitat-based examples of proposals in the 2011 Revised INRMP that would benefit special status species not federally listed:

- Objectives that target habitat values of the property as a Pacific Flyway stepping stone - NAVWPNSTA Seal Beach is one of the great migratory "stepping stones" of the Pacific Flyway used by millions of birds traveling between northern breeding grounds and southern wintering sites;
- Objectives that target avian biodiversity - the SBNWR (along with other Orange County wetlands) has been designated a Globally Important Bird Area by the Audubon Society;
- Objectives to improve shorebird shelter and recovery on intertidal flats - fourteen species have been identified as at-risk in the Southern Pacific Shorebird Conservation Plan (Hickey *et al.* 2003) and for which the California coast is especially important;
- Objectives to improve wetland functioning as a fish nursery - NAVWPNSTA Seal Beach contains important nursery habitat for commercial fisheries such as California halibut, spotted sand bass, and white croaker. Connections among habitats such as eelgrass, mudflats, and tidal channels are necessary so that fishes can move to necessary habitats during their life cycles. Ensuring accessibility of fishes migrating along the coast and to shallow and intertidal nurseries via tidal flows contributes to their productivity in the greater Pacific Ocean;
- Objectives that target fish biodiversity; Resident endemic fishes of the intertidal zone contribute to global biodiversity;
- Objectives that target coastal grasslands - Coastal grasslands are increasingly scarce because of their development potential, and many declining species depend on them, such as burrowing owls, black-tailed jackrabbit, short-eared owl (*Asio flammeus*), and loggerhead shrike (*Lanius ludovicianus*);
- Objectives that target high-elevation salt marsh - these remnant areas are the habitat of Coulter's goldfields, southern tarplant, and Palmer’s frankenia *(Frankenia palmeri);*
- Objectives that target endemic beetles of salt panne and other habitats - salt pannes are upper intertidal areas that are devoid of vegetation. NAVWPNSTA Seal Beach contains some of the few remaining populations in the United States of the mudflat tiger beetle, Frost's tiger beetle, and Gabb's tiger beetle (a globally ranked species);
- Objectives that target tidal creek and microchannel diversity - they are missing from historic conditions and provide diverse microsites for sheltering endemic marine organisms and birds;
- Objectives that target middle marsh pickleweed species such as Belding's savannah sparrow and large-billed savannah sparrow;
- Objectives that target golden and bald eagles; and,
- Objectives that target habitat and species of sandy beaches, dunes, and bluffs - this includes the sandy beach tiger beetle, a Federal Species of Concern, and Lewis's evening primrose, seaside calandrinia, red sand verbena, and southern tarplant, which had its type collection in 1933 at Seal Beach.

By including focused surveys and enhancement for their required habitats, the Proposed Action would be most beneficial to special status species. There would no significant impacts to special status species under the Proposed Action.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. The effects under this alternative on special status species that are not federally listed are beneficial for those

dependent upon agriculture land (e.g. mountain plover), grasslands (e.g. burrowing owl and San Diego black-tailed jackrabbit), marsh (Belding's savannah sparrow), and riparian areas as a mosaic of those habitat would be restored, created, or preserved. However, there would be trade-offs and some negative impacts are a potential. This is because some special status species' requirements are not compatible with a listed species management emphasis due to differing habitat requirements. Additionally, predator control may increase on particular species status species that are predators of listed species.

This alternative would have no significant impacts on special status species.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. The effects on special status species dependent upon grassland habitat, including the burrowing owl and San Diego black-tailed jackrabbit, would be beneficial under this alternative as their habitat could increase by as much as 2,200 acres. Certain special status species are predators of federally listed birds, so predator control requirements may increase even more so than in Alternative 2 as numbers of those individuals increase. Potential negative impacts could occur to the mountain plover with the total loss of agriculture land and to Belding's savannah sparrow because there would be no plan or management for the loss of high marsh.

This alternative would have no significant impacts on special status species.

D. Alternative 4—No Action to Include Continuing Current Management Levels. The 1997 INRMP offered a habitat-based program with a focus on maintaining current surveys and self-sustaining populations of special status species not federally listed. While it did not specify objectives, the general habitat improvement recommended by the 1997 INRMP would incidentally benefit these species.

This alternative would have no significant impacts on special status species.

3.4.6 Invasive Species and Animal Damage Control

Plants and animals that evolved in other locations may have ecological advantages over locally native species, which evolved without the levels of competition and predation present elsewhere. If conditions are hospitable, newly introduced species can become established and out-compete natives. Non-native plants have altered native habitats such that the composition of resident wildlife and wildlife behavior has changed.

Management of invasive species nationwide is focusing on those species presently having obvious negative effects. Recent studies reveal that observed effects may range from "relatively large spatial (habitat-wide) and temporal-scale (decades) to small-scale interactions that take place in a matter of weeks" (Crooks 1998; Reusch and Williams 1998). To be effective, management actions need to understand invasions in the context of the existing and historical natural systems (L. Levin, UC San Diego, *pers. comm.*). Some species have taken decades since introduction to become a "pest," showing that it is "potentially dangerous" to predict future status of an invader from its current status (Crooks 1998). Timing is of the essence, since delays in implementing appropriate control or extirpation measures can cause the measures to be ineffective if the invading population grows too large (Levin, *pers. comm.*).

Once exotic species are established, at least five types of management control can be used: (a) mechanical (through physical removal), (b) chemical (through conventional pesticides), (c) biological (through introduction of known natural predator or parasite), (d) harvest management (through promotion of a sport or commercial fishery), and (e) fire. Biological controls are still in the experimental stage but hold promise. Each type has associated advantages and disadvantages, and combinations of more than one can be applied. Through adaptive management, managers can learn from experience to help identify the best tools for exotic weed control.

Targeting control of the most noxious, potentially ecosystem-damaging species in a timely fashion should also be a high priority because not all alien species create serious problems.

3.4.6.1 Invasive Terrestrial Plants

Invasive exotic species are found scattered throughout NAVWPNSTA Seal Beach. Such introduced species can change ecosystem dynamics by changing soil nitrogen cycling, out-competing natives for water, and changing the structure of vegetation thus altering the way animals utilize the plant community. In addition, some weeds that occur in very low numbers or seem innocuous for years may expand their range dramatically and become a difficult pest under the right environmental conditions. These conditions might include a year with very late rains or a flood that results in heavy sedimentation of drainages in the case of riparian weeds.

Invasive weeds can pose a serious long-term threat to many habitats found on the NAVWPNSTA Seal Beach. Several species possess the ability to completely change the structure of the vegetation, making it unsuitable to most native wildlife species. Sensitive and declining wildlife and plant species are particularly at risk from these weeds.

The Noxious Weed Control Act requires that federal land managers cooperate with state and federal agencies to manage undesirable plants. It mandates that a program and a person be assigned to deal with unwanted plants, funding, cooperative agreements, and the use of integrated pest management systems. The military point of contact for the Act is the Armed Forces Pest Management Board (established by OPNAVINST 6250.4A). The Instruction states the U.S. Navy's pest management policy, requires a comprehensive Pest Management Plan, and stipulates the contents of that Plan. Coordination requirements are not stated. The Instruction discusses the need to control pest outbreaks, which affect the military mission, damage property, or influence the welfare of people. Chapter 17 of OPNAVINST 5090.1C CH-1requires that the use of pesticides comply with applicable regulations to prevent pollution. Day-to-day management of noxious weeds on the agricultural outlease lands on NAVWPNSTA Seal Beach is the responsibility of the lessee.

The 1990/91 EIS/ROD identified that construction of roads through the salt marsh had resulted in changes to the native vegetation and encouraged intrusion of exotic weeds and use by non-native or opportunistic wildlife.

3.4.6.2 Marine Aquatic Invasives

Introduction of invasive species into the marsh is a concern for which the most effective prevention may not come directly from NAVWPNSTA Seal Beach. Prevention of new introductions is the most desirable, although most challenging, strategy. Since ballast water is the most prevalent means of dissemination, the Navy controls this by not conducting ballast water exchange in bays,

and this includes ships coming to Anaheim Bay. Ballast water exchange is a standard operating procedure of the Navy ships that enter Anaheim Bay. Navy policy for ballast water is presently stated in its Environmental Readiness Program Manual (OPNAVINST 5090.1C CH-1, Chapter 22, Section 10). In addition, surface ships must comply with Navy requirements to routinely wash down anchors, chains, and vessel appendages with seawater when retrieving them to prevent on board collection of sediment, mud and silt (OPNAVINST 5090.1C CH-1).

Partially in compliance with EO 13112 (Invasive Species), the Pentagon's acquisitions chief has directed the military services to incorporate invasive species prevention measures into existing operational and transportation policies, as well as into INRMPs and pest management plans. In OPNAVINST 5090.1C CH-1, Navy installations are directed to prevent the introduction of invasive species and provide for their control.

3.4.6.3 Animal Damage Control

If wildlife species can find food, water, or shelter in areas populated by humans, many will adapt to and even thrive in the new environment. Conflicts with humans can arise and range from simple nuisance cases, to damage to buildings or dwellings, or serious issues of disease transmission to people. In particular, coyotes, rats, pigeons, sparrows, feral dogs and cats can become nuisances and occasionally a health hazard.

Hunting and trapping are prohibited on NAVWPNSTA Seal Beach (NAVWPNSTA Seal Beach Instruction 5800.1C [28 Jan 1966]), except for the control of predatory animals, including wild cats and wild dogs and/or the reduction of excessive wildlife as requested by the USFWS.

Predator Management

The 1990/91 Final EIS/ROD for endangered species management and protection at NAVWPNSTA Seal Beach and SBNWR selected the environmentally-preferred alternative. This alternative prescribed maximum flexibility for management of mammalian and avian predators "in order to remain responsive to improvements and changes in technology and control techniques, operations and management of participating agencies, and situations that could suddenly and seriously threaten the endangered species." The selected alternative combined an active predator management program with population monitoring, population and habitat studies, and restoration of native salt marsh and upland coastal sage scrub habitats. Also prescribed was an evaluation of the feasibility of reintroducing coyotes to NAVWPNSTA Seal Beach and SBNWR. Overall, the objective was to implement population and habitat monitoring and management activities aimed at restoring a balance to the estuarine salt marsh ecosystem at NAVWPNSTA Seal Beach and SBNWR.

The EIS and ROD articulated a step-down plan of action for full implementation of the selected alternative over a ten-year period consisting of three phases with seven major categories of action within each phase (e.g. predator management, public education), and several specific tasks within each action category. The timing and implementation of specific components of the plan across that ten-year implementation period would be based on appropriation of funding and availability of personnel or other resources. Predator management activities were identified for each phase, but specifics on who would be responsible for supporting which tasks and personnel were not identified. The ROD stated that the types of predator control activities conducted would be by mutual concurrence of Navy, USFWS, and Animal Damage Control (ADC) and coordinated with CDFG.

Feral Animal Control

Feral dogs and cats present a sensitive problem for land managers, and feral cat numbers are increasing on NAVWPNSTA Seal Beach. Feral animals, including cats and dogs, can be a serious threat to human health and native wildlife populations, including threatened and endangered species. U.S. Navy policy also requires all dogs to be licensed, registered with security, and confined to a leash on military installations. In addition, Trap-Neuter-Release (TNR) programs have been discontinued on Navy lands.

3.4.6.4 Effects on Invasive Species and Animal Damage Control

All alternatives comply with the ROD on predator management in the SBNWR (USFWS and U.S. Navy 1991). All maintain a predator management program targeted to protect the California least tern. All de-conflict possible burrowing owl predation on the least tern by focusing owl management north of Westminster Road.

A. Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action would control vertebrate species that pose a nuisance or potential health hazard to tolerable levels without affecting (the survival of certain species) or causing any incidental take of non-target wildlife, while complying with all applicable laws. It would add an educational program for installation residents to discourage feeding and harboring feral cats and dogs and would encourage best practices, such as ensuring all outdoor trash containers are covered. It would employ Nixalite®, owl decoys, and signs prohibiting the feeding of pigeons. Where there are no sensitive species concerns, it would encourage the presence of natural predators, such as non-poisonous snakes, owls and hawks. It would use enclosed bait stations to control ground squirrels to acceptable levels while avoiding unintentional take using enclosed bait stations. It also proposes a broader scoping Weed Management Plan than the 1997 INRMP and surveys for non-native ants to develop measures to prevent their spread.

In addition, the Proposed Action addresses aquatic invasive species for the first time by providing standards and guidelines for preventing and eradicating new arrivals in the bay and marsh. The Proposed Action would bring NAVWPNSTA Seal Beach into compliance with new invasive species laws and improve its regional collaboration in this regard. Recommending surveys for non-native fish, bullfrogs, crayfish, it would seek measures to prevent their movement through drainages. While there would be damage and mortality to individual invasive plants or wildlife, populations would not experience a decline as a result of the proposed projects.

Therefore, the Proposed Action would be beneficial in preventing invasive species by implementing control measures and eradicating invasives. There would be no significant impacts on invasive species.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. The effect of Alternative 2 on invasive species and animal damage control is similar to the Proposed Action in that more invasive species work would be accomplished over current management practices; however, more predation conflict may be expected if listed species populations expand, and therefore more investment necessary in predator control.

Implementation of this alternative would not have significant impacts on invasive species.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. The effect of Alternative 3 on invasive species and animal damage control is similar to the Proposed Action in that more invasive species work is accomplished over current management practices; however, more predation conflict may be expected if coastal grassland species become more abundant since some of these are predators of federally listed species. Therefore, more investment may be necessary in their management.

Implementation of this alternative would not have significant impacts on invasive species.

D. Alternative 4—No Action/Baseline to Include Continuing Current Management Levels. The No Action Alternative proposes a Noxious Weed Management Plan and targets numerous terrestrial, not aquatic, invasive weeds for control.

Therefore, this alternative would be beneficial to invasive species control. Implementation of this alternative would not have significant impacts on invasive species.

3.5 Air Quality and Climate Change

3.5.1 Air Quality

Air quality is defined by ambient air concentrations of specific pollutants that the U.S. Environmental Protection Agency (EPA) has determined to be of concern to the health and welfare of the general public. The pollutants are classified as primary if they are emitted directly from a source into the atmosphere. Examples of primary pollutants monitored for health concerns include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur oxides (SO_X), respirable particulate matter (PM_{10}), and lead. Secondary pollutants develop over time in the atmosphere by chemical and photochemical reactions. Secondary pollutants include ozone (O_3) and smog. Locally high levels of pollutants also result in highly acidic precipitation (USFWS and U.S. Navy 1990).

In addition to federal standards set by the EPA, the State of California Air Resources Board (CARB) has also set its own, more stringent air quality standards (Table 3-3). Areas in California that exceed a state standard for a particular pollutant are considered to be in "non-attainment" status for that pollutant. An area is designated in "attainment" if the state standard for a particular pollutant was not violated at any site in the area during the past three years. The days exceeding the federal and state standards are presented in Table 3-4.

NAVWPNSTA Seal Beach is in the South Coast Air Basin (Basin) regulated by the South Coast Air Quality Management District (SCAQMD), with the nearest monitoring stations in Costa Mesa and North Long Beach. The South Coast Air Basin includes Orange County and major portions of Los Angeles, San Bernardino, and Riverside Counties. According to the more stringent state standards, the Basin is currently in nonattainment for O_3, fine particulate matter ($PM_{2.5}$), and PM_{10} (Table 3-4). The Basin has shown marked improvements in air quality since the mid-1970s when measurements were first taken regularly, despite an increase in population during that time (18.1% increase in Orange County from 1990-2000 [U.S. Census Bureau 2002]).

Secondary pollutants, specifically oxidants, represent the major air quality problems in the Basin. The dispersion of air pollutants in the Basin is often hampered by the presence of a persistent

temperature inversion in the layers of the atmosphere near the ground surface. The combination of low wind speeds and temperature inversion produces the greatest concentration of pollutants. In the winter, the greatest pollution problems are from carbon monoxide and oxides of nitrogen during the night and early morning hours. In the summer, the longer daylight hours and brighter sunshine combine to cause a reaction between hydrocarbons and oxides of nitrogen to form the typical photochemical smog (USFWS and U.S. Navy 1990). Because of its location directly on the coast, NAVWPNSTA Seal Beach may experience less air quality problems than locations inland.

The primary source of air pollutants near NAVWPNSTA Seal Beach is vehicle traffic on the Pacific Coast Highway (SR-1) to the south and the San Diego Freeway (I-405) to the north. In addition, a local major point source (defined as a source generating a minimum of 100 tons per year of primary air pollutants) is the Haynes Steam Plant. Operated by the Los Angeles Department of Water and Power, the plant is located approximately one mile northeast of NAVWPNSTA Seal Beach (USFWS and U.S. Navy 1990).

Table 3-3. Federal and state standards for air pollutants (California Air Resources Board 2011). Measured in parts per million (ppm).

Pollutant	Averaging Time	California Standard	Federal Standard	
			Primary[a]	Secondary[b]
Ozone (O_3)	1 Hour 8 Hour	0.09 ppm 0.07ppm	----------[c] 0.075 ppm	----------[c] 0.075 ppm
Respirable Particulate Matter (PM_{10})	24 Hour Annual Arithmetic Mean	50 *u*g/m^3 20 *u*g/m^3	150 *u*g/m^3 ----------[c]	150 *u*g/m^3 ----------[c]
Fine Particulate Matter ($PM_{2.5}$)	24 Hour Annual Arithmetic Mean	No separate state standard	35 *u*g/m^3 15 *u*g/m^3	35 *u*g/m^3 15 *u*g/m^3
Carbon Monoxide (CO)	1 Hour 8 Hour	20 ppm 6 ppm	35 ppm ----------[c]	----------[c] ----------[c]
Nitrogen Dioxide (NO_2)	1 Hour Annual Arithmetic Mean	0.18 ppm 0.03 ppm	100 ppb 53 ppb	100 ppb 53 ppb
Lead	30 days average Calendar quarter	1.5 *u*g/m^3 ----------[c]	----------[c] 1.5 *u*g/m^3	----------[c] 1.5 *u*g/m^3
Sulfur Dioxide (SO_2)	1 Hour 3 Hour 24 Hour	0.25 ppm ----------[c] 0.04 ppm	----------[c] ----------[c] ----------[c]	----------[c] 0.5 ppm ----------[c]
Sulfates	24 Hour	25 *u*g/m^3	----------[c]	----------[c]
Hydrogen Sulfide (H_2S)	1 Hour	0.03 ppm	----------[c]	----------[c]

[a] The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
[b] The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[c] Pollutant not measured at this scale.
Source: http://www.arb.ca.gov/aaqs/aaqs2.pdf (01/10/11).

Table 3-4. Numbers of days local air monitoring stations have exceeded federal and state standards for measured pollutants. Also shown is Orange County's current attainment status for state standards (CARB 2011).

Pollutant	No. days exceeding federal standard			No. days exceeding state standard			2009 Orange County Status[a]
Year	2007	2008	2009	2007	2008	2009	
1-Hour Ozone (O_3)[b]	*	*	*	0	0	0	Attainment
8-Hour Ozone (O_3)[b]	0	3	0	2	5	3	Nonattainment
Respirable Particulate Matter (PM_{10})[c]	1	0	0	6	3	1	Nonattainment
Fine Particulate Matter ($PM_{2.5}$)	15	5	4	------[d]	------[d]	------[d]	Nonattainment
Carbon Monoxide (CO)[c]	0	0	0	0	0	0	Attainment
Nitrogen Dioxide (NO_2)[b]	------[d]	------[d]	------[d]	0	0	0	Attainment
Lead[c]	0	0	0	0	0	0	Not Reported
Sulfur Dioxide (SO_2)[b]	0	0	0	0	0	0	Attainment
Sulfates	Not Available						Attainment
Hydrogen Sulfide (H_2S)	Not Available						Unclassified

a Attainment status shown is for state standards that are equal to or stricter than federal standards (CARB 2002).
b Measured at the Costa Mesa monitoring station in Orange County (closest station to NAVWPNSTA Seal Beach in South Coast Air Basin that measures this pollutant).
* Statistics for which standards have been revoked.
c Measured at the Anaheim-Pampas Lane monitoring station in Los Angeles County (closest station to NAVWPNSTA Seal Beach in South Coast Air Basin that measures this pollutant).
d Pollutant not measured at this scale.

3.5.2 Climate Change

3.5.2.1 Greenhouse Gases

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. Emissions of these gases occur from human activities and naturally occurring processes. The earth's temperature is affected by the accumulated of GHGs in the atmosphere, and scientific evidence indicates that the trend of increasing global temperatures over the past century is due to human actions emitting GHGs. The change in climate associated with this rise in global temperatures is expected to produce negative economic and social consequences throughout the planet.

The most common GHGs produced from natural and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Every GHG has an associated global warming potential rating, derived from its ability to trap heat in the atmosphere. The rating system is standardized, and every GHG assigned a value against CO_2.

Federal agencies and states have begun addressing emissions of GHGs through laws and regulations that account for and reduce GHG emissions. California passed the Global Warming Solutions Act of 2006 to reduce statewide emissions. DoN is also implementing EO 13123 (Greening the Government through Energy Efficiency) and the Energy Policy Act of 2005 with renewable energy projects on various installations.

The climate change discussion that follows is a qualitative analysis without a quantitative determination. It addresses the expected direction of effects (increase, decrease or maintain the status quo), but not the amount of impact, since this is not expected to be a meaningful percentage change in terms of the project's ability to exacerbate or ameliorate the effect of climate change, nor the possibility of climate change affecting the project.

None of the alternatives proposed would hinder attainment of the President's greenhouse gas reduction targets for federal agencies as required in EO 13514 "Federal Leadership in Environmental, Energy and Economic Performance."

3.5.2.2 Sea Level Rise

Over the last several decades, tidal gauging stations along the California coast have registered a sea level rise rate of 0.017 to 0.02 m per century (Cayan *et al*. 2009). Based on global climate models (GCMs) that include increases in greenhouse gas levels, global expansion of reservoirs and agriculture, and sea surface temperature increase, among a host of other variables, the rate of sea level rise will increase beyond historical rate by a considerable amount (Cayan *et al*. 2009). In 2001, the United Nation's Intergovernmental Panel on Climate Change (UN IPCC) predicted the values for the increase in global sea level by 2100 are between 0.09 and 0.88 m inclusive of all GHG emissions scenarios (Houghton *et al.* 2001). More recently, the UN IPCC has revised these numbers to between 0.18 and 0.59 m (Solomon *et al.* 2007).

At a regional level, sea level changes can vary from the global mean because of shifts in ocean circulation (Solomon *et al.* 2007, NRC 2010). Cayan *et al*. (2009) present data that estimate sea level rise along the California coast by the end of the 21st century to fall within 0.5 and 1.4 m, depending on which emissions scenario is used. Moreover, spring tides associated with storms are expected to be more severe, especially during El Niño cycles (Cayan *et al*. 2008). A recent study for the San Diego area funded by the California Energy Commission (Messner *et al*. 2009) found that by the year 2050, common daily tidal inundation will be 0.3 to 1.6 m above 2006 levels, with moderately common levels at 1.6 to 2.9 m. In this study, rare inundations due to storm surge could pass 3.4 m above 2006 levels (Messner *et al*. 2009). Regardless of the differences between these various studies and the specific threats they address (sea level rise vs. sea level rise + storm surge), all of these projections suggest the onset of severe coastal impacts at many Naval installations (NRC 2010), especially in terms of erosion stress and wetland habitat loss at NAVWPNSTA Seal Beach.

The Engineering Service Center at Naval Facilities Engineering Command (NAVFAC) has recently conducted a sea level rise assessment for naval installations per a request of the Secretary of Defense. This study found that for a 0.5 m, 1 m, 2 m, and 3 m rise, NAVWPNSTA Seal Beach would lose 11.42 acres (4.6 ha), 85.53 acres (34.6 ha), 993.95 acres (402.2 ha), and 1,717.75 acres (695.1 ha) respectively. This is consistent with the approximate acreage affected by a 0.88 m rise in sea level as determined for NAVWPNSTA Seal Beach as part of the Revised INRMP (DoN 2011). The NAVFAC study is expanding a scope of inundation threat model to determine exactly what individual buildings and facilities are at risk and have developed a prototype model for spatially explicit vulnerabilities using Naval Base Ventura.

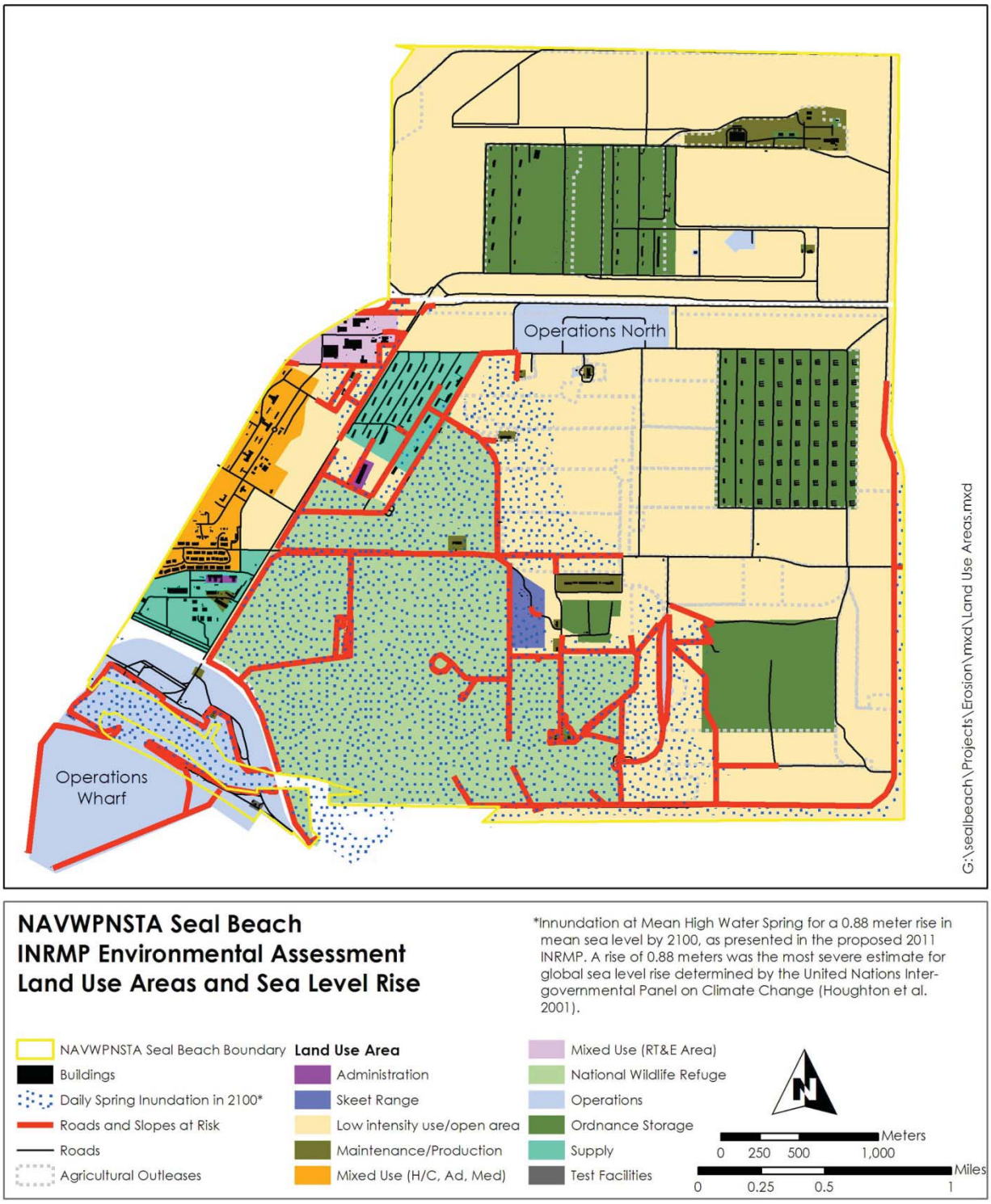
In addition, the USFWS has conducted modeling of sea level rise and potential impacts to SBNWR. These are presented in the Preliminary Draft Comprehensive Conservation Plan (CCP) (USFWS 2010) and confirm that under the most conservative sea level rise scenario, 0.39 m by 2100, roughly one quarter of the Refuge's salt marsh habitat would be converted to subtidal habitat. The amount of salt marsh acres lost to habitat conversion increases to two thirds with a 0.69 m rise by the year 2100. Nearly 100 percent of the salt marsh habitat would be lost under scenarios that assume a rise of greater than 1 m. The small quantity of undeveloped dry land on the Refuge is predicted to be vulnerable under all scenarios run, while the developed dry land was assumed to be maintained and protected in this analysis (Clough and Larson 2008).

Presumably, these three studies do not incorporate potential subsidence of the marsh in their assessments. This geological process has been known to significantly alter the elevation of the marsh in the past, and if currently occurring, will amplify the effects of sea level rise.

Combining an elevation contour map with the most extreme increase in global sea level (0.88 m) provided by the UN IPCC (Houghton *et al.* 2001), the Revised INRMP describes the daily inundation scenario for high spring tides in the year 2100 assuming no subsidence (See Map 3-1). It shows flooding of all wetlands and some operational areas of NAVWPNSTA Seal Beach.

3.5.3 Air Quality and Climate Change Effects

The federal 1963 CAA (42 U.S.C. 7401 *et seq.* as amended) stipulates that federal land managers have a responsibility to protect air quality values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse air pollution impacts. Air quality is affected in the short-term during any type of activity that creates dust; therefore, it is analyzed as a relevant impact topic. Section 176 of the Clean Air Act requires any action on the part of a federal agency in an area considered nonattainment for air quality standards to conform to the state's efforts to attain and maintain these standards.



Map 3-1. Projected sea level rise due to climate change at Naval Weapons Station Seal Beach.

Alternative 1—Proposed Action/Preferred Alternative. The Proposed Action continues mitigation measures for dust and smells emanating from agriculture or dredging operations. Only short-term, ephemeral effects on air quality or greenhouse gases are expected from heavy equipment operation associated with any restoration or agriculture work. However, none of these activities would contribute to a regional increase in GHGs or decrease in air quality.

The Proposed Action specifically considers climate change related sea level rise (in combination with what is believed to be ongoing subsidence of the wetlands) by identifying a buffer area, allowing for the planned expansion of wetlands into inland areas, and identifying monitoring elements and focus species to help prepare for this threat to existing conditions at NAVWPNSTA Seal Beach. The Proposed Action also integrates knowledge of subsidence trends with erosion/sedimentation rates and planning to create long-term wetland viability. It recommends research to determine factors causing adverse changes to land elevation so that they may be alleviated, if necessary and possible, to protect upland Navy property from unwanted tidal inundation caused by the combination of sea level rise and subsidence, or to plan appropriate buffers to accommodate the impact.

This alternative is beneficial in addressing potential sea level rise and global warming. While implementation of this alternative may result in minor, short-term contributions of GHGs. The Proposed Action would not have significant impacts on air quality or climate change.

B. Alternative 2—Emphasis on Federally Listed Species Enhancement. The effects on air quality for this alternative are similar to the Proposed Action, except that agricultural activities are curtailed such that air quality mitigation measures would be fewer and air quality would benefit. Restoration work completed on lands removed from agricultural activity would decrease the release of the GHGs associated with the operation of agriculture equipment; however, it might also result in short-term ephemeral releases of GHGs from equipment operations during restoration activities. None of these activities would contribute to a regional increase in GHGs or decrease in air quality. The net result of restoration work in the long term would be an improvement in air quality.

This alternative allows for some expansion of marsh (to the 1873 boundary) so it would provide some benefit for adapting to climate change. However, it has no specific plan for the expected flooding of operational areas and endangered species habitats.

Implementation of this alternative would result in minor, short-term contributions of GHGs. There would not be significant impacts on air quality or climate change.

C. Alternative 3—Emphasis on Restoring Coastal Grassland Uplands. This alternative would be the same as the Proposed Action, except that agricultural activities would be eliminated so that air quality mitigation measures would be unnecessary and air quality would benefit. Removing lands from agriculture would also potentially decrease the release of GHGs from equipment operations during restoration activities. The net effect of restoration work in the long term would be an improvement in air quality. This alternative addresses possible sea level rise and the migration of marshlands to inland areas but does not identify buffering or monitoring areas.

Implementation of this alternative would result in minor, short-term contributions of GHGs. There would not be significant impacts on air quality or climate change.

D. Alternative 4—No Action to Include Continuing Current Management Levels. Dust mitigation and control of smell from agricultural operations and dredge spoils have been past air quality concerns addressed with conservation measures in the 1997 INRMP. Therefore, the No Action Alternative benefits air quality. Restoration work that involves the use of heavy equipment may have a temporary, short–term effect on air quality standards; however, no long-term effects are expected. The net effect of restoration work in the long term would be an improvement in air quality. The effects on air quality for this alternative would essentially be the same as the Proposed Action.

The 1997 INRMP does not explicitly address climate change. However, the major restoration proposals would, in some cases, alleviate the effects of expected future flooding, such as the proposed perimeter marsh expansion, excavating new tidal access channels, removal of agricultural cultivation along the north property boundary to create freshwater wetlands, and excavating swales to connect the currently disconnected riparian cells. Other proposals would require fill material, such as shallowing Case Pond and the addition of islands in the mitigation ponds, and these shallower conditions would retain some marsh or estuary benefits post-flood while deeper habitats would lose them. The restoration work proposed in the 1997 INRMP has not been implemented to date.

Implementation of this alternative would not have significant impacts on air quality or climate change.

4.0 Cumulative Effects Analysis

4.1 Cumulative Effects

The approach taken to analyze cumulative impacts (or cumulative effects)[1] follows the objectives of the NEPA of 1969, CEQ regulations, and CEQ guidance. CEQ regulations (40 CFR §§ 1500-1508) provide the implementing procedures for NEPA. These are the environmental impacts resulting from "the incremental impacts of the action when added to other past, preset, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR § 1508.7).

4.1.1 Cumulative Effects Definition

The CEQ provides guidance on cumulative impacts analysis in *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997). This guidance further identifies cumulative effects as those environmental effects resulting "from spatial and temporal crowding of environmental perturbations. The effects of human activities will accumulate when a second perturbation occurs at a site before the ecosystem can fully rebound from the effects of the first perturbation." Noting that environmental impacts result from a diversity of sources and processes, this CEQ guidance observes that "no universally accepted framework for cumulative effects analysis exists," while noting that certain general principles have gained acceptance. One such principal provides that "cumulative effects analysis should be conducted within the context of resource, ecosystem, and community thresholds—levels of stress beyond which the desired condition degrades." Thus, "each resource, ecosystem, and human community must be analyzed in terms of its ability to accommodate additional effects, based on its own time and space parameters." Therefore, cumulative effects analysis normally will encompass geographic boundaries beyond the immediate area of the action, and a timeframe including past actions and foreseeable future actions, in order to capture these additional effects. Bounding the cumulative effects analysis is a complex undertaking, appropriately limited by practical considerations. Thus, CEQ guidelines observe, "[it] is not practical to analyze cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful." As such, the projects described below are in various stages of implementation on NAVWPNSTA Seal Beach or nearby.

4.1.2 Geographic Boundaries for Cumulative Impact Analysis

Geographic boundaries for analysis of cumulative impacts vary for the impacted resources and the extent of their reach. For example, air quality would be considered on a basin-wide basis, as defined by the CARB, whereas the project area is the appropriate boundary for other resources. The cumulative effects analysis includes regional projects that directly overlap in time or space. For agricultural resources, the geographic boundary is southern California coastal counties of Ventura, Los Angeles, Orange, and San Diego, where population centers are concentrated that

[1] CEQ Regulations provide that the terms "cumulative impacts" and "cumulative effects" are synonymous (40 C.F.R. § 1508.8[b]); the terms are used interchangeably in this document.

use local agricultural products. For biological resources including wetlands, coastal grasslands, and federally listed species, the geographic boundary is the Southern California Bight or the individual species' distribution.

4.2 Other Past, Present, and Reasonably Foreseeable Future Actions

4.2.1 Installation Restoration Projects

An Installation Restoration Plan has been developed for NAVWPNSTA Seal Beach. This plan provides guidance for the cleanup and closure of IR sites. Various IR cleanup sites have been closed at NAVWPNSTA Seal Beach while a number remain open and are scheduled for closure in the future. Ongoing or future cleanup sites include Oil Island and lead cleanup at the Old Skeet Range (planned for Fiscal Year 2012). Restoration of many sites coincides with natural resources' objectives of the current and Revised INRMP. For example, both of these INRMPs discuss NAVWPNSTA Seal Beach wetlands' linkage to IR site cleanup requirements.

4.2.2 Comprehensive Conservation Plan for Seal Beach National Wildlife Refuge

A CCP, a 15-year management strategy, is in its final phases of development for SBNWR and expected to be complete late 2011. The proposed goals include:

- Support recovery and protection efforts for the federally and state listed threatened and endangered species and species of concern;
- Protect, manage, enhance, and restore coastal wetland and upland habitats to benefit native fish, wildlife, and plant species;
- Enhance public appreciation, understanding, and enjoyment of the refuge's biological and cultural resources through outreach opportunities and quality wildlife-dependent recreation, including wildlife observation, environmental education, and interpretation; and,
- Further strengthen the management partnerships between the SBNWR and NAVWPNSTA Seal Beach, while preserving our respective missions.

Alternatives consist of a No Action option, an alternative to maximize salt marsh, and a third alternative to optimize upland and wetland restoration.

4.2.3 Recovery Plans for Listed Species

Species recovery plans for federally listed species known to inhabit the natural areas at NAVWPNSTA Seal Beach call for protection and management of known habitat in a manner that moves the species toward their down-listing or de-listing.

4.2.4 Interstate 405 Improvement Project

Environmental review and construction is currently underway for widening the I-405. A portion of the I-405 Improvement Project will be located on a California Department of Transportation (Caltrans) easement on the northern boundary of NAVWPNSTA Seal Beach property. As required by the California Environmental Quality Act (CEQA) and NEPA, Caltrans, in

cooperation with the Orange County Transportation Authority (OCTA), prepared an Environmental Impact Report (EIR)/EIS for this project. The Federal Highway Administration assigned NEPA authority to Caltrans for this project and announced the EIS on behalf of Caltrans on 01 September 2009.

The widening would remove a 40-foot strip along the north edge of the installation to create an access road, thus removing a small area of land available for restoration or agriculture within the alternatives. A 2010 addendum to the original 2003 EIR/EIS for the I-405 Improvement Project stated that the construction work on NAVWPNSTA Seal Beach "would not individually or cumulatively have an unavoidable adverse or significant environmental effect."

A project included in the I-405 Improvement Project is the future Seal Beach Avenue Bridge widening scheduled for construction December 2011-August 2013. The bridge, which crosses over I-405, will be widened to accommodate currently increasing traffic in the area as well as to accommodate the projected future increase in traffic from the I-405 Improvement Project. The bridge cuts along the northeast corner of NAVWPNSTA Seal Beach.

4.2.5 Regional Wetland Restoration Project Implementation

Wetland restoration projects along the coast to the north and to the south of NAVWPNSTA Seal Beach are in a range of implementation stages and a culmination of planning over decades by state and federal agencies and non-governmental organizations. A chain of coastal wetlands along the Huntington Beach coast to the south, the southernmost at the Santa Ana River mouth, has had tidal flow reintroduced and other work completed in multi-million dollar projects, part of which will become a future Orange Coast River Park. Brookhurst, Talbert, and most recently (with federal stimulus money) Magnolia marshes had salt water reintroduced (through levee breaching) into excavated tidal channels, and pickleweed, cord grass and salt grass planted. They are what remain of what was once a 3,000-acre tidal wetland complex beneath the western bluffs of what is now Costa Mesa. Immediately south of the NAVWPNSTA Seal Beach, the tidal inlet was restored at Bolsa Chica wetlands in August of 2006. This was the result of a partnership among environmental organizations, local residents, and eight state and federal agencies to restore nearly 600 acres of wetlands. The planting of pickleweed, salt grass, and cordgrass is ongoing in these wetlands.

To the north of NAVWPNSTA Seal Beach in Los Angeles County, wetland restoration projects are also underway. The Ballona Wetland Enhancement Project will improve a variety of native habitats on about 600 acres of the former Ballona Wetlands (now owned by the State of California) along both sides of the Ballona Creek channel. The goals at this site are to restore and enhance salt water influenced wetland habitats to benefit endangered and threatened species, migratory shorebirds, waterfowl, seabirds, and coastal fish and aquatic species. The restoration of seasonal ponds, riparian and freshwater wetlands, and upland habitats is under consideration to assess whether they would benefit the salt water habitats. Ballona wetlands once occupied more than 2,000 acres. Active oil extraction first caused significant alteration of the wetlands; then in the 1930s, Ballona Creek was channelized, straightened, and deepened as part of a flood control project. Construction of Marina del Rey in the 1950s also converted coastal dunes and wetlands into a marina. Dredge spoils from marina construction were deposited on the undeveloped portions of the area. Major infrastructure was built across the wetlands, all creating impacts to hydrologic and habitat connectivity. The Ballona Wetland Enhancement Project integrates planning with other adjacent wetland resources, including Ballona Lagoon, Del Rey

Lagoon, Grand Canal, Marina Del Rey Harbor, and Oxford Lagoon. Restoration of Ballona Wetlands is anticipated to begin in 2012.

At the San Diego Bay National Wildlife Refuge, south of NAVWPNSTA Seal Beach, 300 acres of habitat enhancement is underway for the South San Diego Bay Coastal Wetland Restoration and Enhancement Project. This project would restore approximately 35 acres of shallow subtidal habitat, 20 acres of intertidal mudflats, 123 acres of low salt marsh habitat (cordgrass-dominated salt marsh), 22 acres of mid salt marsh habitat, and 14 acres of high salt marsh habitat.

The net effect of the restoration work accomplished in the geographic region thus far is recovery of some of the lost salt marsh and shallow water ecosystems that were historically present. Another result of the restoration work is a relative decline in coastal uplands and unvegetated salt water habitats, such as mudflats and salt pannes, upon which some species depend. Mudflats provide habitat for shorebirds, salt panes provide habitat for tiger beetles, and coastal uplands provide habitat for the black-tailed jackrabbit.

4.2.6 Santa Ana Watershed Project Authority

Recognizing major regional and local watershed issues, the Santa Ana Watershed Project Authority (SAWPA) is implementing an Integrated Regional Water Management Plan (IRWMP), also known as, "One Water One Watershed" (OWOW). The Plan addresses water quality, water quantity, climate change, and ecological health within the watershed. In 2007, the OWOW Steering Committee identified several guiding objectives, including:

- Preserve and enhance the environment–Protect and enhance water-related habitats, protect sensitive marine and estuarine environments;
- Promote sustainable water solutions–Develop partnerships for planning and implementation of economically, environmentally, and socially sustainable watershed projects;
- Improve regional integration and coordination; and,
- Manage rainfall as a resource–Provide appropriate flood control capacity.

Specifically, the Plan calls for filling in gaps between riparian areas, creating wetlands and linking to other wetlands, and reducing greenhouse gas emissions. The OWOW Plan was adopted in November 2010.

4.2.7 Federal, State, and Regional Agricultural Land Conservation Policies and Programs

Approximately 11 percent of Orange County was used for agriculture in 2010 (County of Orange 2011). Between 1984 and 2008, Orange County lost 18,115 acres of “Farmland of Local Importance” as defined by the State (California Department of Conservation Farmland Mapping and Monitoring Program 2010). This is an average loss of 755 acres per year. Los Angeles County acreages are similar (18,870 acres lost, about 786 acres/year). Ventura County also lost the high-value farmland (9,896 acres, or 412 acres/year). In contrast, San Diego County gained 11,206 acres in the same period; however, recent water reductions have has as of yet unquantified impacts, but the trend is downward.

The CEQA includes farmland loss as a significant impact that must be avoided or mitigated. Some mitigation has occurred, resulting in the preservation of several thousand acres of land under conservation easements. The California Coastal Act (CCA) limits allowable agricultural land conversions in order to protect agriculture in the coastal zones of California. State climate legislation (AB 32 and SB 375) may also be beneficial toward farmland conversion by encouraging more compact, efficient development that requires less auto use, thus less conversion of agricultural land to developed uses. Less auto use would produce fewer GHG emissions overall, including less per capita. Although these state requirements generally do not apply to a federal action, such as potential implementation of an INRMP, they are potential considerations with respect to cumulative impacts insofar as they could be factors in shaping the nature and scope of other, non-federal actions in the region.

4.2.8 Base Realignment and Closure Program

The Defense Base Realignment and Closure (BRAC) Act of 1990 has resulted in the excessing of a great deal of military property throughout the nation. It has also resulted in an increased concentration of military activity at the existing military bases that remain open.

4.3 Potential Cumulative Impacts by Environmental Resource Area

4.3.1 Natural Resources

4.3.1.1 Geology and Soil Resources

Per the potential effects analysis in this EA, implementation of all of the alternatives would result in overall beneficial effects to soil and geologic resources. Implementation of BMPs would be conducted for activities proposed by each alternative to provide for erosion control and soil conservation. Erosion and run-off could result from the identified cumulative restoration and development projects during and, potentially immediately after, the construction phases of the projects; however, the identified cumulative projects would employ soil conservation measures and BMPs, as identified in their respective erosion control plans. The regional wetland restoration projects specifically would enhance erosion control and soil conservation in the geographic region. When added to the impacts from other projects in the cumulative effects region, the alternatives would not result in significant cumulative impacts to geology and soils.

4.3.1.2 Water and Hydrologic Resources

Implementation of any of the four alternatives would result in beneficial effects to water and hydrologic resources. They would provide a framework for protecting wetlands at NAVWPNSTA Seal Beach. The Proposed Action would provide beneficial effects to the regional watershed with the expansion and/or restoration of wetlands and the adoption of policies for improved water quality and efficiency in the region. Alternative 2's benefits to water and hydrologic resources would be similar to the Proposed Action's, except that it would provide additional benefits through reduced water consumption for agricultural land irrigation and the expansion and enhancement of salt marsh and other marine habitats. The effects from Alternative 3 would be similar to those in Alternative 2, with additional grassland benefits and further reduction of water use for agriculture irrigation. The No Action Alternative would also provide

beneficial impacts on the whole, because of the expansion and/or restoration of wetlands and the continued implementation of water quality practices.

In terms of water quality, the I-405 Improvement Project would result in regional increases in impervious surfaces, resulting in incremental increases in urban runoff entering existing flood control channels, natural and developed waterways, estuaries, and the Pacific Ocean; however, these increases are not anticipated to have significant impacts to the water resources on or adjacent to the NAVWPNSTA Seal Beach.

Other projects within the cumulative effects region currently provide and will continue to provide benefits to regional water and hydrologic resources. In particular, the CCP for the SBNWR, the regional wetland restoration projects, and the Santa Ana Watershed Project provide for water and hydrologic resources protection and conservation; specifically the restored wetlands would provide benefits to water quality downstream from development projects as a result of the natural filtering function they offer. When adding the potential impacts from the four alternatives analyzed in this EA to other projects in the cumulative effects region, there would be no significant cumulative effects to water and hydrologic resources.

4.3.1.3 Biological Resources (plant communities, wildlife populations, special status species, invasive species, and animal damage control)

The projects described in the cumulative impacts section represent development and restoration projects. The proposed restoration and development projects could result in temporary impacts to biological resources; however, these impacts would be minimized by avoiding construction activity during the relevant breeding seasons, while other impacts would be offset by the benefits of restoration.

All of the alternatives are anticipated to result in beneficial effects to biological resources by restoring native habitats, controlling invasive species, and providing for predator control of federally listed species. Specific projects in the alternatives either have been, or would in the future be, assessed through separate NEPA planning processes. The Revised INRMP strategies, designed to protect and conserve NAVWPNSTA Seal Beach's natural resources, generally enhance and build on both local and regional ecological goals. The Proposed Action provides a focus on declining species and species groups for which there is less regulatory protection than those that are federally listed, while continuing management of federally listed species. Alternative 2 would emphasize management of federally listed species. Alternative 3 would focus upon increasing the population and management of coastal grassland species. The No Action Alternative would result in continued management of federally listed and other species.

Other projects within the cumulative effects region are currently providing and will continue to provide benefits to area biological resources. One of the goals of the SBNWR CCP is to support the recovery and protection of federally and state listed species and species of concern (USFWS draft 2010). This would increase the abundance and health of habitats for biological resources on NAVWPNSTA Seal Beach and SBNWR. The recovery plans for listed species, the regional wetland restoration projects, and the Santa Ana Watershed projects would all contribute to enhanced biological resources in the area. The I-405 widening project was determined to have minimal impacts on biological resources and no impacts on sensitive species. When adding the

potential impacts from the four alternatives analyzed in this EA to other projects in the cumulative effects region, there would be no significant cumulative effects to biological resources.

4.3.2 Land Use

In both the Proposed Action and the No Action alternatives, the existing NAVWPNSTA Seal Beach agricultural land leases would continue. There could be possible conversion of certain small acreages from agricultural lands to wetlands in the long-term future under the Proposed Action (refer to Map 2-2). Under Alternative 2, approximately 1,000 acres (1.8% of agriculture lands in Orange County), would be converted to coastal grasslands. Under Alternative 3, approximately 2,200 acres of agricultural land (3.8% of agriculture lands in Orange County) would be converted to coastal grasslands. The conversion of these relatively small amounts of agricultural lands to coastal grasslands is not considered a significant impact to land use.

Additionally, some of the areas proposed for conversion under the Proposed Action and Alternatives 2 and 3 are the same locations most likely to become wetlands with sea level rise in the future (see Figure 3-1 of the 2011 Revised INRMP), and are currently the most saline-affected due to historic inundation. Under the No Action Alternative, some of the lowest-lying agricultural lands could be lost in the long term due to sea level rise; these agricultural lands are also the most saline-affected due to historic inundation. Saline-affected soils are very constraining to agriculture, and crop choice and profitability are extremely limited.

The losses of agriculture are considered very small and *de minimis* in terms of cumulative impacts. When added to past, present and foreseeable future projects, the potential conversion of agricultural lands to coastal grasslands under Alternatives 2 and 3 would be considered a small and insignificant contribution to the cumulative impact in terms of regional land use, specifically coastal agriculture in southern California (from Ventura County south). The nature of the cumulative impact is even smaller when inland areas of southern California are considered and with predicted land use shifts that would come with climate change. When added to the impacts of other projects in the cumulative effects region, the alternatives would not result in significant cumulative impacts to land use.

4.3.3 Air Quality & Climate Change

Air Quality

The South Coast Air Basin, in which NAVWPNSTA Seal Beach is located, includes Orange County and major portions of Los Angeles, San Bernardino, and Riverside Counties. According to the state standards, the Basin is currently in nonattainment for O_3, $PM_{2.5}$, and PM_{10} (Table 3-4). Secondary pollutants, specifically oxidants, represent the major air quality problems in the Basin.

Implementation of any of the four alternatives would involve the use of equipment and machinery, either in agricultural activities (Proposed Action, Alternative 2, and the No Action Alternative) or in restoration and maintenance activities (all alternatives). These activities would produce small amounts of air emissions, dust from ground disturbing activities, and airborne pesticides or herbicides associated with agriculture and/or restoration projects. The air emissions from the alternatives, however, would be ephemeral, short-term and insignificant. Emission-producing activities associated with the No Action Alternative would be *de minimis*. Overall emissions associated with the Proposed Action and Alternative 2 and 3 are not anticipated to increase

significantly over current emissions; thus air quality impacts from any of the alternatives is anticipated remain *de minimis*. Mitigation measures would be implemented under all alternatives to reduce airborne dust. Implementation of any of the alternatives would also include compliance with the General Conformity Rule of the Clean Air Act (Sec. 176(c)); therefore, none of alternatives would cause or contribute to any violation of air quality standards in the region. Other cumulative projects, such as the I-405 widening, could generate some minor and short term effects on air quality. These effects, when added to the effects from any of the alternatives, would not be considered significant at the cumulative level.

Greenhouse Gases and Climate Change

The effects of GHG emissions are by nature global; therefore, the small amounts of air emissions from the implementation of any of the alternatives would not have significant effects on GHGs and climate change. Cumulatively, adoption of the proposed SBNWR CCP could bolster the enhancement and restoration of coastal wetland and upland habitats, thus providing future support to the area in alleviating the possible effects from sea level rise. These circumstances would most likely heighten the relative importance of NAVWPNSTA Seal Beach and the SBNWR as habitat for migrating avifauna and resident coastal wildlife. The expansion of marsh within Proposed Action and Alternative 2 provide the greatest amounts of marsh expansion, and would contribute beneficial cumulative effects to accommodate local sea level rise.

The effects from any of the alternatives, when added to the effects from the cumulative projects, are minor and not large enough to have an appreciable effect on GHGs and climate change. There would be no significant cumulative impacts to GHGs and global climate change from any of the alternatives.

4.3.4 Socioeconomics and Environmental Justice

There would be no effects to the issue of environmental justice from any of the alternatives or from any of the cumulative projects. Under Alternatives 2 and 3, effects to socioeconomics would be minor and localized due to the potential loss of a small number of agricultural-related jobs. These effects, however, may be reduced by the employment opportunities created from the restoration work that would be done under these alternatives. Shifts of the revenue or laborers to other communities would be so small as to be considered *de minimis*. The identified cumulative projects, such as the I-405 widening project, the SBNWR CCP, and the regional wetland restoration projects, would also provide employment opportunities in the area. Cumulative impacts with respect to socioeconomics and environmental justice would not be significant from any of the alternatives when added to current and reasonably foreseeable projects in the area of analysis.

4.3.5 Recreational and Aesthetic Values

The Proposed Action and Alternatives 2 and 3 would all increase recreational opportunities at SBNWR and the No Action Alternative would maintain current recreational opportunity levels. All of the alternatives could result in beneficial impacts to visual quality by improving the landscaping and ground maintenance to compliment native vegetation.

The identified restoration and development cumulative projects may not change or may result in modifications to existing visual quality within the area immediately surrounding the various

project sites. The I-405 Improvement Project would have overall negative impacts on the aesthetic resources in various areas of the project corridor. The other described projects would either not change or improve the recreational values of the area. For example, one of the goals of the CCP for SBNWR is to provide quality wildlife-dependent recreation, including wildlife observation, environmental education, and interpretation.

Although the Proposed Action and Alternatives 2 and 3 would provide additional recreational opportunities by implementing new public outreach programs, improving fishing opportunities, and developing a nature center, it would be a limited population (the military and DoD civilians) that would more regularly enjoy the greater aesthetics and recreation activities. Recreational, educational, and otherwise public access and enjoyment of SBNWR would still be limited based on continued military, safety, and security requirements. Because of the exclusive and limited (scheduled and escorted) population able to view and use SBNWR, the Proposed Action and alternatives would not add to, detract from, or be impacted by any identified regional project impacts. When considering regionally available recreational opportunities, those made available at the installation and SBNWR as a result of any of the alternatives would be so small as to be considered *de minimis*. Beneficial impacts from the any of the alternatives and other regional projects would not add to or be negatively impacted by negative aesthetic values from the I-405 widening. The alternatives would not result in significant cumulative impacts to recreational and aesthetic values.

This Page Intentionally Left Blank

5.0 Other NEPA Considerations

5.1 Possible Conflicts Between the Alternative and the Objectives of Federal, Regional, State and Local Plans, Policies and Controls

Implementation of the Proposed Action or alternatives would comply with existing federal regulations and state, regional and local policies and programs while maintaining the military mission. Relevant federal regulations to the action alternatives are listed in Chapter 1; compliance with additional regulations that arose during the course of implementation of action alternatives would also occur.

5.2 Irreversible and Irretrievable Commitment of Resources

Resources irreversibly and irretrievably committed to a project are used on a long-term or permanent basis. Non-renewable natural and human resources, such as labor, petroleum and metals and cultural resources are examples. If a resource could have been used for other purposes, it is considered irretrievable. The unavoidable destruction of natural resources that could limit the range of potential current and future uses of the site also falls into this category. Examples of irreversible commitments include mining and harvesting old growth forest products.

Implementation of all of the alternatives would involve the consumption of resources for land management, restoration and land maintenance activities. Implementation of all of the alternatives would require fuel, chemical products in the form of herbicides and pesticides, and human labor to agriculture and restoration activities; however, the commitment would be short-term and amounts would be not significant.

All of the alternatives involve a degree of land committed to restoration, which would be irretrievable. The Proposed Action and Alternative 3 commit the greatest amount of land to restoration purposes, transferring more available agriculture land to habitat restoration, thus committing the greatest amount of irretrievable land resources. The Proposed Action, Alternative 2, and No Action Alternatives would retain in agriculture use, thus committing to fewer irretrievable land resources.

5.3 Sustainability and Long-Term Management: Relationship of Short-Term Uses and the Maintenance and Enhancement of Long-term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts to the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing a single development option reduces future flexibility in pursuing other options, or that

giving over a parcel of land or other resource to a certain use eliminates the possibility of other uses performed at that site.

The Proposed Action's land use as agriculture is long-term, but not permanent, as agriculture land could be converted to another use. The Proposed Action would dedicate some land long-term, perhaps irretrievably, if wetlands were created. Alternative 2 proposes continuation of agriculture and conversion of some agriculture to grassland, as well as expansion of wetlands. Both agriculture and grasslands use would not be permanent and could be converted to another use; but the wetlands would likely be irreversible, thus permanently narrowing the range of beneficial uses of the environment. Alternative 3 proposes conversion of all agriculture lands to grasslands and expansion of the wetlands; the long-term land uses and conversion potentials are the same as Alternative 2. The No Action Alternative would not result in any impacts that would permanently narrow the range of beneficial uses of the environment.

5.4 Energy Requirements and Conservation Potential of Various Alternatives and Mitigation Measures Being Considered

Consumption of energy for routine maintenance, restoration projects and agriculture activities would be minimal and ephemeral in implementing the alternatives. Mitigation measures would not be required for implementation of the alternatives. Therefore, there is not anticipated to be energy conservation potential and mitigation measures for implementation of any of the alternatives.

5.5 Any Probable Adverse Environmental Effects that Cannot be Avoided and are not Amenable to Mitigation

Implementation of any of the alternatives is not anticipated to generate adverse environmental effects that are unavoidable or not amenable to mitigation.

6.0 Environmental Assessment Preparers and Agencies Consulted

Tierra Data Inc.
10110 W. Lilac Road
Escondido, California 92026

Elizabeth M. Kellogg, Principal, EA preparer, 33 years of experience, M.S. International Agricultural Development, UC Davis; B.S. Agricultural Science and Management, UC Davis

Stephanie Hines, EA preparation, ecologist, 9 years of experience, M.A. Natural Resources and Environmental Management, Ball State University

Cynthia Booth, Technical editor, 13 years of experience

Chelsea Snover, Technical Editor, 6 years of experience

A.C. Ware, Technical Editor, 13 years of experience

Robert Wolf, Terrestrial Ecologist and Geographic Information System (GIS) Specialist, 9 years of experience, Masters of Environmental Management Yale School of Forestry and Environmental Studies; B.S. Plant Biology, UC Davis

Naval Facilities Engineering Command Southwest
Jo Ellen Anderson, Environmental Planner

Sandra Baldwin, Natural Resources Specialist

Mike Waters, Counsel

Ryan Maynard, Environmental Planner

Navy Region Southwest
Connie Moen, N45 NEPA Coordinator

Lynn Murphy, Environmental Planner

Naval Weapons Station Seal Beach
David Baillie, Director, Environmental Programs & Services Code N45

Robert Schallmann, Conservation Program Manager

Lisa Bosalet, NEPA/Cultural Resources Media Manager

6.1 Agencies Consulted

United States Fish and Wildlife – Carlsbad, California Office

California Department of Fish and Game – Sacramento, California

National Marine Fisheries Service

U.S. Army Corps of Engineers

Santa Ana Regional Water Quality Control Board

Seal Beach National Wildlife Refuge

7.0 References

Able, K.W., R.S. McBride, R.A. Roundtree, and K.J. Smith. 1996. Fishes of polyhaline estuarine shores in Great Bay-Little Egg Harbor, New Jersey: a case study of seasonal and habitat influences, p. 335-353. *In* K. F. Nordstrom and C. T. Roman (eds.), Estuarine Shores: Evolution, Environments and Human Alterations. John Wiley & Sons, Ltd. West Sussex, England.

Allen, S.H. and A.B. Sargeant. 1975. A rural mail carrier index of North Dakota red foxes. Wildlife Society Bulletin 3:74-77.

American Farmland Trust. 2009. Agricultural Land Loss and Conversion. White paper for University of California Agricultural Issues Center White Papers on California Agricultural Issues. http://www.aic.ucdavis.edu/publications/whitepapers/index.htm

American Ornithologists Union. 1983. Check-list of North American birds, Sixth Edition. Allen Press, Inc., Lawrence, KS.

Assis de Moraes, A.P. 1977. Flies (Diptera) attracted to black light at the Anaheim Bay salt marsh, California. Unpublished Master's Thesis, California State University, Long Beach, CA. 50 pp.

Atwood, J.L. and P.R. Kelly. 1984. Fish dropped on feeding colonies as indicators of Least Tern food habits. Wilson Bulletin. 96-34-47.

Baker, P.C. 1975. The vascular plants of the salt marsh. In Land, E.D. and C.W. Hill, eds. The marine resources of Anaheim Bay. California Department of Fish and Game, Fish Bulletin 165.

Baltz, D.M, C. Rakocinski, J.W. Fleeger. 1993. Microhabitat use by marsh-edge fishes in a Louisiana estuary. Environ Biol Fish 36:109–126.

Bane, G.W. 1968. Fishes of the upper Newport Bay. Museum of Systematic Biology, University of California, Irvine. Research Series No. 3.

Bloom, P. *personal communication.* 2004. Raptor biologist. Orange County, CA.

Boland, J. 1981. Seasonal Abundances, Habitat Utilization, Feeding Strategies and Interspecific Competition Within a Wintering Shorebird Community and Their Possible Relationships with the Latitudinal Distribution of Shorebird Species. M.S. Thesis, San Diego State University, San Diego.

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

California Air Resources Board (CARB). 2011. http://www.arb.ca.gov/research/aaqs/caaqs/pm/pm.htm.

California Audubon Society. 2010. Important bird areas in California. http://ca.audubon.org/maps/pdf/Orange_Coast_Wetlands.pdf

California Department of Conservation, Farmland Mapping & Monitoring Program California Farmland Conversion Reports, 2004-2006. http://www.consrv.ca.gov/dlrp/cfcp/Pages/Index.aspx.

California Department of Fish and Game (CDFG). 1999. California Wildlife Habitat Relationships System, Version 7.0.

California Department of Fish and Game (CDFG). 2000. The Status of Rare, Threatened, and Endangered Animals and Plants in California, Light-footed Clapper Rail. Available: http://www.dfg.ca.gov/hcpb/cgi-bin/read_one.asp?specy=birds&idNum=46.

California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS). 1976. The Natural Resources of Anaheim Bay—Huntington Harbour. Coastal Wetland Series #18. Prepared by Coastal Wetlands Program Staff of CDFG, under contract with USFWS.

California Department of Transportation (Caltrans). 2010. Environmental Re-evaluation/Addendum for State Route 22/West Orange County Connection FEIS/EIR – Phase II Navy Cost to Cure Items. California Department of Transportation, District 12, Orange County, CA.

_____. 2003. Final Environmental Impact Statement/Environmental Impact Report (FEIS/EIR) for the State Route 22/West Orange County Connection Project (SR-22/WOCC). California Department of Transportation, District 12, Orange County, CA.

California Economic Strategy Panel. 2009. Using Multipliers to Measure Economic Impacts. California Department of Labor.

Callaway, J.C., J.S. Desmond, G. Sullivan, G.D. Williams, and J. B. Zedler. 2001. Assessing the progress of restored wetlands: Hydrology, soil, plants, and animals. Pages 271-335 *In*: J.B. Zedler, editor. Handbook for Restoring Tidal Wetlands. CRC Press, Boca Raton, FL.

Cayan, D.R., E.P. Maurer, M.D. Dettinger, M. Tyree, and K. Hayhoe. 2008. "Climate Change Projections of Sea Level Extremes along the California Coast." *Climatic Change* 87 (Suppl 1): S57-S73.

Cayan, D., M. Tyree, M. Dettinger, H. Hidalgo, T. Das, E. Maurer, P. Bromirski, N. Graham and R. Flick, 2009: Climate Change Scenarios and Sea Level Rise Estimates for the California 2009 Climate Change Scenarios Assessment. California Climate Change Center, publication #CEC-500-2009-014-F, 64 pp.

Center for Demographic Research (CDR). August 2008. Orange Progress Report 2008: Seal Beach. Retrieved online at http://www.fullerton.edu/cdr/cities/Seal%20Beach.pdf

Chan K.M. and E.D. Lane. 1975. Physical and chemical study of the Anaheim Bay salt marsh. *In* Lane, E.D. and C.W. Hill. 1975. The marine resources of Anaheim Bay, California Department of Fish and Game, Fish Bulletin 165, 1-195 pp.

Clark, G.H. 1930a. The California halibut *(Paralichthys californicus)* and an analysis of the boat catches. California Department of Fish and Game. Fish Bulletin 32:1-52

Clark, G.H. 1930b. California halibut. California Department of Fish and Game 16(4):315-317.

Clough, J.S. and E.C. Larson. 2008. Application of the Sea-Level Affecting Marshes Model (SLAMM 5.0) to Seal Beach NWR. Unpublished report submitted by Warren Pinnacle Consulting, Inc. (Warren, VT) to the USFWS, NWRS Division of Natural Resources and Conservation Planning.

Coastal Geotechnical, Inc. 2001. Geotechnical Investigation: Project No. 369.1, 16525 South Pacific Avenue, Sunset Beach, CA. Laguna Beach, CA. January 2001.

Copper, E. *Personal Communication*. Ornithologist. San Diego, California.

Coues, E. 1874. Birds of the Northwest. Government Printing Office, Washington D.C.

Council on Environmental Quality (CEQ). 1997. Considering Cumulative Effects Under the National Environmental Policy Act, January 1997.

County of Orange. 2011. Orange County Facts and Figures 2010. Accessed 05/12/11. http://bos.ocgov.com/finance/ff2010/pages_frm.asp?OPT=facts_full

Cramp, S., and K.E.L. Simmons, eds. 1983. The Birds of the Western Palearctic, vol. 3.Oxford: Oxford University Press.

Crooks, J.A. 1998. Habitat alteration and community-level effects of an exotic mussel, *Musculista senhousia,* Marine Ecology Progress Series 162, 137-152.

Eisenberg, J.F., M.A. O'Connell, and P.V. August. 1979. Density, productivity, and distribution of mammals in two Venezuelan habitats. In Vertebrate ecology in the northern Neotropics. Eisenberg, J.F., (Editor). Washington D.C.: Smithsonian Institute Press. Pp: 187-207.

Emmons, L.H. 1984. Geographic variation in densities and diversities on non-flying mammals in Amazonia. Biotropia 16:210-222.

Flores, C. 2011. Personal communication. NAVFAC Southwest. San Diego, California.

Frederickson, L. 1979. Furbearer population surveys: techniques, problems and uses in South Dakota. Pages 62-70 *in* Proceedings of the Midwest furbearer conference, Cooperative Extension Service, Kansas State University, Manhattan, Kansas, USA.

Frey, H.W., ed. 1971. California's living marine resources and their utilization. California Department of Fish and Game. 148 pp.

Garrett, K., and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles: Los Angeles Audubon Society.

Glanz, W.E. 1982. The terrestrial mammal fauna of Barro Colorado Island: censuses and long-term changes. Pages 455-468 in E. G. Leigh, Jr., A. S. Rand, and D. M. Windsor, editors. Ecology of a tropical forest. Smithsonian Institution Press, Washington, D.C., USA.

Griffis, R.B. 1987. A floral and invertebrate faunal survey of unrestored, restored, and natural saltmarsh habitats of the Seal Beach SBNWR and NAVWPNSTA Seal Beach. U.S. Navy, Seal Beach, Rept. No. NEFC-10436. 86pp.

Grinnell, J., and A.H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27. 608pp.

Hesson, B.H. and H.R. Olilang. 1990. Seal Beach Oil Field Alamitos and Marine Areas. Publication No. TR39. Department of Conservation, Division of Oil and Gas. Sacramento, CA.

Hickey, C., W.D. Shuford, G.W. Page, and S. Warnock. 2003. Version 1.1. The Southern Pacific Shorebird Conservation Plan: A strategy for supporting California's Central Valley and coastal shorebird populations. PRBO Conservation Science, Stinson Beach, CA.

Hickman, J.C. 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley, CA. 1400pp.

Holland, R.E. 1986. Preliminary descriptions of the terrestrial natural communities of California. Nongame-Heritage Program. The Resources Agency, California Department of Fish and Game. Sacramento. iii + 156 pp.

Holland, K. and D. Keil 1995. California vegetation. Kendall/Hunt Publishing Company, Iowa. 516 p.

Horn, M.H. and L.G. Allen. 1985. Fish community ecology in southern California bays and estuaries. In: Yanez-Arancibia, A. (ed.) Fish community ecology in estuaries and coastal lagoons: towards ecosystem integration. Universidad Nacional Autonoma de Mexico, Mexico City, pp 169±190.

Houghton T., Y. Ding, D. J. Griggs, N. Noguer, P. J. van der Linden, D. Xiaosu, K. Maskell and C. A. Johnson. 2001. Climate change 2001: The scientific basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 881 pp.

Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press. Stanford, California.

International Union of Conservation of Nature Marine Turtle Specialist Group (IUCN MTSG). 2004. Green Sea Turtle Assessment. http://iucn-mtsg.org/red_list/cm/MTSG_Chelonia_mydas_Assessment_April-2004.pdf

Johnson, J. 2002. Personal Communication. Environmental Division. Naval Weapons Station Seal Beach.

Jorgensen, P. D. 1975. Habitat preference of the light-footed clapper rail in Tijuana Marsh, California. Unpublished report for U.S. Fish & Wildlife Service. 69 pp.

Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin Co., Boston. 675 pp.

Kauwling, T.J. and D.J. Reish. 1975. A quantitative study of the benthic polychaetous annelids of Anaheim Bay and Huntington Harbour, California. Pages 57-58 In E.D. Land and C.W. Hill, eds. The marine resources of Anaheim Bay. California Department of Fish and Game, Fish Bulletin 165.

Klingbeil, R.A., R.D. Sandell, and A.W. Wells. 1975. An annotated checklist of the elasmobranchs and teleosts of Anaheim Bay. *In* The marine resources of Anaheim Bay, E. D. Lane and C. W. Hill, eds. Calif Dep. Fish Game, Fish Bulletin. 165:79-115.

Kneib, R.T. 1997. The role of tidal marshes in the ecology of estuarine nekton. Oceanography and Marine Biology: an Annual Review, 35, 163–220.

Knopf, F.L. 1996. Mountain Plover (*Charadrius montanus*). *In* The Birds of North America, No. 211 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Kus, B.E. and P. Ashfield. 1989. Bird Use of the Tijuana River Estuary. Unpublished report, SDSU. 36 pp. [Technical Report]

Lane, E.D., & Hill, C.W. 1975. The marine resources of Anaheim Bay. California Department of Fish and Game, Fish Bulletin 165, 1–195.

Law Crandall Inc. 1997. Final Non-point Source Pollution Monitoring Program for Agricultural Outlease Programs for Naval Weapons Station Seal beach, California. Prepared for Southwest Division, Naval Facilities Engineering Command Contract No. N68711-93-D-1452-49. San Diego, CA.

Levin, L. *Personal Communication.* University of California San Diego.

LSA Associates, Inc. 2009. Draft Environmental Impact Report for Alamitos Bay Marina Rehabilitation Project. Long Beach, CA

Luers, A. L., D.R. Cayan, G. Franco, M. Hanemann, and B. Croes. Our Changing Climate Assessing the Risks to California. A Summary Report from the California Climate Change Center.

Macdonald, K.B., R.F. Ford, E.B. Copper, P. Unitt, and J.P. Haltiner. 1990. South San Diego Bay Enhancement Plan, vol. 1, Bay History, Physical Environment and Marine Ecological Characterization, vol. 2, Resources Atlas: Birds of San Diego Bay, vol. 3, Enhancement Plan, vol. 4, Data Summaries. Published by San Diego Unified Port District, San Diego, CA and California State Coastal Conservancy.

Massey, B.W and R. Zembal. 1979. A comparative study of the light-footed clapper rail, *Rallus longirostris levipes* in Anaheim Bay and Upper Newport Bay, Orange County, CA. US Fish and Wildlife Service Endangered Species Office, Sacramento, CA.

Massey, B.W and R. Zembal. 1980. A comparative study of the Light-footed Clapper Rail (*Rallus longirostris levipes*) populations in Anaheim Bay and Upper Newport Bay, Orange County, CA. Rep. to U.S. Fish and Wildlife Service, Endangered Species Office, Sacramento, CA.

Massey, B.W. and J.L. Atwood. 1979-1985. Application of ecological information to habitat management for the California least tern. Final Job Progress Report #1-7, U.S. Fish and Wildlife Service, Endangered Species Program, Sacramento, CA.

Massey, B.W., R. Zembal, and P.D. Jorgensen. 1984. Nesting habitat of the light-footed clapper rail in southern California. Journal of Field Ornithology. 53:67-80.

McArthur, A.G. 1962. Control burning of eucalyptus forests. 8th Commonwealth Forestry Conf. (Canberra Australia), Forestry and Timber Bureau, Leaflet No. 80.

MEC Analytical Systems Inc. 1995. 1994 and 1995 field survey report of the ecological resources of Agua Hedionda Lagoon. 47 pp., plus appendices.

Merkel & Associates. 2006. Naval Weapons Station Seal Beach Wetland Delineation.

Messner, S., Cayan, S. Miranda, K. Green, C. Phillips, J. Dudley, D. Cayan, E. Young 2009. Climate change-related impacts in the San Diego region by 2050: draft paper. A paper for the California Climate Change Center. California Energy Commission. Sacramento, California. Publication number CEC-500-2009-027-D.63 pp.

Minnesang, D.J. 1980. Abiotic factors influencing the number of Coleoptera taken at black light in a southern California salt marsh. Master's thesis. California State University at Long Beach. 55 pp.

Morris, R.H., Abbott, D.P. & Haderlie, E.C. 1980. Intertidal Invertebrates of California. Stanford University Press, Stanford, CA.

Moyle, P.B. and J.J. Cech, Jr. 1982. Fishes: an introduction to ichthyology. Prentice-Hall, Trenton, NJ.

Mudie, P.J., 1970. A survey of the coastal wetland vegetation of San Diego Bay, California Department of Fish and Game.

Myrick, R.M., and L.B. Leopold. 1963. Hydraulic geometry of a small tidal estuary. U. S. Geol. Surv. Prof. Paper 422-B. 18 pp.

Nagano, C.D. and J.N. Hogue, 1982. The insects and related terrestrial arthropods of Point Mugu Naval Air Station, Ventura County, Ca. Report to U.S. Navy, Point Mugu, No. N63126-80-M-3441. 118 pp.

National Oceanic and Atmospheric Administration (NOAA), Office of Coast Survey (OCS). 2000. U.S. Coast Pilot 7, Pacific Coast: California, Oregon, Washington, Hawaii, and Pacific Islands, (32nd) Edition.

National Research Council (NRC). 2010. *Committee on National Security Implications of Climatic Change for U.S. Naval Forces: Letter Report*. Washington, D.C.

Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach). October 2001. Storm Water Discharge Management Plan Volume 1 and 2 (with revised figures) for Naval Weapons Station Seal Beach at Seal Beach, California. Prepared for Southwest Division, Naval Facilities Engineering Command by LAW Crandall, a Division of Law Engineering and Environmental Services, Inc. Contract No. N68711-99-D-6509.

Ogden, J.C. 1995. A comparison of wading bird nesting colony dynamics (1931-1946 and 1974-1989) as an indication of ecosystem conditions in the Southern Everglades. In: Everglades: The ecosystem and its restoration, S.M. Davis and J.C. Ogden (Eds.) 1995. St. Lucie Press, Delray Beach, Fla. Chap. 25.

Orange Coast Wetlands complex. California Audubon Society webpage 2002 Retrieved online at: http://www.audubon-ca.org/.

Orange County Workforce Investment Board (OCWIB). 2008. Orange County Workforce Indicators, 2008-2009. 100 pp. Available online at: http://egov.ocgov.com/vgnfiles/ocgov/Community%20Investment/Docs/OCWIB/Portals/Workforce_Indicators_Report_2008.pdf.

Page, G.W., J.C. Warriner, and P.W.C. Paton. 1995. Snowy plover (Charadrius alexandrinus). In A. Poole and F. Gill, editors. The birds of North America, No. 154. Academy of Natural Sciences, Philadelphia, Pa., and The American Ornithologists' Union, Washington, D.C.

Page, G.W., L.E. Stenzel, J.E. Kjelmyr, and W.D. Shuford. 1990. Shorebird numbers in wetlands of the Pacific Flyway: A summary of Spring and Fall counts in 1988 and 1989. Contribution Number 471, Point Reyes Bird Observatory.

Pestrong, R. 1965. The development of drainage patterns on tidal marshes. Stanford University Publications Geol. Sci. Vol. X. No. 2 87 pp.

Powell, A. *Personal Communication*. U.S. Geological Service Biological Resource Division, North Prairie Wildlife Research Center.

Powell, J.A., and C.L. Hogue. 1979. California Insects. University of California Press, Berkeley, CA.

Reardon, J.B. 1981. Depositional Environmental of Anaheim Bay Salt Marsh, Seal Beach California. Master's Thesis. California State University, Long Beach.

RBF/Sholders & Sanford. October 1994. Naval Weapons Station Seal Beach, California Subsidence Monitoring Study. Completed under Contract N68711-93-D-1580 with Southwest Division, Naval Facilities Engineering Command.

Redfield, A.C. 1972. Development of a New England salt marsh. Ecological Monographs 42 (2):201-237.

Regional Water Quality Control Board (RWQCB) Santa Ana Region. 1995. Water Quality Control Plan for the Santa Ana River Basin.

Reise, K. 1985. Tidal Flat Ecology. Springer-Verlag, Berlin, Heidelberg, New York.

Reish, J.R. 1975. Invertebrates, especially benthic annelids in outer Anaheim Bay. Pages 73-78 in E.D. Lane, C.W. Hill, eds., the Marine Resources of Anaheim Bay. California Department of Fish and Game, Fish Bulletin 165.

Reish, J.R., T.K.J. Kauwling and T.C. Schreiber. 1975. Annotated checklist of the marine invertebrates of Anaheim Bay. Pages 41-51 in E.D. Lane, C.W. Hill, eds., the Marine Resources of Anaheim Bay. California Department of Fish and Game, Fish Bulletin 165.

Reusch, T.H.B. and S.L. Williams. 1998. Variable response of native eelgrass *Zostera marina* to a non-indigenous bivalve *Musculista senhousia*. Oecologia 113:428-441.

Romero, P.D. 1976. Bird Use of Anaheim Bay: A Southern California Salt Marsh. Thesis presented to the Department of Biology California State University, Long Beach.

Ruiz, G. M., A.H. Hines, and M.H. Posey. 1993. Shallow water as refuge habitat for fish and crustaceans in nonvegetated estuaries - an example from Chesapeake Bay. Marine Ecology Progress Series. 99(1-2):1-16.

Santa Ana River Watershed. Watershed Profile. 2002. Retrieved online at: http://www.wrpinfo.scc.ca.gov/watersheds/sa/. Accessed January 2006.

Santa Ana Watershed Project Authority. 2010. One Water One Watershed Plan. Retrieved online at: http://www.sawpa.org/owow-generalinfo.html. Accessed November 2010.

Sawyer, J.O. and T. Keeler-Wolf. 1995. A manual of California vegetation. California Native Plant Society. Sacramento, CA.

Scatolini, S.R. and J.B. Zedler. 1996. Epibenthic invertebrates of natural and constructed marshes of San Diego Bay. Wetlands 16:24-37 cited in Williams and Desmond 2001.

Schallmann, R. 2004, 2006 and 2011. Personal Communication. Conservation Program Manager, Naval Weapons Station Seal Beach, Seal Beach, CA.

Schitoskey, F. Jr. and S.R. Woodmansee. 1978. Energy requirements and diet of California ground squirrel. Journal of Wildlife Management. 42:373-382.

Schoenherr, A.A. 1992. Natural history of California. Berkeley: University of California Press.

Small, A. 1994. California birds: their status and distribution. Ibis Publishing Company, Vista, CA.

Smith, C.F. 1976. A flora of the Santa Barbara region, California. Santa Barbara Museum of Natural History, Santa Barbara, CA.

Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller. 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.

Southern California Wetlands Recovery Project (SCWRP) Regional Restoration Strategy. Adopted November 29, 2001. Available online at: http://www.coastalconservancy.ca.gov/scwrp/ReglStrat.htm.

Spotila, J. 2004. Sea Turtles: a complete guide to their biology, behavior, and conservation. The John Hopkins University Press. Baltimore, MD.

State of California, Department of Transportation. 2002. California storm water best management practices handbooks, including project planning and design guides, storm water pollution prevention plan, water pollution control program preparation manuals, and construction site BMPs manual. Website. Available online at: http://www.cabmphandbooks.com/

State of California, Employment Development Department (EDD), Labor Market Division. May 22, 2009. Orange Santa Ana-Anaheim-Irvine Metropolitan Division (Orange County): Orange County loses 1,000 jobs over the month, 72,and 6000 over the year. Retrieved online at http://www.fullerton.edu/cdr/ocff.pdf

Terborgh, J., and B. Winter. 1980. Some causes of extinction. Pages 119–134 *in* M.E. Soule and B.A. Wilcox, editors. Conservation biology: an evolutionary–ecological perspective. Sinauer Associates, Sunderland, Massachusetts, USA.

United Nations Framework Convention on Climate Change (UNFCCC). 2006. Climate Change Information Sheet 11. Available online at: <http://unfccc.int/>

U.S. Census Bureau. 2002. Orange County Census 1990-2000. Retrieved online at: http://quickfacts.census.gov/qfd/states/06/06059.html.

U.S. Department of Agriculture. 1978. Soil survey of Orange County and western part of Riverside County, California. Soil Conservation Service.

U.S. Department of Defense (DoD). 2007. Guidance to Implement the Memorandum of Understanding to Promote the Conservation of Migratory Birds. Available online at: <https://www.denix.osd.mil/portal/page/portal/content/environment/NR/PolicyGuidance/MIGRATORY-BIRD-MEMO-AND-TOOLS-FOR-MOU-3-APR-07.PDF>.

_____. 2011. Chief of Naval Operations Instruction (OPNAVINST) 5090.1C-CH1. Environmental Readiness Program Manual. Office of the Chief of Naval Operations. Washington, D.C.

U.S. Department of the Navy (DoN). 1988. Master Plan Update, Cultural Resources Assessment Final Report, Naval Weapons Station—Seal Beach Complex. Western Division, Naval Facilities Engineering Command, San Bruno, California.

_____. 2002. Archaeological testing at sites P-30-001502, P-30-001503, and P-30-001504 Naval Weapons Station, Seal Beach, Orange County, California. Prepared by EDAW, Inc.

_____. 2009. Soil and Water Conservation Plan Naval Weapons Station Seal Beach, California for Agriculture Outlease Parcel 4A01.

_____. 2010. Work plan for archaeological evaluation of site P-30-1503 Naval Weapons Station Seal Beach, Seal Beach, California. Prepared by AECOM, Inc.

U.S. Department of the Navy (DoN), Commander Navy Region Southwest (CNRSW). 2002. Ordnance Storage Magazines Final Erosion Maintenance/Repair Study.

U.S. Department of the Navy Western Division (DoN WESTDIV). 1989. Master Plan Update. Naval Weapons Station, Seal Beach Complex Master Plan Update. Contract No. N62474-86-C-1397. Prepared for U.S. Naval Weapons Station, Seal Beach, by ARCHIPLAN, Inc., San Bruno, CA.

U.S. Department of the Navy, Naval Facilities Engineering Command Southwest (DoN NAVFAC SW). 1995. Naval Weapons Station Seal Beach, Seal Beach, California

Installation Restoration Program Final National Wildlife Refuge Study Report 5 April 1995.

_____. 1997. Final Integrated Natural Resources Management Plan for Naval Weapons Station, Seal Beach. Prepared by RECON, San Diego, CA.

U.S. Fish and Wildlife Service (USFWS) 1995. Brown Pelican. U.S. Fish and Wildlife Service Division of Endangered Species, Species Accounts. Retrieved online at: http://endangered.fws.gov/i/b/sab2s.html.

_____. 2008. 12-month petition finding and proposed rule to remove the brown pelican (*Pelecanus occidentalis*) from the federal list of endangered and threatened wildlife. 50 CFR Part 17. February 20, 2008.

_____. 2009. Draft post-delisting monitoring plan for the brown pelican.

_____. 2010. Seal Beach National Wildlife Refuge Comprehensive Conservation Plan/Environmental Assessment (Preliminary Draft). Carlsbad, California.

U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG). 1976. The natural resources of Anaheim Bay and Huntington Harbour. Coastal wetland Series No. 18. 103 pp. + app

U.S. Fish and Wildlife Service (USFWS) and the U.S. Department of the Navy (DoN). 1985. California Least Tern Recovery Plan. Portland, OR.

U.S. Fish and Wildlife Service (USFWS) and the U.S. Navy. 1990. Endangered species management and protection plan, Naval Weapons Station - Seal Beach and Seal Beach National Wildlife Refuge. Final environmental impact statement. Portland, Oregon.

_____. 1991. Record of Decision for Management and Protection of Endangered Species at Naval Weapons Station Seal Beach and the Seal Beach National Wildlife Refuge, Orange County, California. Approved by the U.S. Fish and Wildlife Service Regional Director and the U.S. Navy Deputy Director for Environment, Office of Assistant Secretary of the Navy. Portland, Oregon.

Unitt, P.A. 1984. Birds of San Diego County. Memoir No.13. San Diego Society of Natural History.

VanRossen, A.J. 1947. A synopsis of the savannah sparrows of northwestern Mexico. Condor 49: 97—107.

Water Conservation News 2002. “Long Beach at Forefront of Water Technology” *in* Water Conservation News. Department of Water Resources, Office of Water Use Efficiency. October 2002.

Wells, S.M., R.M. Pyle, and N.M. Collins. 1980. The IUCN invertebrate red data book. International union for the conservation of nature and natural resources, Gland, Switzerland. 632+L. Cited in USFWS and U.S. Navy 1990.

Williams, G.D. and J.S. Desmond. 2001. Restoring assemblages of invertebrates and fishes. In Handbook for Restoring Tidal Wetlands, ed. J. Zedler, pp. 235-269. CRC Press, Boca Raton, Florida.

Zedler, J. B.1982. The ecology of southern California salt marshes: a community profile. U.S. Fish and Wildlife Service FWS/OBS-8154. Second printing with corrections, 1984.

Zedler, J.B. 1992. Restoring cordgrass marshes in southern California. Pages 7-51 *In* Restoring the Nation's Marine Environment, G.W. Thayer, ed. College Park: A Maryland Sea Grant Book.

Zedler, J.B. 1993. Canopy architecture of natural and planted cordgrass marshes: selecting habitat evaluation criteria. Ecological Applications. 3(1):123–138.

Zedler, J.B. 1996. Tidal wetland restoration: a scientific perspective and southern California focus. California Sea Grant Report T-038, La Jolla, CA.

Zedler, J.B. 2001. Handbook for restoring tidal wetlands. CRC Press, Boca Raton, FL.

Zedler, J.B., C.S. Nordby, and B.E. Kus. 1992. The Ecology of Tijuana Estuary, California: A National Estuarine Research Reserve. NOAA Office of Coastal Resource Management, Sanctuaries and Reserve Division, Washington, DC.

Zedler, J.B., J.C. Callaway, J.S. Desmond, G. Vivian-Smith, G.D., G. Sullivan, A.E. Brewster, and B.K. Bradshawl. 1999. California salt marsh vegetation: an improved model of spatial pattern. Ecosystems. v2.19-35.

Zembal R. and J.M. Fancher, 1988. Foraging behavior and foods of the Light-footed Clapper Rail. Condor 90:959-962.

Zembal, R. 1993. "The need for corridors between coastal wetlands and uplands in southern California". Pages 205-208 *In I*nterface Between Ecology and Land Development in California. J.E. Keeley, ed. Los Angeles: Southern California Academy of Sciences.

Zembal, R., Susan M. Hoffman, and John R. Bradley. 1996. Light-footed clapper rail management and population assessment. Available online at: http://www.dfg.ca.gov/hcpb/info/bm_research/bm_pdfrpts/97_08.pdf.

This Page Intentionally Left Blank

Appendix A: Summary of Public Participation

A draft of this Environmental Assessment (EA) was made available to the public on September 2, 2011. The Navy sought public comment on the draft EA for a 15-day period, beginning on September 2, 2011, ending on September 16, 2011. The document with referential material was posted on the Commander for Navy Region Southwest's (CNRSW) website on September 2, 2011 and was available for download.

The following public notice of availability of the draft EA was published in the Orange County Register and online at https://www.cnic.navy.mil/cnrsw/index.htm.

Notice of Availability for the Draft Environmental Assessment (EA) for the

Naval Weapons Station Seal Beach, Revised Integrated Natural Resources Management Plan (INRMP) at Seal Beach, California

Pursuant to the National Environmental Policy Act, the U.S. Navy gives notice that a Draft EA has been prepared for the Revised INRMP at Naval Weapons Station Seal Beach. The Draft EA evaluates the potential environmental impacts associated with the Proposed Action of revising the INRMP to fulfill goals and objectives for natural resources management on the military installation, while providing for no net loss to its military mission. Other alternatives are also evaluated, including a No Action alternative. This project is needed to revise the current INRMP (implemented in 1997) to address recent management concerns and U.S. Navy guidelines, to take into consideration recent scientific studies and monitoring results and to reevaluate current natural resource management practices.

The Draft EA is available for public review at the Mary Wilson Public Library, 707 Electric Avenue, Seal Beach, CA 90740-6103. Electronic copies of the Draft EA may also be obtained by visiting the Navy website https://www.cnic.navy.mil/cnrsw/index.htm.

Comments on the Draft EA should be submitted to Ms. Jo Ellen Anderson, NAVFAC SW, 1220 Pacific Highway, San Diego, CA 92132 or emailed to: joellen.anderson@navy.mil. A 15-day comment period begins September 2, 2011 and ends on September 16, 2011.

This Page Intentionally Left Blank

Appendix B: Record of Non-Applicability

Appendix B: Record of Non-Applicability

Department of Defense
U.S. Navy

Record of Non-Applicability

Naval Weapons Station Seal Beach, Seal Beach, California

Integrated Natural Resources Management Plan

Pursuant to Section 176 (c) of the Clean Air Act, as amended by the 1990 amendments; the General Conformity Rule at 40 CFR Parts 51 and 93; and the Chief of Naval Operations Interim Guidance on Compliance with the Clean Air Act Conformity Rule (CNO Guidance), the Department of Navy (DoN) determined that the potential actions and managements practices outlined in the Naval Weapons Station Seal Beach Revised 2011 Integrated Natural Resources Management Plan (INRMP) are exempt from conformity requirements in accordance with sections 40 CFR 93.153 (c) (2) (ii), (iv), (vi), (vii), (viii), (ix), (x) and (xiii). The INRMP outlines many routine and continuing activities for the Naval Weapons Station Seal Beach, located in the South Coast Air Basin, which would result in no emission increase or an increase that is clearly *de minimis,* including agricultural activities and maintenance dredging. The maintenance dredging activities would not result in any new depths and were analyzed under a separate Environmental Impact Statement. Development of projects and future implementation of planning guidelines for a range of activities, including habitat restoration and landscape maintenance projects, are also expected to result in emissions increases that would be *de minimis*; however, specific analyses would be performed to verify that emissions do not exceed *de minimis* levels when specific actions are proposed. Consequently, the proposed action is exempt from the conformity determination requirements of the Environmental Protection Agency's conformity rule.

To the best of my knowledge, the information contained in this Record of Non-Applicability is correct and accurate.

8/4/2011

David Baillie
Installation Environmental Program Manager
Naval Weapons Station Seal Beach

Date

This Page Intentionally Left Blank

DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY

FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR THE ENVIRONMENTAL ASSESSMENT (EA) FOR THE NAVAL WEAPONS STATION (NAVWPNSTA) SEAL BEACH INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP), SEAL BEACH, CALIFORNIA

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) implementing the National Environmental Policy Act (NEPA) and Navy NEPA regulations (32 CFR Part 775) and Chief of Naval Operations Instruction 5090.1C, CH-1, the Department of the Navy (Navy) gives notice that an Environmental Assessment (EA) had been prepared and an Environmental Impact Statement (EIS) is not required for the NAVWPNSTA Seal Beach INRMP, Seal Beach, California.

A Draft EA was released for public review from September 2, 2011 to September 16, 2011. The Navy published a Notice of Availability of the Draft EA for three consecutive days in the Orange County Register newspaper which described the Proposed Action, solicited public input, and announced the locations the Draft EA was available for public review. The Draft EA was made available for public review at the Mary Wilson Public Library, 707 Electric Avenue, Seal Beach, California 90740-6103 and online at the Navy Region Southwest website (https://www.cnic.navy.mil/cnrsw/index.htm). Copies of the Draft EA in CD-ROM format were also made available to interested parties, upon request. No comments on the Draft EA were received from the public.

Proposed Action: The purpose and need for the project is to meet statutory requirements under the Sikes Act Improvement Act (SAIA) of 1997 (16 United States Code § 670a *et seq.*), as well as the requirements of various Department of Defense (DoD) and Navy Instructions. The SAIA requires the Secretaries of the respective military departments to prepare and implement an INRMP for each military installation in the United States.

The Proposed Action is the adoption of the NAVWPNSTA Seal Beach INRMP. The Proposed Action, through the use of management focus areas, will balance natural resource management with the military mission of NAVWPNSTA Seal Beach. The agricultural leases on NAVWPNSTA Seal Beach will continue, with the possibility of

conversion to native habitats over the long-term. A strategy to improve public access for wildlife viewing will be implemented, as well as natural resource management goals and objectives.

Existing Conditions: The NAVWPNSTA Seal Beach is located in northern Orange County between Huntington Beach and Long Beach, California. It is a Navy owned asset used, along with its detachments, to provide shore-based infrastructure support to the Navy's ordnance mission and other fleet and fleet support activities. The primary land uses of NAVWPNSTA Seal Beach involve the storage, inspection, maintenance, and distribution of ordnance. Infrastructure on the Station includes 220 buildings, 33.2 miles of inactive railroad track, 68 miles of paved road, and 98 ammunition magazines. Approximately 2,200 acres of agricultural leases are contained within the Station. The Seal Beach National Wildlife Refuge is located within the Station and contains approximately 956 acres of wetlands.

Within the boundaries of NAVWPNSTA Seal Beach are a number of important natural resources, including a total of 1,385 acres of jurisdictional and non-jurisdictional wetlands and several federally listed species.

Of these listed species, the light-footed clapper rail *(Rallus longirostris levipes)* and western snowy plover *(Charadrius alexandrinus nivosus)* are potentially present year-round, while the California least tern *(Sterna antillarum browni)* is a migrant bird species present only during the spring/summer breeding season. A fourth federally endangered species, the salt marsh bird's beak *(Cordylanthus maritimus* ssp. *maritimus)*, has not been sighted in the area in recent years. A fifth federally threatened species, the eastern Pacific green sea turtle *(Chelonia mydas)*, has been observed in the region in recent years but is not known to utilize the wetlands of the Seal Beach National Wildlife Refuge or nearby Anaheim Bay.

Alternatives Analyzed: The EA analyzed the potential environmental effects of the Proposed Action (Alternative 1) and three additional alternatives, including the No Action Alternative. The Proposed Action is the selected alternative because it best meets the purpose and need for the project and presents the most comprehensive approach to effectively manage the natural resources on the Station. Of the alternatives considered, the Proposed Action also offers the most effective

approach towards reducing potential conflicts between natural resources and the military uses of the area.

Alternative 1 - (see Proposed Action description above)

Alternative 2 - Emphasis on Federally Listed Species Enhancement. This alternative would adopt the INRMP and emphasize the management and recovery of federal and special listed species occupying Navy lands. It would expand and enhance salt marsh and other marine habitats to the late-1800s marsh boundaries, restore coastal grassland uplands, and enhance remnant riparian areas suitable to support federally listed species. Agricultural leases north of Westminster Avenue would remain, while those agricultural leases south of Westminster Avenue would be converted to native grassland. It would include a strategy to improve public access for wildlife viewing.

Alternative 3 - Emphasis on Restoring Coastal Grassland Uplands. This alternative would adopt the INRMP with an emphasis on restoring coastal grassland uplands. All existing agricultural leases, approximately 2,200 acres, would be converted to coastal grasslands. Marshland would be allowed to expand naturally. It would include a strategy to improve public access for wildlife viewing.

Alternative 4 - No Action. The No Action Alternative would continue existing natural resources management on the Station.

Environmental Effects: The following is a summary of the environmental consequences of the Proposed Action:

Land use: No immediate changes to land use will occur. Any future land use changes under the Proposed Action may involve the expansion of wetlands, losses to agricultural leases, and an increase in native habitat. Any of the future changes in land uses that may occur under the Proposed Action will require separate NEPA processes, as needed. Therefore, the Proposed Action will not result in significant impacts to land uses.

Socioeconomics: Current socioeconomic benefits from agricultural leases related employment on the Station will continue. A few additional temporary jobs will be generated from the restoration projects in the Proposed Action. Therefore, the Proposed Action will not result in significant impacts to socioeconomics.

Recreational and Aesthetic Values: Where compatible with the safety and security of the Station, recreational opportunities will be developed and expanded under the Proposed Action. Increased public access to wildlife viewing and the development of a nature center at Oil Island (after oil and gas extraction operations there have ceased) will result in benefits to recreational values. Landscape planning, with a focus on drought-tolerant native species, will improve the visual quality of the area. Therefore, the Proposed Action will not result in significant impacts to recreational and aesthetic values.

Geology and Soils: Under the Proposed Action, benefits to soil and geologic resources will be expanded from current management practices. Increased protection of soil resources will occur through the development and implementation of improved best management practices and strategies to prevent soil erosion on bunkers, stream banks, and channels. Sediment surveying will occur regularly along vegetation transects to monitor wetland and other habitat changes. Therefore, there will be no significant impact to geologic and soil resources.

Water and Hydrology: The Proposed Action will result in improved water quality and water efficiency. Best management practices will be developed and implemented to reduce water consumption in landscaping and maintenance. Stringer and perimeter wetlands will treat runoff water before release into the estuary, thus improving water quality in the estuary and Anaheim Bay. Perimeter wetlands will also be used as an encroachment buffer to benefit the military mission. Therefore, there will be no significant impacts to water and hydrology.

Biological Resources: The Proposed Action will result in benefits to plants and wildlife, including special status species. Primarily, it will promote native habitats and species through enhanced monitoring and long-term enhancement, restoration, and protection projects. A map of sensitive species management emphasis areas will be developed and a system of buffer zones established to protect habitat areas. Federally listed species habitats will be enhanced. The enhancement of marsh and wildlife-friendly agriculture will provide additional foraging for birds. The effects from the Proposed Action on overall biological resources will be beneficial, with some minor negative impacts to non-federally listed plants and wildlife. Therefore, there will be no significant impact to biological resources from the Proposed Action.

Air Quality and Climate Change: Small amounts of air emissions and greenhouse gases will be released over the course of the Proposed Action from the use of motorized trucks and other vehicles. These will not have significant impacts on air quality or climate change.

Finding: Based on the analysis presented in the EA and in coordination with the U.S. Fish and Wildlife Service, California Department of Fish and Game, National Marine Fisheries Service, U.S. Army Corps of Engineers, the Regional Water Quality Control Board, and the Seal Beach National Wildlife Refuge, the Navy finds that implementation of the Proposed Action will not significantly impact the quality of the human or natural environment or generate significant controversy.

The EA prepared by the Navy addressing this action is on file and interested parties may obtain a copy from Sara Yamashita, Environmental Planner, NAVFAC Southwest, 1220 Pacific Highway, San Diego, CA 92132, (619) 532-3868, or sara.yamahita@navy.mil.

7/6/12
Date

RADM Dixon R. Smith, USN
Commander, Navy Region Southwest

Appendix B: Acronyms and Abbreviations

Table B-1 Naval Weapons Station Seal Beach Integrated Natural Resources Management Plan Acronyms

Acronym/Abbreviation	**Definition**
°C	degrees Celsius
°F	degrees Fahrenheit
AC&S	Agri-Chemical & Supply, Inc.
ACP	Area Contingency Plan
ADC	Animal Damage Control
ADUSD	Assistant Deputy Under Secretary of Defense
AEGIS	(type of missile)
APP	Avian Protection Plan
ARB	Air Resources Board
ARPA	Archeological Resources Protection Act
ATFP	Anti-Terrorism Force Protection
BA	Biological Assessment
BCFC	Bolsa Chica Flood Control Channel
BEAP	Base Exterior Architecture Plan
BMP	best management practice(s)
BO	Biological Opinion
CA	Cooperative Agreement
Cal/EPA	California Environmental Protection Agency
Cal-IPC	California Invasive Pest Plant Council
CalTrans	California Department of Transportation
CARB	California Air Resources Board
CCA	California Coastal Act
CCA	Critical Coastal Area
CCC	California Coastal Commission
CCMP	Coastal Zone Management Program
CCP	Comprehensive Conservation Plan
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERFA	Community Environmental Response Facilitation Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CESU	Cooperative Ecosystem Studies Units
CI	Community Indicator
cm	centimeter(s)
CNDDB	California Natural Diversity Database
CNI	Commander Navy Installations
CNIC	Commander Navy Installations Command
CNO	Chief of Naval Operations
CNPS	California Native Plant Society
CNRSW	Commander, Navy Region Southwest
CO	Commanding Officer
CO	carbon monoxide
COMPACFLT	Commander in Chief Pacific Fleet
CRMP	Cultural Resources Management Plan
CRPI	Comprehensive Regional Planning Instruction
CRWQCB	California Regional Water Quality Control Board
CSLUB	California State University Long Beach
CSU	California State University
CSULB	California State University Long Beach
CWA	Clean Water Act

CZARA	Coastal Zone Act Reauthorization Amendments
CZMA	Coastal Zone Management Act
DASN	Deputy Assistant Secretary of the Navy
DASN [I&E	Deputy Assistant Secretary of the Navy for Installations and Environment
DDE	Dichlorodiphenyldichloroethylene
DDESB	Department of Defense Explosives Safety Board
DDT	Dichlorodiphenyltrichlorethane
DEIS	Draft Environmental Impact Statement
DEIS/ EIR	Draft Environmental Impact Statement/ Environmental Impact Report
DoD	U.S. Department of Defense
DoDINST	Department of Defense Instruction
DoDINST	U.S. Department of Defense Instruction
DoDM	U.S. Department of Defense Manual
DOI	Department of Interior
DoN	U.S. Department of the Navy
DTSC	Department of Toxic Substance Control
DUSD[I&E]	Deputy Undersecretary of Defense for Installations and the Environment
EA	Environmental Assessment
EARR	Environmental Aspects and Requirements Review
ECPRA	Emergency Planning and Community Right to Know Act
EDS	Electronics Data Systems
EEZ	Exclusive Economic Zone
EFA	Engineering Field Activity
EFD	Engineering Field Division
EFH	Essential Fish Habitat
EGGW	East Garden Grove-Wintersburg Channel
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMAP	Environmental Monitoring and Assessment Program
EMD	Environmental Management Database
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
EPR	Environmental Program Requirements
EPSO	Environmental Programs and Services Office
ERL	Environmental Readiness Level
ESA	Endangered Species Act
ESOH	Environment, Safety and Occupational Health
ESQD	Explosive Safety Quantity Distance
F&ES	Fire and Emergency Services
FEMP	Federal Energy Management Plan
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FONSI	Finding of No Significant Impact
FS	Feasibility Study
ft	feet
FWCA	Fish and Wildlife Coordination Act
GIS	Geographic Information System
GPRA	Government Performance and Results Act
GPS	Global Positioning System
GSA	Government Services Administration
HARP	Historic and Archaeological Resources Protection
HC	Habitat Connectivity Indicator
I&E	Installations and Environment
IAFWA	International Association of Fish and Wildlife Agencies
IBI	Index of Biotic Integrity
ICRMP	Integrated Cultural Resources Management Plan
IDP	Individual Development Plans
IMO	International Maritime Organization

INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IR	Installation Restoration
ISO	International Organization for Standardization
ISSA	Interdepartmental Service Support Agreement
ITT	Information and Telecommunications Technology
JFTB	Joint Forces Training Base
km	kilometers
KV	kilovolt
LCP	Local Coastal Plan
m	meter(s)
MBTA	Migratory Bird Treaty Act
MBTRA	Migratory Bird Treaty Reform Act
MCL	maximum contaminant limits
MHHW	mean higher high water
MHW	mean high water
MHWS	mean high water spring
mi	mile(s)
MILCON	Military Construction
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MOMAU	Mobile Mine Assembly Unit
MOU	Memorandum of Understanding
MPCD	Marine pollution control device
mph	miles per hour
MPRSA	Marine Protection, Research, and Sanctuaries Act
MRP	Mission Response Program
MSL	mean sea level
MSRON	Maritime Security Squadron
MWR	Morale, Welfare, and Recreation
NAAQS	National Ambient Air Quality Standards
NABCI	North American Bird Conservation Initiative
NAF	Nonappropriated Funded
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities Engineering Command
NAVFAC SW	Naval Facilities Engineering Command Southwest
NAVFACINST	Naval Facilities Instruction
NAVSEA	Naval Sea Systems
NAVWPNSTA	Naval Weapons Station Seal Beach
NAVWPNSTASB INST	Naval Weapons Station Seal Beach Instruction
NBC	Naval Base Coronado
NCIS	Naval Criminal Investigative Service
NCCP	Natural Communities Conservation Program
NCDC	National Climatic Data Center
NCGR	Nature Conservancy Global Rank
NCP	National Contingency Plan
NDAA	National Defense Authorization Act
NEP	National Estuary Program
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutant
NEX	Naval Exchange
NHPA	National Historic Preservation Act
NIFZ	Newport-Inglewood Fault Zone
NISA	National Invasive Species Act
nm	Nautical miles
NMFS	National Marine Fisheries Service
NMFWA	National Military Fish and Wildlife Association

NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
NPS	non-point source
NR	Natural Resources
NRCS	Natural Resource Conservation Service
NRDA	Natural Resource Damage Assessment
NRO	Natural Resources Office
NSPS	New Source Performance Standards
NWR	National Wildlife Refuge
NWS	Naval Weapons Station
O&M	Operations and Maintenance
O_3	Ozone
OCFCD	Orange County Flood Control District
OCSD	Orange County Sanitation District
OCTA	Orange County Transportation Authority
OCVCD	Orange County Vector Control District
OCWD	Orange County Water District
OIC	Officer-in-Charge
OP-5	Operational Procedures 5
OPA	Oil Pollution Act
OPNAVINST	Naval Operations Instruction
OSD	Office of the Secretary of Defense
OUSD	Office of the Under Secretary of Defense
OV	Ocean View Channel
P.L.	public law
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl(s)
PCH	Pacific Coast Highway
pH	acidity/alkalinity
PI	Practical Indicator
PIF	Partners in Flight
PM_{10}	Particulate Matter
POLB	Port of Long Beach
PPA	Pollution Prevention Act
ppt	parts per thousand
PS	Protected Species
QRP	Qualified Recycling Program
RA	Remedial Action
RAB	Resource Advisory Board
RC	Recreational and/or Commercial Species
RD	Remedial Design
REC	Regional Environmental Counsel
RI	Remedial Investigation
ROD	Record of Decision
RT&E	Research Test and Evaluation
RWQCB	Regional Water Quality Control Board
SAIA	Sikes Act Improvement Act
SAMP	Special Area Management Plan
SAP	Sampling and Analysis Plan
SAR	Small Arms Range
SARA	Superfund Amendments and Reauthorization Act
SBNWR	Seal Beach National Wildlife Refuge
SCAPS	Site Characterization Analysis Penetrometer System
SCAQMD	South Coast Air Quality Management District
SCB	Southern California Bight or the Bight
SCCAT	Southern California Caulerpa Action Team

SCCWRP	Southern California Coastal Waters Research Program
SCWRP	Southern California Wetlands Recovery Project
SDWA	Safe Drinking Water Act
SECNAV	Secretary of the Navy
SECNAVINST	Secretary of Navy Instruction
SESEF	Shipboard Electronics Systems Evaluation Facility
SHPO	State Historic Preservation Office
SI	Site Inspection
SLC	State Lands Commission
SM-2 ER	(type of missile)
SO_X	Sulfur Oxides
SP	National Shorebird Conservation Priority
SPCC	Spill Prevention Control and Countermeasures
STANDARD	(type of missile)
SWANCC	Solid Waste Agency of Northern Cook County
SWDIV	Southwest Division
SWDMP	Stormwater Discharge Management Plan
SWPPP	Storm water pollution prevention plan
SWRCB	State Water Resources Control Board
TBT	tributyltin
TCE	trichloroethene
TCP	Traditional cultural places or properties
TMDL	Total Maximum Daily Load
TNR	Trap-Neuter-Release
TOMAHAWK	(type of missile)
TPH	Total Petroleum Hydrocarbon
U.S.C.	U.S. Code
UC	University of California
UCD	University of California Davis
UCI	University of California Irvine
UCLA	University of California Los Angeles
UCSB	University of California Santa Barbara
UIC	underground injection control
UNDS	Uniform National Discharge Standards
UNFCCC	United Nations Framework Convention on Climate Change
USACE	U.S. Army Corps of Engineers
USACE	Army Corps of Engineers
U.S.C.	United States Code
USCG	U.S. Coast Guard
USDA SCS	U.S. Department of Agriculture Soil Conservation Service
USDI	Department of Interior
USDI	U.S. Department of Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USS	U.S. Ship
VLS	Vertical Launch System
VOC	Volatile organic compounds
WESO	Weapons Environmental Support Office
WFVZ	Western Foundation of Vertebrate Zoology
WMI	Watershed Management Initiative
WSFSB	Weapons Support Facility Seal Beach
WWII	World War II

This Page Intentionally Blank

Appendix C: Legislation, Regulations, Instructions and Orders

C.1 Legislation Related To Natural Resources

American Indian Religious Freedom Act

The American Indian Religious Freedom Act of 1978 (P.L. 95-341; 42 U.S.C.§ 1996) directs consultations with traditional leaders, where appropriate, to insure continuity in religious practices on federal lands. Requires the federal government to protect the right of American Indian, Eskimo, Aleut, and Native Hawaiian to exercise traditional religious practices.

Antiquities Act

The Antiquities Act of 1906 (P.L. 59-209; 16 U.S.C. §§ 431 *et seq*., 1982) authorizes the President to designate as National Monuments historic and natural resources of national significance located on federally owned or controlled lands. The act further provides for the protection of all historic and prehistoric ruins and objects of antiquity located on federal lands by providing criminal sanctions against excavation, injury, or destruction of such antiquities without the permission of the Department having jurisdiction over such resources. The Secretaries of the Interior, Agriculture, and Defense are further authorized to issue permits for archaeological investigations on lands under their control to recognized educational and scientific institutions for the purposes of systematically and professionally gathering data of scientific value.

Archaeological and Historic Preservation Act

The Archaeological and Historic Preservation Act of 1974 (Moss-Bennett Act; 16 U.S.C. §§ 469 *et seq*.) provides for the protection of historic and archaeological sites threatened by federal or federally funded or assisted construction projects.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470 *et seq*., 1982) sets up penalties for destruction or removal of archaeological materials from federal land without the proper permits. Requirements for obtaining these permits are also established by this regulation.

Bald Eagle Protection Act

The Bald Eagle Protection Act (Bald and Golden Eagles Act; P.L. 95-616; 16 U.S.C. §§ 668 *et seq*.) of 1979 provides for protection of the bald eagle and the golden eagle by prohibiting taking, possession, and commerce in the birds.

California Water Code

The California Water Code Section 1243 declares the reservation of water for the enhancement and protection of fish and wildlife to be a beneficial use.

Clean Air Act

The Clean Air Act (CAA; 42 U.S.C. §§ 7401 *et seq*.) mandates the prevention and control of air pollution from stationary and mobile sources. Requires the establishment of: National Ambient Air Quality Standards (NAAQS) to regulate primary and secondary concentrations for six priority air pollutants; New Source Performance Standards (NSPS) to provide ceiling emission standards for certain new industrial sources; and National Emission Standards for Hazardous Air Pollutants (NESHAP) to control pollutants, not covered under NAAQS, which may increase mortality rates or cause serious irreversible illness.

Clean Water Act

The objective of the CWA (P.L. 92-500, as amended; 33 U.S.C. §§ 1251 *et seq*.) is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (Section 101a). The CWA has three major approaches to water pollution control:

1. Construction grants for reducing municipal discharges;
2. NPDES permits for control of point source (storm water and waste water) discharges; and
3. Water quality management planning for nonpoint source (NPS) control from diffuse natural origins such as sediment.

In 1972 Congress adopted a "zero-discharge" goal, and a focus on "preventable causes of pollution," to emphasize the source of contamination rather than controls at the outfall or water body itself. Water quality "standards" include a legal designation of the desired use for a given body of water and the water quality criteria appropriate for that use. The "criteria" are specific levels of water quality which are expected to make a water body suitable for its desired use. "Effluent limitations" are restrictions on quantities, rates, and concentrations in wastewater discharges measured at the discharger's outfall pipe. (Goldfarb 1984)

Administration of the Act is delegated to the SWRCB in California and, locally, to the Santa Ana RWQCB. The RWQCB is responsible for setting water quality standards and criteria for water bodies in its regional plan, and for issuing and enforcing NPDES permits.

Section 404 (33 U.S.C. Section 1344) deals with discharge of dredge or fill material into waters of the U.S. Regulatory authority has been delegated by the Environmental Protection Agency to USACE for Sec. 404. Discharges are any material that results in a change in the bottom elevation of a water body or wetland, including grading, road fills, stream crossings, building pads, and flood and erosion control on stream banks. Vernal pools are considered non-tidal waters that are isolated wetlands under Section 404. There are 26 more or less generic nationwide permits that preauthorize certain minor discharges as long as they meet certain conditions--e.g. construction of outfall structures, backfill or bedding for utility lines, fill for bank stabilization, and minor road crossings. The nationwide permit system is currently being modified. If a discharge would cause the loss of or substantially modify one to 10 acres of water, including adjacent wetlands, then the nationwide permit may not apply. Work cannot begin until USACE notifies the U.S. Navy that the nationwide permit applies.

The individual permit process is much more complex and time-consuming. It requires consultation, an EA prepared by the USACE, Public Interest Review and a 404(b)(1) Evaluation. If significant impacts are found, then an EIS must be prepared. These regulations apply to vernal pools. Customarily, the L.A. District Engineer requires Individual Permit and an EA for fills in any vernal pool regardless of the presence or absence of endangered species. The USACE is attempting to formalize requirements particular to vernal pools. A Memorandum of Agreement between the USACE and EPA dated 07 February 1990 states that all potential impacts must first be shown to have

been avoided, minimized and then compensated for. Compensation is considered a last resort only, which involves the creation of a habitat to replace a similar habitat unavoidably eliminated at a project site. The concerned agencies must be completely convinced that the proposed compensation will completely mitigate the lost habitat. Any activity in a wetland will require at least an EA.

Penalties: A Class I or civil penalty may not exceed $10,000 per violation, with the maximum amount of $25,000. Class II civil penalty may not exceed $10,000 per day as each violation continues, with the maximum amount not to exceed $125,000.

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. § 1451, *et seq*.) requires federal permit applicants to obtain a certification that verified activities proposed within the "coastal zone" are consistent with state coastal zone management programs; e.g. federal Clean Water Act and §404 applicants. The CZMA creates a broad program based on land development controls within coastal zones, incorporating state involvement through the development of programs for comprehensive state management. The CZMA also requires federal agencies of licensees to carry out their activities in such a way that they conform to the maximum extent practicable with a state's coastal zone management program.

Community Environmental Response Facilitation Act

The Community Environmental Response Facilitation Act (CERFA) (42 U.S.C. § 9601 note, 9620) amends CERCLA Section 120 (h) to allow expedition of reuse and redevelopment of federal facilities being closed. It was expanded to include Federal agency requirements pertaining to the disposal of real property.

Comprehensive Environmental Response, Compensation, and Liability Act

The CERCLA of 1980 (43 U.S.C. §§ 9601 *et seq*.) establishes programs for the cleanup of hazardous waste disposal and spill sites to ensure protection of human health and the environment. Designates the President as trustee for federally protected or managed natural resources.

Conservation and Rehabilitation Program on Military and Public Lands

The Conservation and Rehabilitation Program on Military and Public Lands (P.L. 93-452; 16 U.S.C. §§ 670 *et seq*.) amends P.L. 86-797 by providing for fish and wildlife habitat improvements, range rehabilitation, and control of off-road vehicles on federal lands.

Conservation
Programs on Military Installations (Sikes Act)

See Fish and Wildlife Conservation and Military Reservations Act (Sikes Act) and Sikes Act Improvement Act (SAIA), which are 1997 amendments to the Sikes Act.

Conservation Programs on Military Reservations

The Conservation Programs on Military Reservations (P.L. 90-465; 16 U.S.C. §§ 670 *et seq*.) amend P.L. 86-797 to include outdoor recreation programs on military lands.

Data Quality Act

Under the Data Quality Act, which took effect 01 October 2002, federal agencies must ensure that the information it uses and disseminates meets certain quality standards. The Data Quality Act requires federal agencies to issue guidelines ensuring the quality, utility, objectivity and integrity of information that they disseminate and provide mechanisms for affected persons to correct such information by petitioning and challenging the quality of

information it has used or disseminated. Two questions that remain unanswered about the Data Quality Act is whether agency information quality guidelines apply to rule-making and whether an agency's denial of a petition to correct information is reviewable by the courts.

Defense Appropriations Act

The Defense Appropriations Act of 1991 Legacy Program (10 U.S.C. § 2701) provides for the stewardship of biological, geophysical, cultural and historic resources on DoD lands.

Emergency Planning and Community Right-to-Know Act

The Emergency Planning and Community Right-to Know Act of 1986 (EPCRA; 42 U.S.C. §§11001 *et seq*.) is also known as Title III of the Superfund Amendments and Reauthorization Act (SARA). The EPCRA focuses on the hazards associated with toxic chemical releases. Most notably, specific sections of EPCRA require immediate notification of releases of oil and hazardous substances and CERCLA-defined hazardous substances to state and local emergency response planners. Requires state and local coordination in planning response actions to chemical emergencies. Requires certain industries to submit information on chemical inventories and fugitive emissions.

Endangered Species Act

The ESA (P.L. 93-205; 16 U.S.C. §§ 1531 *et seq*.), ESA, of 1973 requires that all federal agencies undertake programs for the conservation of endangered and threatened species. These agencies are prohibited from authorizing, funding, or carrying out any action that would jeopardize a listed species or destroy or modify its "critical habitat" (Section 7). Critical habitat is usually designated concurrently with a listing. Section 9 prohibits the "taking" of endangered fish or wildlife, including direct killing, harming, harassing, or destruction of habitat that may be important to the species' survival or recovery. Prohibitions against *threatened* species are discretionary on the part of the Secretary of the Interior, but can be as restrictive as those protecting endangered species. Lists are maintained by the Secretary of the Interior. Monitoring of candidate species (Category 1 and Category 2) is required, with adoption of emergency listing when there is significant risk (Section 4).

For plants, collection or removal of seed material or whole plants of a threatened or endangered species, even for revegetation or monitoring purposes, requires a USFWS collection permit. There is no general taking prohibition for plants that compares to that which applies to animals (See Bean *et al*. 1991).

If an area is designated "critical habitat," physical and biological features of the environment must be protected for the purposes of conserving the listed species. "Incidental takes" are permissible only if an "incidental take statement" is issued by the Secretary of the Interior/USFWS with a biological opinion after agency consultation. Management options will likely be limited as a requirement for minimizing the taking.

Coordination regarding threatened and endangered species is addressed in Section 7 of this Act. In particular, Section 7(a) requires a federal agency to consult with USFWS on any proposed action if the agency has reason to believe that an endangered or threatened species could be directly or indirectly affected by the action. Species under review and those of "special concern" are also included. A BA by the lead agency is required under Section 7(c) if listed species or critical habitat may be affected by a major construction activity. The purpose of a BA is to evaluate potential effects of the action on listed species and/or critical habitat, and to assist USFWS in rendering a BO.

A consultation consists of one or more of these steps: (1) Informal, (2) Formal, or (3) Further Discussion. An informal consultation is an optional process that includes all discussions and correspondence between the USFWS and the federal agency to determine whether a formal consultation or conference is required. A formal consultation

is a process between the USFWS and the federal agency that commences with federal agency's written request for consultation and concludes with the USFWS's issuance of a BO.

A BO must include: (1) a summary of the information on which the opinion was based (the information is to be provided by the federal agency), (2) a detailed discussion of the effects of the action on listed species or critical habitat, and (3) the USFWS opinion on whether the action is likely to jeopardize the continued existence of a listed species or adversely modify critical habitat. The BO may include an incidental take statement that specifies: (1) the amount of "take" that is allowed, (2) reasonable and prudent measures that the USFWS considers necessary or appropriate to minimize such a "take", and (3) the terms and conditions that must be complied with to implement the reasonable and prudent measures.

The Navy must take measures to assure that no irreversible or irretrievable commitment of resources is authorized, funded or carried out by them that will likely jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify designated critical habitat, until the Consultation process is complete. The Navy is to provide leadership in identifying and protecting habitat that is critical for any threatened or endangered species.

Navy installations are required to carry out the following:

1. Maintain liaison with local governmental agencies and organizations having an interest in endangered and threatened species protection;
2. Delineate boundaries of the habitat areas of endangered and threatened species on maps;
3. Initiate consultation with the USFWS or NMFS per cooperative agreement procedures when a proposed action or program has been identified that may affect listed species or their habitat;
4. Perform a BA for any action that may adversely affect the continued existence of endangered and threatened species or result in the destruction or adverse modification of habitat of such species (The EA should contain the final biological opinion of the USFWS or NMFS following the consultation process);
5. Cooperate with the USFWS or NMFS during development and implementation of a recovery plan for listed species occurring on the installation.

The California State Legislature has expressed its intent to protect, preserve and enhance endangered or rare species as issued in the Fish and Wildlife Code (Div. 2, Chpt. 10 Native Plant Protection and Div. 3, Chpt. 1.5 Endangered Species). California Endangered Species Act (CESA) violations can result in a fine of up to $5,000 and / or one year in prison. While this law does not apply to federal actions, it does apply to state agencies and private landowners. In the spirit of the law and as a service to state agencies and private landowners, federal agencies operate under these guidelines.

Penalties: Civil penalty of up to $25,000 per violation or criminal penalty of up to $50,000 and / or one year in prison, knowing violation for a take or damage / destruction of critical habitat of an endangered animal.

Endangered Species Act and Amendments

The ESA of 1973 (1978 Amendments), (P.L. 95-632; 16 U.S.C. §§ 1531 *et seq*.) provides for the conservation and protection of endangered and threatened species of fish, wildlife, and plants and expands the consultation process.

Farmlands Protection Policy Act

The Farmlands Protection Policy Act of 1981 (7 U.S.C. §4201) considers federal activities which result in the conversion of farmlands. It requires federal agencies to identify prime and unique farmland, take into account adverse effects of federal programs on their preservation, and consider alternative actions to reduce these effects.

Federal Facilities Compliance Act

The Federal Facilities Compliance Act (42 U.S.C. § 6961) of 1992 amends the Resource Conservation and Recovery Act. It subjects federal agencies to civil and administrative penalties for noncompliance with federal, state, interstate, or local solid and hazardous waste requirements (Subtitles C and D of RCRA).

Federal Flood Disaster Prevention Act

The Federal Flood Disaster Prevention Act (P.L. 93-234; 42 U.S.C. §§ 4001 *et seq*.) established the Federal Flood Insurance Program, which has provided some incentives for construction outside flood-prone areas. To a limited degree, this has reduced destruction of riparian vegetation by developments. President Carter issued two executive orders in a related effort: E011988 (Floodplain Protection) directed federal agencies to avoid construction in flood-hazard areas and to seek restoration and preservation of the natural and beneficial values of floodplains; E011990 (Protection of Wetlands) directed federal agencies to minimize the destruction, loss, or degradation of wetlands.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide and Rodenticide Act (7 U.S.C. 136) governs the use and application of pesticides in natural resource management programs.

Federal Noxious Weed Act

The Federal Noxious Weed Act of 1974 (P.L. 93-629; 7 U.S.C. § 2801) provides for the management of undesirable plants and their regulation in interstate and foreign commerce.

Federal Water Pollution Control Act Amendments

The Federal Water Pollution Control Act Amendments of 1972 (see Clean Water Act; P.L. 92-500; 33 U.S.C. §§ 1251 *et seq*.) sets up a federal permit and license system to carry out certain pollution discharge activities in navigable waters. Section 314 of this Act established the Clean Lakes Program (CLP). The purpose of the CLP is to develop a national program to clean up publicly owned freshwater lakes. In order to receive a grant for in-lake restoration under this Program, all point sources of pollution must be treated or have treatment planned under Section 201 and 402 of the Clean Water Act.

Fish and Wildlife Conservation Act

The Fish and Wildlife Conservation Act of 1980 (P.L. 96-366; 16 U.S.C. §§ 2901 *et seq*.) provides for conservation, protection, restoration and propagation of certain species, including migratory birds threatened with extinction.

Fish and Wildlife Conservation and Military Reservations Act (Sikes Act)

The Fish and Wildlife Conservation and Military Reservations Act (Sikes Act; 16 U.S.C. § 670) applies to any installation in the U.S. with land or water suitable for conservation of fish and wildlife. It requires that fish and wildlife be a part of, and integrated into a multiple-use program for managing natural resources. This includes a requirement to develop a cooperative management plan with state and federal fish and wildlife conservation agencies. The law sets the guidelines for charging user fees and retaining the funds to benefit the activity, such as improving habitat or restocking a fish pond. The Fish and Wildlife Conservation and Natural Resources

Management Programs on Military Reservations amends the Sikes Act to require that trained professionals be used to integrate fish and wildlife into a balanced natural resource program.

Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservations

The Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservations (P.L. 96-561) amends the Sikes Act above to require that trained professionals be used to integrate fish and wildlife into each base's resource program.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (P.L. 85-624; 16 U.S.C. §§ 661 *et seq*.). is a law which mandates that wildlife conservation receive equal consideration and be coordinated with other features of water resource development. The intent is to prevent loss or damage of wildlife and provide for development and improvement of wildlife in conjunction with water development projects. Federal agencies proposing to impound, divert or control surface waters are required to consult with the USFWS and CDFW, to include and give full consideration to the recommendations of these agencies, and to provide justifiable means and measures for benefiting wildlife in project plans. ACOE must coordinate permit applications with USFWS and CDFW. Like NEPA, implementation of this Act is essentially procedural in that no particular outcome is mandated. The Act authorizes project modification, land acquisition, and other measures necessary to protect wildlife.

Historic Sites Act

The Historic Sites Act of 1935 (P.L. 74-292; 16 U.S.C. §§ 461 *et seq*., 1982) Establishes as national policy the preservation for public use of historic resources by giving the Secretary of the Interior the power to make historic surveys and to document, evaluate, acquire, and preserve archaeological and historic sites across the country. The act led to the eventual establishment within the National Park Service of the Historic Sites Survey, the Historic Buildings Survey, and the Historic Sites Engineering Record.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (P.L. 94-265) as amended through October 11, 1996 (16 U.S.C. 180) provides for the conservation and management of fisheries and other purposes, such as rebuilding overfished stocks. Defines Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Ensures federal agencies consult with NOAA National Marine Fisheries Service on any action that may adversely affect EFH. Requirements for habitat sections of all Fishery Management Plans were expanded under this Act.

Migratory Bird Treaty Act

The MBTA (P.L. 65-186, as amended; 16 U.S.C. §§ 703 *et seq*.) protects most birds, whether or not they migrate. Birds, their nests, eggs, parts or products may not be killed or possessed. Game birds are listed and protected except where specific seasons, bag limits, and other features govern their hunting. Exceptions are also made for some agricultural pests, which require a USFWS permit (yellow-headed, red-winged, bi-colored red-winged, tri-colored red-winged, Rusty and Brewer's blackbirds, cowbirds, all grackles, crows and magpies). Some other birds that injure crops in California may be taken under the authority of the County Agricultural Commissioner (meadowlarks, horned larks, golden-crowned sparrows, white- and other crowned sparrows, goldfinches, house finches, acorn woodpeckers, Lewis woodpeckers, and flickers). Permits may be granted for various non-commercial activities involving migratory birds and some commercial activities involving captive-bred migratory birds.

Penalties: Violations of this act can cost an individual or organization up to $5,000 and $10,000, respectively, and up to six months imprisonment for a misdemeanor. Felony violations may result in fines of up to $250,000 for individuals, $500,000 for organizations, and up to two years' imprisonment.

Recent court decisions and DoD policy now interpret this law as not applicable to federal agencies. However, DoD does support the spirit of the law as guideline for management practices on its properties. According to the USFWS Carlsbad Office, controlled burns during the avian breeding season (approximately February through October) would violate the Act.

Military Construction Authorization Act

The Military Construction Authorization Act of 1975 (10 U.S.C. § 2665) allows the proceeds from the sale of recyclable material be credited to the installation to cover specified costs.

Military Construction Authorization Act- Leases; Non-excess property

The Military Construction Authorization Act- Leases; Non-excess property (10 U.S.C. § 2667) provides for the outleasing of public lands.

Military Construction Authorization Act - Military Reservation and Facilities-Hunting, Fishing and Trapping

The Military Construction Authorization Act - Military Reservation and Facilities-Hunting, Fishing and Trapping (10 U.S.C. § 2671) requires that all hunting, fishing, and trapping on military installations follow Fish and Wildlife laws of the state in which it is located, and be issued appropriate state licenses for these activities.

National Environmental Policy Act

The NEPA of 1969 (P.L. 91-190; 42 U.S.C. §§ 4321 *et seq*.), evolved over 10 years from the desire of Congress to have a cohesive statement of the national environmental policy. Agencies must assess, in detail, the potential environmental impact of any proposal for legislation or other major federal action that has the potential for significantly affecting the quality of the human environment. The Act is intended to help public officials and citizens make decisions that are based on understanding of environmental consequences and take action that protects, restores and enhances the environment.

The NEPA mandates that agencies use a "systematic, interdisciplinary approach" that integrates the natural and social sciences and environmental design. The courts have interpreted this mandate to be essentially "procedural;" that is, environmental impacts must be considered, but proposals with environmentally damaging consequences need not necessarily be rejected.

The law requires a detailed statement of "significant" environmental impacts of "major" federal actions. An action may be significant in terms of geographical extent, long-term impact, potential risk, or because of its effect on heritage resources or endangered species.

The process identifies reasonable alternatives to proposed actions to that might have less or no environmental effect. Individual and cumulative impacts must be considered. A three-tiered approach is used to evaluate impacts: (1) The EA is the analysis to be completed when the government is uncertain as to whether an action will significantly affect the environment or the action is controversial. The result of an EA is either a Finding of No Significant Impact (FONSI) or a requirement to complete an EIS; (2) The EIS is a full-disclosure document that presents a full and unbiased discussion of significant impacts, informing the public and decision makers of reasonable alternatives to the proposed action; and (3) A Categorical Exclusion is used for actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures

adopted by the DoN in implementation of federal regulations and for which, therefore, neither an EA nor an EIS is required. (P.L. 91-190; 42 U.S.C. 4321-4347, 01 January 1970, as amended by P.L. 94-52; 03 July 1975, P.L. 94-83, 09 August 1975, and P.L. 97-258, Section 4(b), 13 September 1982)

National Historic Preservation Act

The NHPA of 1966 (P.L. 89-665; 16 U.S.C. §§ 470 *et seq*.) expands the National Register of Historic Places, provides a list of significant historic and prehistoric sites and districts, and gives them formal protection. Section 106 requires that federal agencies with direct or indirect jurisdiction over such properties identify them for the Federal Register. It further directs agencies to consider historic and archaeological resources during planning, and allows the Advisory Council on Historic Preservation, established by this Act, an opportunity to comment when a federal undertaking could affect historic properties.

National Trails Systems Act

The National Trail Systems Act of 1968 (16 U.S.C. § 1271) promotes development of recreational, scenic, and historic trails for persons of diverse interest and abilities.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act of 1990 (PL101-601; 25 U.S.C. §§ 3001 *et seq*.) provides requirements for treatment, determination of ownership, control of, and repatriation of human remains and cultural items on federal or Tribal lands. The term "Indian Tribe" refers to any Tribe, band, nation, or other organized Indian group or community that is on the current list of recognized Indian Tribes published by the Bureau of Indian Affairs. "Human remains" refers to all Native American human remains.

Noise Control Act

The Noise Control Act of 1972 (42 U.S.C. § 4901 *et seq*.) (as mended by the Quiet Communities Act) authorizes establishment of federal noise emission standards for products distributed in commerce, and coordinates federal research efforts in noise control.

Noxious Plant Control Act

The Noxious Plant Control Act (P.L. 90-583; 43 U.S.C. § 1241) provides for the control of noxious plants on lands under control or jurisdiction of the federal government.

Oil Pollution Act

The Oil Pollution Act of 1990 (OPA) (33 U.S.C. §§ 2701 *et seq*.) provides that the National Contingency Plan (NCP) include planning, rescue and minimization of damage to fish and wildlife in responding to oil pollution.

Outdoor Recreation-Federal/State Program Act

The Outdoor Recreation-Federal/State Program Act (P.L. 88-29; 16 U.S.C. §§ 460[L] *et seq*.) provides for the management of lands used for outdoor recreation. Requires consultations with U.S. National Park Service regarding management.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code §§ 13000 *et seq*.) is the state's primary water law. It gives the SWRCB and the nine regional water quality control boards substantial authority to regulate water use.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA; 42 U.S.C. §§ 692 *et seq*.) establishes a comprehensive program which manages solid and hazardous waste. Subtitle C, Hazardous Waste Management, sets up a framework for managing hazardous waste from its initial generation to its final disposal. Waste pesticides and equipment/containers contaminated by pesticides are included under hazardous waste management requirements.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA; 42 U.S.C. §§ 300[f] *et seq*.), SDWA, prescribes treatment and distribution control strategies for abating contamination of drinking water and also requires the establishment of a permit program to regulate injection of liquids into underground strata.

The SDWA provides for direct control of underground injection of fluids that may affect groundwater supplies. States may assume the predominant role in executing groundwater protection programs. The EPA has direct responsibility only if a state chooses not to participate in an underground injection control (UIC) program.

Sikes Act Improvement Act

The SAIA of 1997 (16 U.S.C. § 670a *et seq*.) requires military installations to prepare and implement INRMPs to provide for conservation and rehabilitation of natural resources, sustainable multipurpose uses of resources, and public access for use of natural resources, subject to safety and military security considerations.

Soil Conservation Act

The Soil Conservation Act (P.L. 74-46; 16 U.S.C. § 590A) provides for application of soil conservation practices on federal lands. Requires federal agencies to control and prevent soil erosion and preserve natural resources in managing federal lands.

Stream Alteration Controls

The CDFW's authority over the use of suction dredges (Fish and Wildlife Code, § 5653), alterations of fish spawning areas (Fish and Wildlife Code, § 1505), and alterations of stream beds in general (Fish and Wildlife Code, §§ 1601 *et seq*.) are all useful tools for the protection of instream resources (but generally not for riparian vegetation outside of the stream or overflow areas). The §§1601-1603 agreements (§1601 covers public projects, while §1603 addresses private work) do not have the status of state approvals under law, instead providing for a negotiation and agreement process.

Wild and Scenic River Act

The Wild and Scenic River Act (P.L. 90-542; 16 U.S.C. § 1274) requires identification and protection of any river or stream that qualifies under the Act.

Youth Conservation Corps Act

the Youth Conservation Corps Act of 1972, amended (P.L. 93-408 as amended; 16 U.S.C. § 1701) expands and makes permanent a Youth Conservation Corps program and establishes objectives for youth employment and conservation work on public lands.

C.2 Executive Orders Relevant To Natural Resources

Exotic Organisms (EO 11987)

The Exotic Organisms Executive Order (EO 11987) restricts federal agencies in the use of exotic plant species in any landscape and erosion control measures.

Federal Agency Recycling and the Council on Federal Agency Recycling and Procurement Policy (EO 12780)

Federal Agency Recycling and the Council on Federal Agency Recycling and Procurement Policy (EO 12780) requires federal agencies to promote cost-effective waste reduction and recycling of reusable materials and the establish federal preferences for procurement of items made from recycled materials.

Federal Compliance with Pollution Control Standards (EO 12088)

Federal Compliance with Pollution Control Standards (EO 12088) provides that the head of each federal agency is responsible for compliance with "applicable pollution control standards," defined as "the same substantive procedural and other requirements that would apply to a private person." Requires federal agencies to cooperate with the US EPA, states and local agencies in the prevention, control and abatement of environmental pollution. Requires the EPA Administrator to provide technical advice and assistance to executive agencies in order to ensure their cost effective and timely compliance with applicable pollution control standards. Provides that disputes between the US EPA and another federal agency regarding environmental violations shall be elevated to the Office of Management and Budget for resolution.

Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (EO 12856)

Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements (EO 12856) of August 3, 1993 directs all Federal agencies to comply with all provisions of the Emergency Planning and Community Right to Know Act (EPCRA) and the Pollution Prevention Act (PPA) and implementing regulations. It mandates leadership in pollution prevention at Federal facilities and in providing information to the public concerning the manufacture, process, use and release or transfer of toxic chemicals and pollutants at these facilities. It also requires the head of each Federal agency to develop a written pollution prevention strategy including a pollution prevention policy statement. Each agency was required to reduce releases of toxic chemicals and off-site transfers of such chemicals by 50 percent by the end of 1999.

Floodplain Management (EO 11988)

The Floodplain Management Executive Order (EO 11988) specifies that "Agencies shall encourage and provide appropriate guidance to applicants to evaluate the effects of their proposals in floodplains prior to submitting applications". This order includes wetlands that are within the 100-year floodplain and especially discourages filling.

Greening the Government through Efficient Energy Management (EO 13123)

Greening the Government Through Efficient Energy Management (EO 13123) dated 3 June 1999 directs federal government to significantly improve its energy management in order to save taxpayer dollars and reduce emissions that contribute to air pollution and global climate change. It promotes energy efficiency through energy efficient building design, construction, and operation; water conservation; use of renewable technologies; and fostering markets for emerging technologies.

Greening the Government through Leadership in Environmental Management (EO 13148)

Greening the Government through Leadership in Environmental Management (EO 13148) dated 21 April 2000 directs federal government to ensure that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision-making and long-term planning processes, across all agency missions, activities, and functions. Environmental management considerations must be a fundamental and integral component of federal government policies, operations, planning and management.

This EO mandates environmental compliance audit programs and policies that emphasize pollution prevention as a means to both achieve and maintain environmental compliance. It also requires reductions in use by the federal government in toxic chemicals, hazardous materials, ozone-depleting substances, and other pollutants. Section 207 requires environmentally and economically beneficial Landscaping. Each agency shall strive to promote the sustainable management of Federal facility lands through the implementation of cost-effective, environmentally sound landscaping practices, and programs to reduce adverse impacts to the natural environment. This Executive Order supersedes EO 12902, "Energy Efficiency and Water Conservation at Federal Facilities" of 08 March 1994.

Greening the Government through Waste Prevention, Recycling, and Federal Acquisition (EO 13101)

Greening the Government through Waste Prevention, Recycling, and Federal Acquisition (EO 13101) dated 14 September 1998 directs the head of each executive agency to incorporate waste prevention and recycling in the agency's daily operations and work to increase and expand markets for recovered materials through greater Federal Government preference and demand for such products. It is the national policy to prefer pollution prevention, whenever feasible. Pollution that cannot be prevented should be recycled; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner. Disposal should be employed only as a last resort.

Invasive Species (EO 13112)

The Invasive Species Executive Order (EO 13112) restricts federal agencies in the use of exotic plant species in any landscape and erosion control measures.

Migratory Birds (EO 13186)

The Migratory Birds Executive Order (EO 13186) issued 10 January 2001 directs executive departments to take certain actions regarding the protection of migratory birds. Among these actions is the development and implementation of a MOU with the USFWS within two years of the EO on the protection and conservation of migratory birds. The DoD is currently developing a MOU with USFWS, however, in the interim the EO provides that federal agencies are "encouraged to immediately begin implementing the conservation measures" identified in the EO, "as appropriate and practicable."

Off-Road Vehicles on Public Lands (EO 11989)

The Off-Road Vehicles on Public Lands Executive Order (EO 11989) provides for closing areas to use where soil, wildlife, or other resources are adversely affected. Amends EO 11644 by exempting fire, military, emergency, law enforcement, or combat/combat support vehicles.

Protection and Enhancement of the Cultural Environment (EO 11503)

Protection and Enhancement of the Cultural Environment (EO 11503) directs federal agencies to take a leadership role in preserving, restoring, and maintaining the historic and cultural environment of the Nation. Federal agencies must locate, inventory, and nominate to the National Register all historic resources under their jurisdiction or control. Until these processes are completed, agency heads must exercise caution to ensure that potentially qualified federal property is not inadvertently transferred, sold, demolished, or substantially altered. When planning projects,

agencies are urged to request the opinion of the Secretary of the Interior as to the eligibility for National Register listing of properties whose resource value is questionable or has not been inventoried. Agencies are directed to institute procedures, in consultation with the President's Advisory Council on Historic Preservation, to ensure that federal plans and programs contribute to the preservation and enhancement of non-federally owned historic resources. Protection of National Register historic and Archaeological sources is achieved by the Marine Corps through implementation of the Historic and Archeological Resources Protection (HARP) Plan. The plan facilitates compliance by providing management goals, priorities, and standard operating procedures for site protection.

Protection and Enhancement of Environmental Quality (EO 11514) and (EO 11991)

Protection and Enhancement of Environmental Quality (EO 11514) directs issuance of instructions and guidelines relative to preparation of environmental impacts. This order created the Council on Environmental Quality to oversee the implementation of NEPA, mediate disputes and develop environmental policy.

Protection and Enhancement of Environmental Quality (EO 11991) amends EO 11514 (05 March 1970) to require Council on Environmental Quality to issue regulations to make environmental impact statements more effective. The CEQ was recently abolished by Vice-President Gore, and to date there is no replacement of the body.

Protection of Wetlands (EO 11990)

The Protection of Wetlands Executive Order (EO 11990) directs all federal agencies to "take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands". This applies to the acquisition, management, and disposal of federal lands and facilities; to construction of improvements undertaken, financed, or assisted by the federal government; and to the conduct of federal activities and programs which affect land use. Section 4 of the EO requires that when federally owned lands are leased and easement is assigned, or when disposed of to a non-federal party, a reference be included in the conveyance to identify any wetlands and indicate those uses which are restricted in such areas.

C.3 Federal Regulations, Directives, And Instructions

C.3.1 Federal Regulations

CFR 50. EPA Regulations on National Primary and Secondary Ambient Air Quality Standards.

CFR 172. DoD Instruction 7310.1 DoD Regulations for the Disposition of Proceeds from Sales of Surplus Property.

15 CFR 990. NOAA Regulations on Natural Resource Damage Assessments.

18 CFR 1312. Archeological Resource Protection Act Regulations.

32 CFR 188. Environmental Effects in the United States of DoD Actions.

32 CFR 190. Natural Resources Management Program.

32 CFR 775. Procedures for Implementing NEPA. DoN policy to supplement DoD regulations (32 CFR 214) by providing policy and assigning responsibilities to the Navy and Marine Corps for implementing CEQ regulations and implementing NEPA.

33 CFR 156. USCG Regulations for Universal Waste Management Standards.

33 CFR 330. Dredge and Fill Nationwide Permit Program.

36 CFR 60. National Register of Historic Places.

36 CFR 65. National Historic Landmarks Program.

36 CFR 800. NHPA Regulations for the Protection of Historic Properties.

40 CFR 6. EPA Regulations on Implementation of NEPA Procedures.

40 CFR 122. EPA NPDES Permit Regulations.

40 CFR 125. EPA Regulations on Criteria and Standards for NPDES.

40 CFR 130. EPA Requirements for Water Quality Planning and Management.

40 CFR 141-143. EPA National Drinking Water Regulations.

40 CFR 150-186. EPA Regulations for Pesticide Programs.

40 CFR 230. EPA Interim Regulations on Discharge of Dredged or Fill Material into Navigable Waters.

40 CFR 273. EPA Regulations for Universal Waste Management Standards.

40 CFR 279. Used Oil Management Standards.

40 CFR 1500. Council on Environmental Quality Regulations. Defines the methods of implementing NEPA.

43 CFR 7. Archaeological Resources Protection Act of 1979; Uniform Regulations.

43 CFR 11. USDI Regulations on Natural Resource Damage Assessments.

50 CFR 10. Regulations Concerning Marine Mammals.

50 CFR 10.13. List of Migratory Birds.

50 CFR 17.11 and 17.12. Fish and Wildlife Service List of Endangered and Threatened Wildlife.

50 CFR 402. Interagency Cooperation - ESA of 1973.

C.3.2 Department of Defense Directives and Instructions

DoD Directive 4140.1 of 04 January 1993. Material Management Policy

DoD Directive 4150.7 of 24 October 1983. DoD Pest Management Program.

DoD Directive 4165.57 of 08 November 1977. Air Installations Compatible Use Zones.

DoD Directive 4165.60 of 04 October 1976. Solid Waste Management - Collection, Disposal, Resource Recovery, and Recycling Program.

DoD Directive 4700.1 of 06 November 1978. Natural Resources Conservation and Management. Provides for management of renewable natural resources on military lands.

DoD Directive 4700.2 of 15 July 1988. Secretary of Defense Award for Natural Resources and Environmental Management.

DoD Directive 4700.4 of 24 January 1989. Natural Resources Management Program.

DoD Directive 4705.1 of 09 July 1992. Management of Land-based Water Resources in Support of Joint Contingency Operations.

DoD Directive 4710.1 of 21 June 1984. Archeological and Historic Resources Management. Establishes policies, procedures, and assigns responsibilities for the management of archeological and historic resources located in and on waters and lands under DoD control. This Directive implements these guidelines consistent with federal law, Executive orders, and other DoD directives that deal with archeological and historic preservation issues.

DoD Directive 4715.DD-R. April 1996. Draft integrated natural resources management in the Department of Defense. Prescribes procedures for preparing integrated natural resources management plans for DoD lands.

DoD Directive 4715.1 of 24 February 1996. Environmental Security.

DoD Directive 4715.2 of 03 May 1996. DoD Regional Environmental Coordination.

DoD Instruction 4715.3 of 03 May 1996. Environmental Conservation Program. Implements policy, assigns responsibilities, and prescribes procedures under DoDINST 4715.1 for the integrated management of natural and cultural resources on property under DoD control.

DoD Directive 4715.4 of 18 June 1996. Pollution Prevention.

DoD Directive 4715.5 of 22 April 1996. Management of Environmental Compliance at Overseas Installations.

DoD Directive 4715.6 of 24 April 1996. Environmental Compliance.

DoD Directive 4715.7 of 22 April 1996. Environmental Restoration Program

DoD Directive 4715.8 of 02 February 1998. Environmental Education Training and Career Development.

DoD Directive 4715.9 of 03 May 1996. Environmental Planning and Analysis.

DoD Directive 4715.10 of 24 April 1996. Environmental Education Training and Career Development.

DoD Directive 4715.11 of 17 August 1999. Environmental and Explosive Safety Management on DoD Active and Inactive Ranges within the U.S.

DoD Directive 4715.12 of 19 August 1999. Environmental and Explosive Safety Management on DoD Active and Inactive Ranges Outside the U.S.

DoD Directive 4751.DD-R of April 1996. Draft integrated natural resources management in the DoD.

DoD Instruction 5000.13 of 13 December 1976. Natural Resources- the Secretary of Defense Natural Resource Conservation Award. Delineates procedures for participating in completion for Secretary of Defense Conservation Award.

DoD Directive 6050.1 of 1979. Environmental Effects in the U.S. of DoD Actions.

DoD Directive 6050.2 of 19 April 1979, as amended. Use of Off-Road Vehicles on DoD Lands. Provides policy for use of off-road vehicles on DoD lands.

DoD Directive 6050.5 of 29 October 1990. DoD Hazard Communication Program.

DoD Directive 6050.16 of 20 September 1991. DoD Policy for Establishing and Implementing Environmental Standards at Overseas Installation.

DoD Instruction 7310.1. DoD Regulations for the Disposition of Proceeds from Sales of Surplus Property.

C.3.3 Department of the Navy Manuals and Instructions

NAVFAC P-73. Real Estate Manual P-73. This manual sets forth the authority of the Commander, NAVFAC, for outgrant of Navy controlled real property. Responsibility for administration, management, and utilization of Navy real property lies with the Commanding Officer, and his superiors, of the installation to whose plant account the property belongs. Naval Facilities Engineering Command does not have general responsibility for management of Navy real property, except for lands of installations under its command. However, NAVFAC has a technical responsibility for real estate action on lands which have been determined temporarily or partially excess.

NAVFACINST 6250.3H. Applied Biology Program Services and Training. Requires the use of an integrated pest management approach to minimize the use of herbicides.

NAVFACINST 11012.111A. Land Use Conservation Planning.

NAVFACINST MO-100.4.Guidance on Special Interest Areas.

OPNAVINST 5090.1C. DoN Environment and Natural Resources Procedural Manual. Chapter 22, Natural Resources Management, describes requirements, guidelines, and standards for conserving natural resources on Navy lands. Summarizes the natural resources management program to include management of waters, forests, fish and wildlife, and outdoor recreation.

OPNAVINST 6250.4B (1998). Pest Management Programs. Requires Navy and Marine Corps to have a comprehensive Pest Management Plan. Discusses the need to control pest outbreaks which affect the military mission, damage property, or impact the welfare of people.

SECNAVINST 6240.6E. Implementation of DoD directives under DoD Instruction 4700.4.

Appendix D: Joint Agreements and EIS Record of Decision

Record of Decision for Management and Protection of Endangered Species at the Naval Weapons Station Seal Beach and the Seal Beach National Wildlife Refuge, Orange County, California - 1991

Memorandum of Understanding Among the U.S. Department of Defense and the U.S. Fish and Wildlife Service and the International Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resources Management Program on Military Installations - January 31, 2006

INRMP Strategic Action Plan - February 3, 2005

Tripartite Agreement between the U.S. Navy, the U.S. National Park Service, and the California Department of Parks and Recreation - 1995

This Page Intentionally Blank

Record of Decision

Endangered Species Management and Protection Plan

Naval Weapons Station - Seal Beach
Seal Beach National Wildlife Refuge

U.S. Department of the Interior
Fish and Wildlife Service
Region One
Portland, Oregon

U.S. Department of Defense
Navy
Naval Weapons Station - Seal Beach
Seal Beach, California

RECORD OF DECISION

ENDANGERED SPECIES MANAGEMENT AND PROTECTION PLAN

NAVAL WEAPONS STATION-SEAL BEACH AND SEAL BEACH NATIONAL WILDLIFE REFUGE

U.S. FISH AND WILDLIFE SERVICE
REGION ONE
PORTLAND, OREGON

U.S. NAVY
NAVAL WEAPONS STATION-SEAL BEACH
SEAL BEACH, CALIFORNIA

RECOMMENDATION

I recommend the adoption of the Preferred Alternative as the Endangered Species Management and Protection Plan, Naval Weapons Station-Seal Beach and Seal Beach National Wildlife Refuge.

Thomas J. Chamley
Refuge Manager, Kern National Wildlife Refuge Complex

Feb 12, 1991
Date

Captain Stephen T. Holl
Commanding Officer, Naval Weapons Station-Seal Beach

19 Feb 1991
Date

CONCURRENCE

I concur with the selection of the Preferred Alternative as the Endangered Species Management and Protection Plan, Naval Weapons Station-Seal Beach and Seal Beach National Wildlife Refuge.

for John R. Doebel
Assistant Regional Director, Refuges and Wildlife

3/1/91
Date

Captain William J. Nelson
Director, Combat Systems Field Operations and Ordnance Support Group

25 FEB 1991
Date

APPROVAL

I approve the decision for implementation of the Endangered Species Management and Protection Plan, Naval Weapons Station-Seal Beach and Seal Beach National Wildlife Refuge as recommended. This document meets the requirements for agency decision-making as provided by 40 CFR 1505.

Marvin L. Plenert
Regional Director, U.S. Fish and Wildlife Service

March 4, 1991
Date

Nancy S. Stehle
Deputy Director for Environment, Office of Assistant Secretary of the Navy, (Installations and Environment)

Feb 27, 1991
Date

U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
AND
U.S. DEPARTMENT NAVY

RECORD OF DECISION FOR MANAGEMENT AND PROTECTION OF ENDANGERED SPECIES AT THE NAVAL WEAPONS STATION-SEAL BEACH AND THE SEAL BEACH NATIONAL WILDLIFE REFUGE, ORANGE COUNTY, CALIFORNIA.

This Record Of Decision (ROD) has been developed by the U.S. Fish and Wildlife Service (Service) and U.S. Navy in compliance with agency decision-making requirements of the National Environmental Policy Act (NEPA) of 1969, as amended. The purpose of this ROD is to document the decision of the Service and Navy (the Agencies) for selection of an alternative for implementing the Endangered Species Management and Protection Plan, Naval Weapons Station-Seal Beach and Seal Beach National Wildlife Refuge (Plan). Alternatives have been fully described and evaluated in the August 1990, Final Environmental Impact Statement (EIS) for this Plan.

Based on review of the alternatives and their environmental consequences described in the Final EIS for the Plan, the decision of the Agencies is to implement the Preferred Alternative. The Preferred Alternative is Alternative E, Expanded Endangered Species Management with Ecosystem Restoration. The selected action entails a phased transition from the interim management actions currently in place, as described in Alternative A, through intermediate actions, to a fully implemented expanded endangered species management program. The selected alternative is determined to be the environmentally preferred alternative.

Timing of implementation of specific components of the Plan will occur based on appropriation of funding, and the availability of personnel and other resources. The Plan is designed to maximize the protection and survival of endangered species at the Seal Beach National Wildlife Refuge and Naval Weapons Station-Seal Beach by establishing a range of mechanisms for recognizing, analyzing and responding to changing conditions.

This ROD is designed to: a) state the Agencies' decision, present the rationale for its selection, and portray its implementation; b) identify all alternatives considered in reaching the decision, including the environmentally preferable one(s); and c) state whether all means to avoid or minimize environmental harm from the implementation of the selected alternative have been adopted (40 CFR 1505.2). Additionally, this document and appendices summarize the project background and key issues, provide details of the plan phases, and include the most recent data available for the species of concern. Supplementary information is provided in appendices to this ROD.

For further information please contact: Mr. Charles J. Houghten, U. S. Fish and Wildlife Service, 2233 Watt Avenue, Suite 375, Sacramento, California 95825-0509, Telephone: (916) 978-4420.

TABLE OF CONTENTS

BACKGROUND

SCOPE, PURPOSE, AND NEED FOR ACTION

The Seal Beach National Wildlife Refuge (Refuge) consists of 911 acres administered by the U.S. Fish and Wildlife Service (Service). The Refuge overlays a portion of the 5,000-acre Naval Weapons Station-Seal Beach (Station), located adjacent to the City of Seal Beach in northwestern Orange County, California (Appendices A and B).

The scope of the Seal Beach Environmental Impact Statement (EIS) encompasses a comprehensive plan for endangered species management and protection for the Station and Refuge. The proposed action is the implementation of this plan. The purpose of the proposed action is to maximize the endangered species' opportunities for survival both at the Refuge and throughout their ranges. The need for action has resulted from an immediate and serious threat to the survival of the endangered species due to predation and other potential impacts at the Refuge and Station. The predatory red fox, which is not native to coastal southern California, has been a significant concern.

PROJECT AREA AND DESCRIPTION

Comprised almost entirely of coastal salt marsh (Appendix C), the Refuge provides essential habitat for a variety of birds dependent on this very limited and rapidly disappearing habitat in southern California. The management and protection of two species of federally-listed endangered birds which rely on Refuge habitat for their survival are of principal concern. The populations of the endangered California least tern (Appendix D) and light-footed clapper rail (Appendix E), hover at low levels throughout their discontinuous and limited ranges. These species rely on the salt marsh habitat of the Refuge for nesting, rearing young, and foraging. While the least terns are present only during their breeding season, generally from April-August, the clapper rails are year-round residents of the Refuge.

In addition to the endangered rails and terns, a variety of other migratory and resident birds, including other endangered species, fish, mammals and other wildlife, also rely on the Refuge's salt marsh and environs for essential habitat. Endangered peregrine falcons and California brown pelicans, as well as state-listed endangered Belding's savannah sparrows, use the Refuge. A variety of other birds recognized by the State or Federal Government as sensitive or candidate species for protective status also use the environs of the Station.

Since its establishment in 1974, the Refuge has been managed with a principal focus on endangered species. The variety of activities to protect and manage endangered species on the Station have also benefited other wildlife. Management and protection activities have included salt marsh restoration, habitat enhancement, research, monitoring, and predator control.

Since the mid-1980's, the already low and fluctuating populations of California least terns and light-footed clapper rails have experienced significant impacts due in large part to predation. Predation impacts have been principally attributed to red foxes, (Appendices D, E, and F).

Introduced (non-native) red foxes have moved onto the Refuge in high numbers since native coyotes, previously the top predators, became absent from the Refuge in the mid-1970's. Because of the low numbers of endangered species on the Refuge and throughout their ranges, predation is considered a significant threat to their survival. The presence of red foxes on the Station and Refuge represents a significant threat to terns and rails because they are known as surplus killers and major predators of ground-nesting waterbirds and eggs. With the recent territorial expansion of non-native red foxes into new areas along California's coast, cumulative impacts on endangered species in these areas could potentially be major.

In response to declines in production and total numbers of the endangered least terns and clapper rails, increased predation incidents, and initial and increased sightings and sign of red foxes in and near the Refuge, an Environmental Assessment (EA) for a plan to control non-native red foxes on the Station and Refuge was prepared in 1986. The EA was prepared to comply with mandates of the federal Endangered Species Act, the National Environmental Policy Act (NEPA), and the National Wildlife Refuge Administration Act.

Legal challenges to the adequacy of the EA resulted in a federal court requirement for preparation of an EIS. In the interim, the court has allowed predator control activities for the protection of endangered species to continue on the Station and Refuge.

DEVELOPMENT OF THE EIS

Public involvement was a principal feature throughout the development of the EIS for the Seal Beach Endangered Species Management and Protection Plan. The EIS process was initiated in November 1988 (see Appendix G), with preliminary meetings and discussions, problem identification, and organization of the EIS team of experts. The EIS team consisted of representatives from

the Service, Navy, other state and federal agencies, and private consultants. A Notice of Intent to prepare the EIS was published in the Federal Register on January 12, 1989. That Notice, along with news releases, public notices and agency mailings, announced the EIS effort and public scoping period, including a public scoping meeting. A public scoping meeting was held in the City of Seal Beach on February 2, 1989, with over thirty people and three news reporters in attendance. A Fact Sheet was disseminated at the public meeting and to others on the mailing list or upon request.

Based on comments received at the public meeting and by written and telephone communications, key issues and concerns were identified (see "Key Issues" below). The period for public comment as part of the initial EIS public scoping process was formally open through February 28, 1989. In August 1989, a second Fact Sheet and a Scoping Report were prepared and disseminated to persons, groups, agencies, and media on the EIS mailing list.

Throughout the EIS process, data collection, data synthesis, research and writing of the EIS were ongoing. In March 1990, a preliminary draft EIS was produced for interagency review. On May 18, 1990, the Draft EIS was filed with the Environmental Protection Agency (EPA) and a Notice of Availability published in the Federal Register. Prior to the official filing date, copies of the Draft EIS were provided to all agencies, groups, and individuals on the EIS mailing list. Local public libraries and others requesting copies were also provided with the Draft EIS. Public notices, press releases, and a Fact Sheet were distributed at the time of Draft EIS release. The public comment period for the Draft EIS was open through July 17, 1990. All public and agency comments received during that period and the agencies' responses to the comments are published in the Final EIS.

The Final EIS was filed with the Environmental Protection Agency (EPA) on August 31, 1990, and news releases and a Fact Sheet distributed at that time. Prior to the official filing date, copies of the Final EIS were provided to agencies, groups, and individuals on the EIS mailing list. It is expected that implementation of the selected plan will begin during Spring 1991.

KEY ISSUES

Through public scoping and with input from various public agencies and experts, key issues were identified and organized into five categories. Key issues addressed in the EIS are identified as the effects that implementation of the proposed action would have on: 1) endangered species and their habitats, 2) predatory mammals and other predators, 3) other wildlife and their habitats, 4) physical factors, and 5) the local community and general public.

ALTERNATIVES

A number of alternatives were identified by the public and the EIS team through meetings and public scoping activities. In a process of clarifying and reducing the number of alternatives, many of the important features of the various alternatives considered were incorporated into the alternatives presented in the EIS. Although a number of specific alternatives were dismissed from further consideration, the environmental consequences of many of the actions they contained are evaluated as part of the alternatives in the EIS. Specific alternatives considered during the initial process of developing alternatives, but that have been dismissed from further consideration are: 1) Alternatives involving any endangered species management or predator control action by the Service or the Navy beyond the boundaries of the Station or the Refuge; 2) Alternatives without endangered species management by the Service; 3) Alternatives dealing only with predator control and not the other aspects of endangered species management; 4) Alternatives providing habitat restoration without predator control; 5) Alternatives focusing primarily on only one method or group of methods for predator control; and 6) Alternatives dealing directly with only a single or limited number of predatory species which may require control. The rationale for dismissing each of these specific alternatives is provided in the EIS.

For consideration in the EIS, the range of alternatives was reduced to five alternatives for implementation of a management and protection plan for the endangered species of the Refuge and Station. Each alternative has a goal of protecting and managing the endangered species to various degrees. Also, each alternative is defined by different methods or levels of management within each of the following components: 1) management actions for endangered species, 2) monitoring and researching environmental quality, 3) public use and education, and 4) staff and funding. The five alternative management plans are: A) Interim Management, B) No Action, C) Reduced Management, D) Expanded Endangered Species Management, and E) Expanded Endangered Species Management with Ecosystem Restoration. The Preferred Alternative is Alternative E which entails a phased transition from Interim Management through Expanded Endangered Species Management with Ecosystem Restoration. The alternatives are summarized below.

ALTERNATIVE A

Alternative A, Interim Management, is defined as the present level of endangered species management at the Refuge and Station. This alternative is considered interim until a decision is made regarding the plan of action for protecting and managing the endangered species, and the Federal Court determines that NEPA compliance is adequate.

This alternative combines species population monitoring, studies of species biology and habitat requirements, habitat enhancement programs, and an active predator control program. Active predator control includes consideration of a wide range of techniques designed to protect the Station's endangered species from impacts caused by avian and mammalian predators, principally non-native red foxes. This alternative includes potential management actions considered for implementation in the future.

It is intended that this alternative provide maximum flexibility for predator control in order to remain responsive to improvements and changes in technology and control techniques, operations and management of participating agencies, and situations that could suddenly and seriously threaten the endangered species.

ALTERNATIVE B

Alternative B, No Action, is defined as consisting almost entirely of operations at the Station and Refuge prior to the development of the Service's 1986 EA. This alternative consists of a varied endangered species management program on the Refuge and Station that includes employing episodic live trapping and relocation of mammalian predators on the Station. This alternative assumes the retention and maintenance of certain recent additions to the Refuge such as recent changes to the NASA Island fence. Other conditions of this alternative are defined based on their status during or prior to 1986.

ALTERNATIVE C

Alternative C, Reduced Management, is defined as a low level of endangered species and other wildlife management with very little human intervention. Coordination of management, studies, and other activities with such entities as the California Department of Fish and Game, would be reduced from ongoing to intermittent.

Levels of management actions, research, and monitoring of endangered species and environmental quality, would vary under this alternative. Active predator control would not occur. Levels of reduced management for predator control would include passive measures such as limited fencing or other barriers that may only provide partial protection for the Refuge's endangered species.

ALTERNATIVE D

Alternative D, Expanded Endangered Species Management, is defined as ongoing expansion of management for endangered species on the Refuge and Station. It is intended to maximize the monitoring, study, management, and protection of the endangered species. Based on increased knowledge and identification of needs and opportunities, management actions would be designed to benefit endangered species and other native wildlife on the Station and Refuge.

Alternative D incorporates the management flexibility for predator control activities described for Alternative A and expands on many of the interim endangered species management efforts.

ALTERNATIVE E

Alternative E, Expanded Endangered Species Management with Ecosystem Restoration, is the Preferred Alternative. It is defined as expanded management for endangered species on the Refuge, as presented in Alternative D, along with restoration of supporting habitats. It entails a phased transition from the interim management actions currently in place as described in Alternative A (Phase 1), through intermediate actions (Phase 2), to a fully implemented expanded endangered species management program (Phase 3). New and expanded actions would be implemented based on funding and staff availability, coordination, and information from research and studies.

Additional high quality wetlands and a restored ecosystem that maximizes production of native fish and wildlife on the Station and Refuge, would be developed. As closely as possible, a self-perpetuating collection of natural habitats would be provided. Research would be conducted to explore the possibilities and feasibility of restoring native shrubland habitat and reintroducing coyotes to the Station. An objective would be to create a more naturally balanced ecosystem requiring minimum human intervention to support and protect endangered species.

Restoration of native plant communities and the feasibility of coyote reintroduction would require careful study and planning. Research on coyote reintroduction would require examination of alternative reintroduction and control methods, monitoring programs, and public involvement and education programs. Additional agency coordination and environmental compliance documentation is anticipated for the coyote reintroduction effort.

ENVIRONMENTALLY PREFERABLE ALTERNATIVES

It is determined that Alternative E, the Preferred Alternative, is the environmentally preferred alternative because it minimizes or avoids adverse environmental impacts and provides the most comprehensive benefits for the endangered species, other migratory birds and the public. Moreover, this action fulfills mandates of the Endangered Species Act for the protection of endangered species. Of the alternatives presented in the EIS, Alternative E is the most comprehensive, providing a flexible plan of action for protection and management of endangered species.

Alternatives A and D are also determined to be environmentally acceptable alternatives, preferable to Alternatives B and C. Alternatives A and D would also minimize or avoid environmental harm with their implementation. Alternative D is superior to Alternative A due to the further environmental enhancements proposed under Alternative D.

Appendix H presents an issue-oriented comparison of the five alternatives. Benefits and impacts of implementing each alternative are broken down into categories of key issues and summarized. Alternative E would provide the overall highest benefits for endangered species as well as the Seal Beach environment by phasing in actions and programs as appropriate and needed, and as knowledge and funding allow. This alternative also provides high benefits for the majority of the concerned public and local community.

DECISION

SELECTION OF THE PREFERRED ALTERNATIVE

The agencies' decision is to implement the Preferred Alternative, Alternative E, as it is described in the Final EIS for the Endangered Species Management and Protection Plan, Naval Weapons Station-Seal Beach and Seal Beach National Wildlife Refuge. This decision is based on a thorough review by the agencies of the alternatives and their environmental consequences described in the EIS.

The Selected Plan entails a phased transition from interim management actions currently in place, described in Alternative A, through intermediate actions, to a fully implemented expanded endangered species management program with ecosystem restoration as described in Alternative E. It is anticipated that the Selected Plan will provide direction for protection and management of endangered species at the Refuge and Station for at least the next 10 years.

EXPLANATION OF THE SELECTED PLAN

The Selected Plan, Expanded Endangered Species Management with Ecosystem Restoration, is comprised of principal components that include: species population monitoring; endangered species studies; endangered species protection; predator control; habitat management; habitat restoration and enhancement; monitoring and researching environmental quality; public use and education; and staff and funding. Various components of the Preferred Alternative will be phased in over an approximate 10-year period with implementation based on available staff and funding. An objective of implementing this alternative is to establish a more naturally balanced ecosystem supportive of endangered species and other native wildlife. A summary of key plan components is provided below. Details of the components and phasing for the Selected Plan are described in Appendix I, Plan Components, and Appendix J, Plan Phases.

POPULATION MONITORING

Population monitoring actions are designed to determine abundance and population trends of various species within the Refuge and Station. The objective of monitoring is to provide information on which to base management decisions.

Principal monitoring actions include night surveys (to indicate population numbers of nocturnal, predatory species), California least tern surveys, and light-footed clapper rail call counts and high tide surveys. As the various phases of the plan are implemented, population monitoring projects are expected to be expanded.

ENDANGERED SPECIES STUDIES

Studies of the population dynamics and habitat use of the California least tern and light-footed clapper rail will be continued and expanded through the implementation of the Plan.

ENDANGERED SPECIES PROTECTION

The principal means of providing protection of terns and rails from predatory species, for all phases of the Plan, involve habitat modification and population management measures. All methods used for controlling predators from the Station or Refuge will conform to government regulations and approval subject to U.S. Fish and Wildlife Service and U.S. Department of Agriculture, Animal Damage

Control (ADC) guidelines and requirements. Predator control activities will be conducted based on the mutual concurrence of the Service, Navy, and ADC and initiation of all activities will be coordinated with California Department of Fish and Game (CDFG).

The barrier and electric fence around the NASA Island least tern nesting colony will be maintained as needed and enhanced as improved designs are identified. The Station's perimeter security fence will be maintained. Improvements to the perimeter fence such as the addition of a horizontal ground level extension to discourage burrowing under by predators will be made as the fence is repaired or replaced.

Predatory mammals will be actively controlled using techniques for trapping and relocation, trapping and euthanization, and other methods as appropriate. For predatory mammals such as red foxes, the primary method of capture will be by padded leghold traps. Cage traps or other methods may be employed to capture other predatory mammals (such as feral cats, opossums, or striped skunks) when it is determined that such techniques are effective and appropriate. When suitable relocation sites or facilities have been identified, captured animals will be transported and released to those locations. Relocation will occur based on stringent criteria outlined in the EIS. In the absence of suitable relocation sites, captured predatory mammals will be euthanized at the trap site. The principal means of euthanasia is by lethal injection. Other effective, safe, and humane means of predator control may also be employed, as identified in the EIS.

Animals trapped that are not considered to pose a significant threat to endangered species because of the time of year trapped, total estimated numbers on the Station, or other factors, may be released at the trap site or to an area away from the marsh based on criteria and guidelines to be developed as described in Appendix K ("Predator Control Action Index").

Techniques for controlling avian predators include live capture and release off-site, live capture and euthanization, shooting, and toxicant application. Live capture of predatory birds will be by baited foot noose harnesses or modified pole traps. In the event that common ravens or American crows become problem predators of endangered species on the Refuge in the future, a toxicant, starlicide (DRC-1339), may be used for their control. Shooting of avian predators will be used only in rare cases where a problem bird cannot be trapped or returns after release away from the Station and continues to prey on endangered species. Techniques for avian predator control will adhere to agency policies for safety and humane treatment of animals.

An index will be established to aid management of predator populations on the Station and Refuge (see "Predator Control Action Index" Appendix K). Species of predators will be controlled based

on location, seasonality, and numbers of predator sign or sightings on the Station and Refuge. The type, extent, timing, and duration of control activities for targeted species will be based on this index and on the population status and trends evident for endangered species at the time. As new information becomes available and knowledge gained, indices will be periodically revised. If significant or repeated predation of endangered species occurs, immediate emergency control measures will be implemented. A purpose of the index is to avoid the need for enacting emergency control measures for protecting endangered species.

In Phase 3, habitat restoration conducive to supporting the reintroduction of the native top carnivore coyote, will provide the means for establishment of a more self-sustaining and naturally-functioning ecosystem on the Station and Refuge. Research efforts will study the potential for coyote reintroduction. Should reestablishment of coyotes on the Station prove feasible, it is possible that a more naturally-balanced ecosystem including more natural suppression of predators, might allow a lower degree, or perhaps the elimination, of active predator control efforts such as trapping.

HABITAT MANAGEMENT

Several habitat management activities are ongoing and other activities will be expanded during plan implementation. Management and maintenance of nesting sites for terns and rails will continue. Furthermore, additional nesting areas for these species will be planned and developed in the future.

HABITAT RESTORATION AND ENHANCEMENT

Habitat restoration and enhancement efforts will be undertaken as funding and staff become available. Efforts will be initiated to examine the feasibility of cleanup and restoration of the Oil Island site to a use more compatible with Refuge purposes. An 8-acre wetland parcel, located on the Station but currently outside the Refuge boundary, will be considered for inclusion as part of the Refuge. The 116-acre Port of Long Beach mitigation project, completed in summer 1990 on the Refuge, will continue to be monitored for its effectiveness in providing fish and wildlife habitat. Other completed restoration projects on the Refuge will continue to be monitored for their effectiveness.

Additional efforts that are planned include: 1) Wetland restoration and enhancement; 2) Upland habitat restoration (adjacent to the Refuge); 3) Providing agricultural tailwater and local runoff to enhance marsh vegetation production; 4) Coyote reintroduction; and, 5) Use of Oil Island when oil production

operations are phased out. Each of these efforts will be studied and the findings implemented as appropriate.

MONITORING AND RESEARCHING ENVIRONMENTAL QUALITY

The Navy's multi-phase Installation Restoration Program to evaluate and correct potential problems associated with past hazardous waste disposal activities on the Station will be continued. The Navy will continue to work on the program in association with the California Department of Health Services, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the County of Orange. A contaminant study that has been initiated on the Refuge as a cooperative study between the Service and Navy will be expanded. The study will determine whether contaminants on the Station are being bioaccumulated and, if so, to what extent they may impact endangered species and other wildlife. If appropriate, remedial action will be initiated. Other ongoing environmental monitoring programs will also continue under this Plan.

PUBLIC USE AND EDUCATION

Public education programs and presentations regarding the ecology of the Refuge and its environs currently conducted by Service personnel and the Station's environmental coordinator will be continued. In Phases 2 and 3 public involvement will be increased to include public tours of the Refuge at least one day each year and a symposium on poignant environmental issues for the Refuge every other year. Possibilities of developing public viewing and interpretation facilities will be explored.

STAFF AND FUNDING

Under the Selected Plan, staff and funding changes would be phased in along with other program changes and modifications. Funding for the Seal Beach Refuge is controlled by Congress and agency allocations to geographical regions and specific national wildlife refuges. Past funding for the Refuge has fluctuated and may again fluctuate in the future based on variable allocations.

Under Phase 1 of the Plan implementation, annual total support staff from Service and Navy personnel is expected to be equivalent to 1.5 staff years, at an approximate cost of $67,500 per year, in 1989 dollars.

Phase 2 of the Plan will be phased in for implementation as staff and funds become available. During Phase 2, annual funding is expected to be approximately $182,000 (in 1989 dollars), which would include 4.5 Service and Navy staff positions. Active management personnel, support, and administration are included. Major projects such as new studies, site development, and fencing

improvements would be funded through regular Navy or Service sources. Additional funding may be secured through solicitation of restoration funds. Additional nominal costs would be associated with tours, symposia, and brochures that would be shared jointly by the involved parties.

Implementation of Phase 3 will occur as staff and funds become available. The total cost of the Preferred Alternative, at full development, would include annual funding of about $225,000 (in 1989 dollars), which includes 5.5 Service and Navy staff positions. The initial cost of the shrubland development and coyote reintroduction is estimated at about $250,000.

RATIONALE FOR DECISION

The decision to select the Preferred Alternative, Alternative E, as the action to be implemented as the Endangered Species Management and Protection Plan, Naval Weapons Station-Seal Beach and Seal Beach National Wildlife Refuge is based on consideration of a number of environmental factors and issues.

Implementation of the Preferred Alternative represents the full commitment by the Navy and Service to maximize wildlife values on the Station over time, thus maximizing protection and recovery goals for the endangered species. This action, which will initially be phased in from current (interim) management will require expanded manpower and funding. The Preferred Alternative addresses the need to recognize the connection between upland and wetland habitats, particularly in food web interactions, and the potential for achieving a self-maintaining ecosystem on the Station. This decision represents a commitment to prioritize the development and maintenance of wildlife values to the highest degree possible, while accommodating the primary military mission of the Station. The mandates of the Endangered Species Act would be achieved with the successful implementation of Alternative E.

A principal component of the Selected Plan is the expanded role of environmental monitoring and research. Research results will provide guidance for the planned upland restoration and coyote reintroduction.

Current and expanded monitoring programs including contaminants investigations will help assure that appropriate knowledge of the Seal Beach ecosystem is obtained. Consequently, management actions will assure the existence of a quality environment for the endangered species and other wildlife. Furthermore, the public will benefit through increased understanding of the environment and increased awareness of important environmental issues. Through implementation of the various actions of the Selected Plan, including wildlife population monitoring, endangered species

studies and protection, habitat management, restoration and enhancement, monitoring and researching environmental quality, and improvements to public use and education, environmental harm will be avoided or minimized.

PROTECTION OF ENVIRONMENTAL RESOURCES AND MAINTAINING ENVIRONMENTAL QUALITY

Implementation of the Preferred Alternative extends the protection of environmental resources and maintenance of environmental quality to the maximum extent possible and beyond what would be achieved under either of the other two environmentally preferable alternatives (Alternatives A and D). Environmental resources and quality will be maximized under the Selected Plan through: 1) continuing protection of the resources by minimizing public access and incompatible public use; 2) restoration and enhancement of the maximum wetland habitat acreage possible; 3) restoration of the maximum acreage possible to high quality upland habitats, in support of many sensitive species of wildlife, including Category 2 Candidates for Federal listing; 4) restoration of a balanced food chain, to the extent possible, including the reintroduction of coyotes if research and monitoring indicate the potential benefits anticipated; 5) a program of monitoring and research which will be used to assure that adjustments in management and restoration techniques will be made to maximize benefits for environmental resources and quality; 6) minimization or elimination of potentially harmful chemicals from the Refuge environment; 7) attempting to establish and maintain wildlife corridor connections between the Station and surrounding open space, working cooperatively with the county, cities, and interested individuals and organizations; and 8) maximizing public participation and education through the regular dissemination of information and the eventual establishment of a visitor interpretation and wildlife observation facility on a suitable site in or near the Refuge.

The principal reason for the selection of Alternative E as the plan for implementation was biological. It was chosen because it includes all of the measures identified to protect and enhance the environmental resources and quality of the Refuge and Station to the maximum extent possible. Although Alternative D is also an environmentally beneficial alternative, it does not include attempts at coyote reintroduction and repair of the local food chain, and so is inferior to Alternative E. Alternative A, the other environmentally preferable alternative, is inferior to Alternative D in that it does not maximize protection, study, monitoring, or restoration measures.

Alternatives B and C are not environmentally preferable compared to the other alternatives in that wildlife resources, including endangered species, may not be adequately protected. The light-

footed clapper rail is likely to be extirpated from the Refuge under either of these alternatives and the least tern would likely be extirpated under Alternative C. Wildlife values would not be maximized and would likely decrease.

Implementation of the Selected Plan will function to restore the biological diversity and productivity feasible in this geographic location, given site constraints. The restoration of coastal sage scrub will be attempted on the Station, where elsewhere in Orange County this habitat type is continuing to disappear. This restoration may accommodate several rare species on the Station and may make it possible for species such as the California gnatcatcher to recolonize this area of Orange County.

Whereas the Preferred Alternative would result in large scale and maximal protection, restoration and enhancement of the biological environmental, it should be considered the least environmentally damaging alternative, as well. Since the measures used in achieving the goals of the Selected Plan are designed to avoid or minimize environmental harm, monitoring is incorporated into this plan as a major component, and maximum benefit would be achieved for public fish and wildlife resources. Implementation of this action is self-mitigating.

ENDANGERED SPECIES ISSUES

Implementation of the Selected Plan will maximize protection and proliferation of the endangered species, compared to the effects of all other alternatives. The health and survival of populations of light-footed clapper rails and California least terns on the Refuge are extremely important to the overall survival of these species throughout their ranges. The Refuge provides habitat for the third largest population group of light-footed clapper rails in the United States. Also, in 1989, the Refuge accounted for over 13% of all California least terns produced in the State. (Also see Appendix L, New Data). Maintaining genetic diversity of the species is essential for maintaining their resilience to devastating disease outbreaks and regional or local catastrophes. Maintenance of a diverse gene pool through dispersed, viable breeding populations of the endangered species is essential for their recoveries.

Implementation of the Selected Plan will provide the greatest variety of activities to protect and manage endangered species on the Station, while maximizing benefits for other native wildlife, as well. Protection will be maximized through active monitoring of predator populations, enhanced understanding of predator-prey relations, and control activities that are based on monitoring results and principally aimed at avoiding serious predation on endangered species, particularly by non-native predators such as the red fox. Management activities will maximally benefit the

endangered species through constant refinement of techniques based on understanding gained through increased monitoring and study of the birds, their needs and environment. The habitat base available to the endangered species will be expanded by restoring available low-lying acreage to wetlands and by providing additional nesting sites. When a more complete food chain supported by high quality upland habitat is created, a subsequent reintroduction of native coyotes may suppress mesopredators such as red fox. This could eventually reduce requirements for direct predator control by humans.

The implementation of Alternative D would result in very similar benefits for endangered species with the exception of upland, and therefore food chain, restoration. The implementation of Alternative A would also benefit endangered species but to a reduced extent. The implementation of Alternatives B and C may not result in adequate protection of endangered species.

PREDATORY MAMMAL ISSUES

With full implementation, the Selected Plan will result in balanced predator populations on the Station. As conceptualized, the need for active predator control could be reduced by restoring an environment in which more natural controls are at work. Native predatory mammals would benefit in the availability of high quality habitat that is minimally impacted by human activities. It is also surmised that limited numbers of the non-native carnivores would also survive in this environment.

As a part of expanded wildlife management programs at Seal Beach, the Agencies will endeavor to develop an index for predator control actions. The principal purpose of this index is to provide effective and efficient protection of endangered species on the Refuge and Station by enacting a prompt and responsive program of predator control. An additional objective of this action is to prevent reduction of predator populations to levels lower than necessary to assure protection and perpetuation of endangered species on the Refuge. Additional information will be collected with the implementation of the early phases of the Selected Plan. These data will provide Service biologists and managers with: 1) better population estimates of problem and potential problem predators on the Station and Refuge; 2) expanded information on the local ranges of these predatory species; and 3) estimates of reasonable carrying capacities for endangered species, native predators and other important wildlife on the Station and Refuge. For more details on the Predator Control Action Index see Appendix K.

Implementation of Alternative D would have similar consequences to the Preferred Alternative, except that the regulation of population levels of these carnivores would be entirely through human

intervention and predator control activities. A balance would still be expected through monitoring and study of predator populations and species and use of the Predator Control Action Index.

Implementation of Alternative A would also attempt a balance in predator populations but with less monitoring and study accompanying the control activities, such activities would be more sporadic and intensive. Predator populations would probably go through larger fluctuations in numbers. The effects of Alternative B and C on these predators would be mixed. On the surface, it may appear beneficial to these mammals to reduce or eliminate predator control activities. In reality, high population levels that would eventually come about as a result of the lack of artificial or natural regulation of their numbers, would likely result in prey base reductions, increased potential for the spread of diseases, and eventual catastrophic crashes in the populations of some species.

OTHER WILDLIFE ISSUES

Implementation of the Selected Plan would lead to an enhanced ecosystem over the entire Station to the benefit of nearly all of the wildlife species on the Station. This would be accomplished by the conversion of as much acreage as possible to wetlands and to functional, productive upland habitats. The lands that would be converted are currently in poor condition and regularly disturbed, with very low existing wildlife values. The habitat base for wildlife in general on the Station would be increased and active steps would be taken to maximize the quality of the environment for all wildlife with particular emphasis on sensitive species. This would be achieved through monitoring and study of restoration areas, established areas, and populations of various wildlife species with a goal of refining the management to achieve maximum wildlife benefits.

The implementation of Alternative D would provide benefits for wildlife associated with wetlands similar to those achieved under Alternative E. Upland restoration would not be achieved and the benefits associated with this type conversion would not be realized. Alternative A would result in increased benefits for only wetland-associated species but the amount of restoration and benefit would be reduced compared to Alternative D. Protection for existing native wildlife from unnatural levels of predation would be achieved through natural or artificial control activities under all three of the above alternatives. Under Alternatives B and C, protection from predation would be poor to non-existent and habitat restoration efforts would be minimal. Impacts to a wide variety of wildlife may result.

OTHER ENVIRONMENTAL FACTORS AND CONTAMINANT ISSUES

The rationale for choosing the Selected Plan over other alternatives when considering other environmental factors was that it provided the greatest improvement in the physical environment while remaining consistent with the other plan objectives. Alternative E provides for improved air quality, improved soil productivity, improved hydrology, and environmental noise reduction which equals or exceeds that provided under Alternatives A, B, C, and D.

Alternative E would provide contaminant information on which to base future management decisions where existing information is not sufficient. The increasing population of endangered species after the initiation of predator control activities, during which time available information shows no substantive change in contaminant levels, indicates that predation was suppressing endangered species populations and contaminants were not. It is appropriate to obtain more detailed information on contaminants in the water, food chain, sediments, and wildlife species because contaminants have the potential to reduce reproductive success of endangered species and other wildlife. Under the Selected Plan, the Navy and Service have committed to an extensive effort to investigate potential contaminant problems including a bioaccumulation study. Equal contaminant monitoring would occur under Alternatives A, D, and E. Reduced contaminant monitoring would occur under Alternatives B and C.

RELATIONSHIP TO THE LOCAL COMMUNITY AND THE GENERAL PUBLIC

PUBLIC INPUT

The Service and the Navy have provided a full and open public involvement process associated with the development of the Seal Beach EIS. A summary of the public involvement process is provided in the section, "Development of the EIS", above. Comments on the Draft EIS were received from three Federal agencies, three State of California agencies, two local agencies, seven organizations and fourteen individuals. Of the twenty-nine respondents to the Draft EIS, twenty commentors specifically endorsed the selection of Alternative E, the Preferred Alternative, for implementation. Four respondents voiced general support for the implementation of the proposed action, two respondents were non-committal, and three respondents voiced general dissatisfaction with the EIS and did not favor any of the alternatives. Only five comments were received in response to the Final EIS. One respondent was generally dissatisfied with the EIS and requested to be removed from the mailing list, one respondent voiced approval of the Final EIS, and three respondents asked for some clarification on specific, minor issues (see Issue Clarification, Appendix M).

A survey of public opinion on protection of endangered species and control of predators was conducted as a part of the socio-economic assessment for the EIS. The study, entitled A Socio-Economic Impact Assessment of the Endangered Species Management and Protection Program at the Seal Beach National Wildlife Refuge, by R.K. Hageman, Department of Economics, San Diego State University, and V.M. Witkowski, Global Environmental Conflict Resolutions, included a survey of residents in Orange, Los Angeles, and San Diego Counties. The survey indicated that the majority of the public supports the concept of endangered species management and protection outlined in Alternative E, the Preferred Alternative.

The report stated: "We can conclude that socio-economic impacts, as indicated by these respondents' views are positive when endangered birds are protected, even if predators must be euthanized, but especially so if ecosystem restoration is used to restore native habitat and a natural predator-prey balance in the food chain...Public responses showed no clear consensus about whether red foxes deserve equal protection or whether permanently caging captured foxes is preferred to euthanasia. However, the very strong negative response (more than 50% of respondents) to a funding question indicates that the majority of households would not be willing to contribute to a fund to be used to cover costs of live capture and maintenance of foxes in captivity." (This report is included in the Final EIS as Appendix G.)

Alternatives A and D address concerns the public voiced regarding endangered species on the Refuge. However, these alternatives do not involve ecosystem restoration with the potential for reduced human intervention as planned with the Preferred Alternative. Alternatives B and C are less likely to provide sustained protection of endangered species on the Refuge. Protection of endangered species was strongly supported by a large part of the public.

COORDINATION AND CONSULTATION WITH OTHER AGENCIES

The Service and the Navy worked closely with a number of Federal, State and local agencies throughout the development of the Seal Beach EIS. Close coordination was maintained with the California Department of Fish and Game, and the U.S. Department of Agriculture, Division of Animal Damage Control. The California Department of Fish and Game fully endorsed the selection of the Preferred Alternative for implementation. While the USDA Division of Animal Damage Control supported all aspects of the Preferred Alternative except for study of the potential reintroduction of coyotes to the Station in their comment letter on the Draft EIS, recent discussions with Animal Damage Control representatives has resulted in renewed interest in participating in the coyote reintroduction study by that agency.

In August 1990, the Service provided a Coastal Consistency Determination for this project to the California Coastal Commission. On October 9, 1990, the California Coastal Commission concurred with the proposed implementation of the Endangered Species Management and Protection Plan for Seal Beach Refuge and Station. The Commission found that the project was consistent to the maximum extent practicable with the California Coastal Management Program, an approved State coastal program under the Federal Coastal Zone Management Act of 1972.

Furthermore, Alternative E provides for the greatest degree of future interaction with the public agencies, local communities, and the general public. Alternative D would provide for greater interaction with the community than Alternatives A and B, but less than Alternative E. Alternative C would reduce the current level and timeliness of consultation and coordination with all entities, potentially isolating the Refuge from the surrounding public and communities.

PUBLIC HEALTH ISSUES

A variety of public health concerns exist in southern California. The selection of the Preferred Alternative for implementation weighed public health considerations. The red fox is a potential vector for several diseases that are public health concerns. Furthermore, control of red foxes could potentially increase rodent populations which can also be disease vectors. Since red foxes are larger, more mobile animals than rodents, they would be more likely to leave the Station and represent a public health concern in the surrounding developed area. Alternative E is expected to promote raptor and other predators in numbers high enough to naturally control rodent numbers minimizing the threat of disease outbreaks. Alternatives A and D would provide similar situations relating to rodents. Alternatives B and C would maintain very low rodent populations resulting from mammal predation, but the high predator numbers could contribute to the spread of disease. Therefore, the potential for a significant change in public health risks due to increased rodent populations in response to reduced red fox populations is minimal under the Selected Plan.

When present, diseases spread rapidly through dense animal populations. The Selected Plan buffers this potential by maintaining species with potential to transmit diseases through interaction with people and domestic pets, at low levels. This Plan also provides for implementation of more precise indices of predatory mammal numbers on the Station and Refuge. This is an advantage over Alternatives A and D in preventing dense populations of predatory mammals to build up to levels of concern. Alternatives B and C would not maintain low levels of species such as the red fox. These Alternatives would potentially increase the

threat of disease spread associated with dense predatory mammal populations.

PUBLIC USE AND EDUCATION

The Selected Plan provides for the greatest degree of public use consistent with endangered species management and the mission of the Station. Refuge tours, greater information exchange programs, a visitor interpretation and wildlife observation facility will all contribute to better inform and provide wildlife viewing opportunities to the public. Implementation of a symposium every other year will provide interested public members the opportunity to learn more about management programs on the Refuge. These activities would lend support to public desires to visit the Refuge if it were open to the public. These components go beyond the public use and education opportunities of Alternatives A, B, and D by providing a variety of resource related experiences to the public. Alternative C would reduce the level of public use/education to a level below that of either Alternatives A, B, D, or E.

The rationale for choosing Alternative E over other alternatives when considering the availability of viewing opportunities for endangered species, red fox, and other wildlife species was that Alternative E was the most consistent with the established purpose of Seal Beach Refuge to protect endangered species. Alternatives B and C were not chosen because reducing endangered species populations to enhance red fox viewing opportunities is inconsistent with the purpose of the Refuge. Mitigation for the reduction of red fox viewing opportunities associated with implementation of Alternatives A, D, or E is not required as numerous red fox viewing opportunities are present in the local area. Mitigation for reduction of endangered species viewing opportunities if Alternatives B or C were implemented would not be possible at the Refuge as the limited management under Alternative B, or reduced management under Alternative C, would preclude maintaining endangered species populations at the current level.

OTHER FACTORS

LEGISLATIVE MANDATES

The selection of the Preferred Alternative is consistent with the mandates of: the National Environmental Policy Act of 1969, as amended; the Endangered Species Act of 1973, as amended; the National Wildlife Refuge Administration Act of 1966, as amended; the Animal Damage Control Act of 1931, as amended; and the Sikes Act of 1960, as amended. With the selection of the Preferred

Alternative, the Service and the Navy have considered the mandates, policies, and guidelines of these, as well as other Acts and Orders, and chosen an action which is fully in line with the directives of these Federal Acts. While implementation of Alternatives A and D would also be consistent with these directives, it is possible that Alternative B and likely that Alternative C would not be consistent with the mandates of the Endangered Species Act.

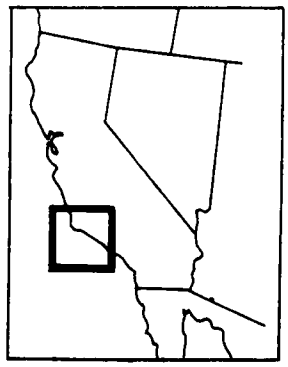
COSTS AND BENEFITS

The economic costs of the implementation of the various alternatives are highest to lowest respectively, for the Preferred Alternative, followed by Alternative D, A, B, and finally C. Alternative A would be the most inexpensive of the environmentally preferable alternatives to implement. However, in the long-term it is expected that the additional costs associated with the implementation of the Preferred Alternative will provide important benefits to endangered species, other wildlife, the public and the general environmental quality of the area. Implementation of the Selected Plan will provide an endangered species management program for the Refuge and Station that will result in the greatest long-term benefits to these species, a vital, diverse and productive environment, and enjoyment by the public of the endangered species and the Seal Beach environment.

APPENDICES

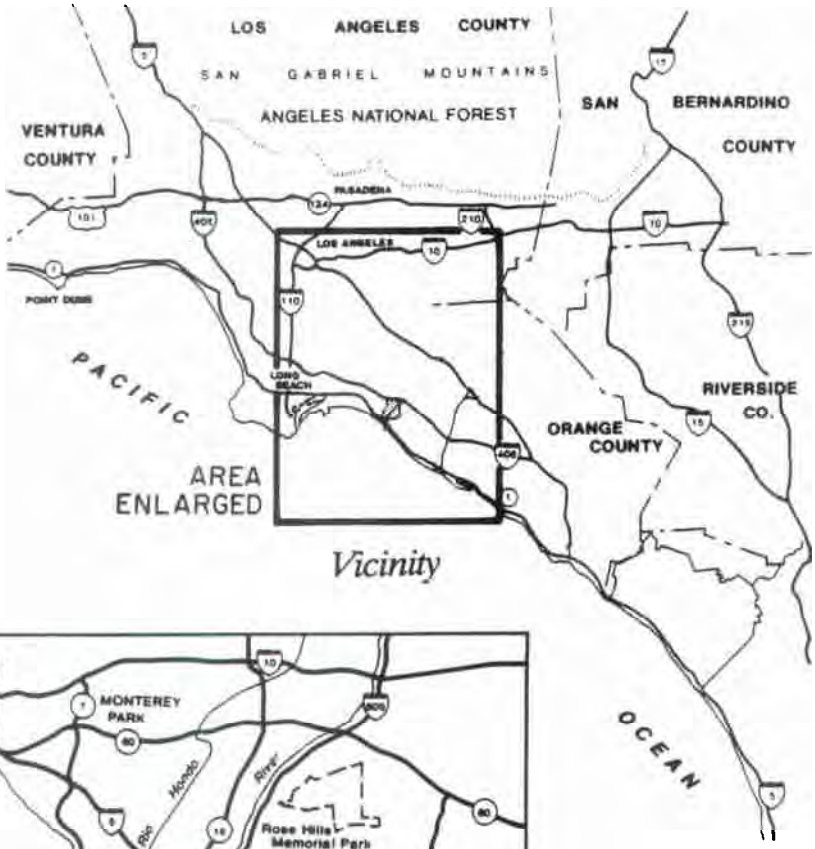
LIST OF APPENDICES

APPENDIX A: REGIONAL, VICINITY AND LOCATION MAPS OF NAVAL WEAPONS STATION - SEAL BEACH AND SEAL BEACH NATIONAL WILDLIFE REFUGE

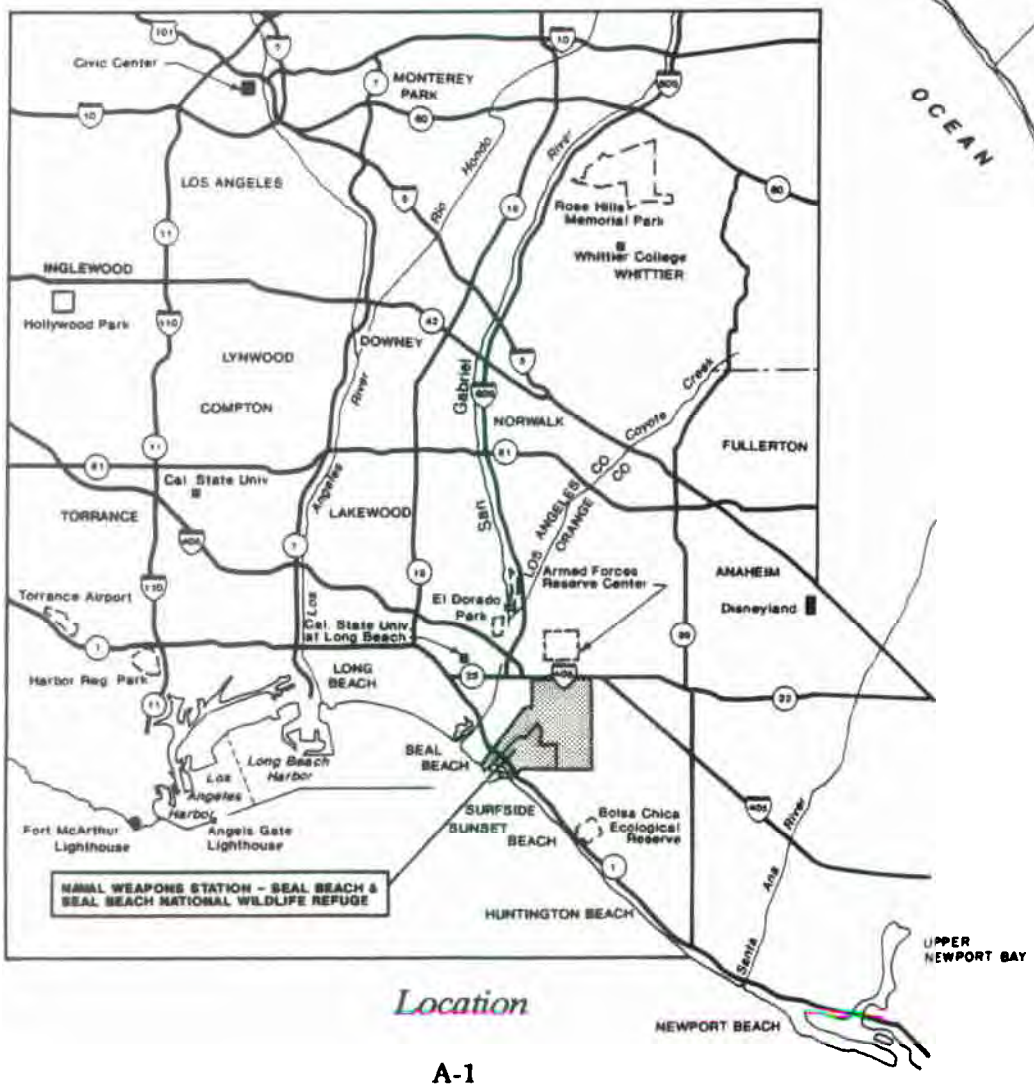


AREA ENLARGED

Region

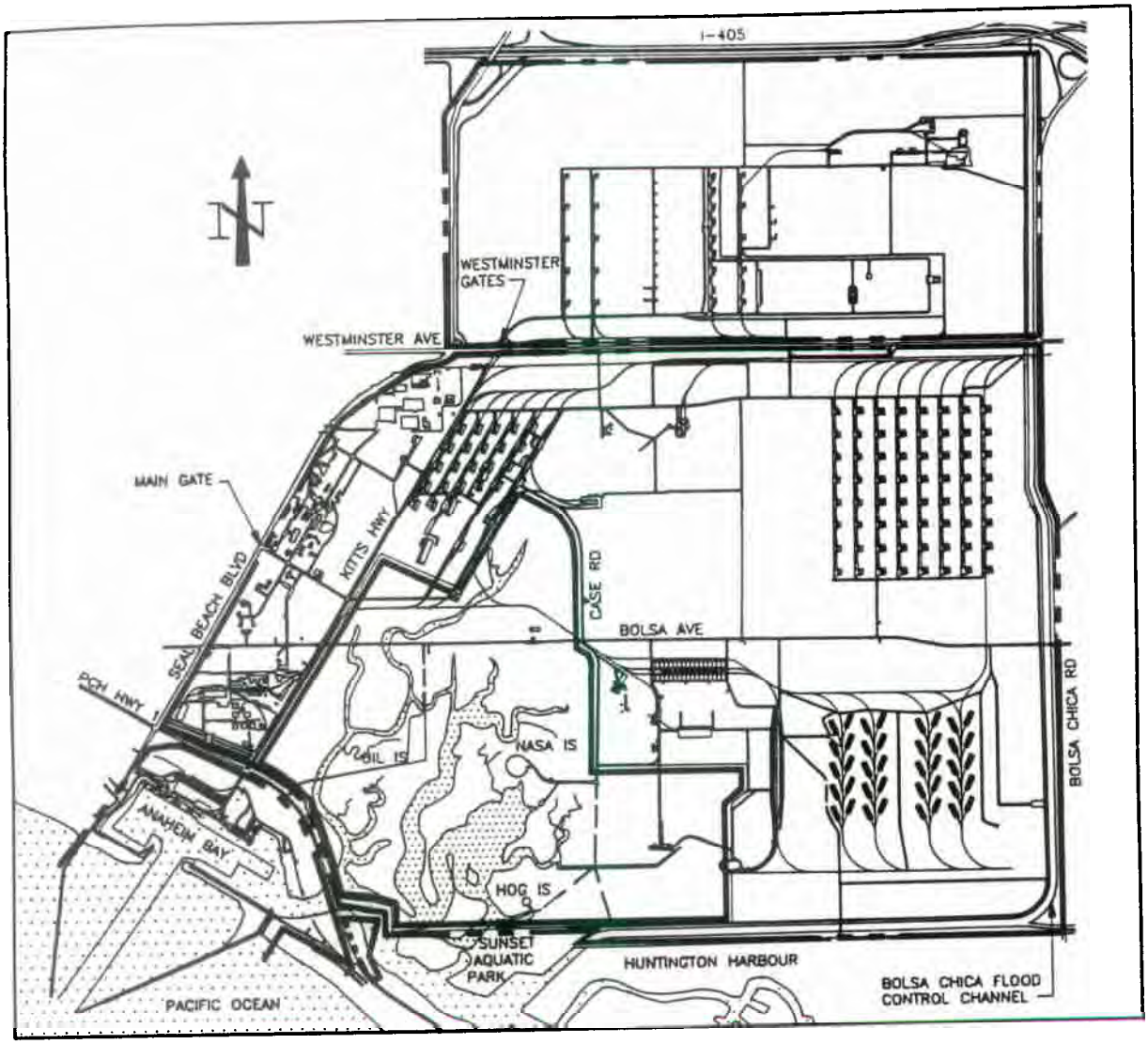


Vicinity



Location

APPENDIX B: NAVAL WEAPONS STATION - SEAL BEACH AND SEAL BEACH NATIONAL WILDLIFE REFUGE



LEGEND

HARBORS AND OPEN WATER

TIDAL CHANNELS

REFUGE BOUNDARY

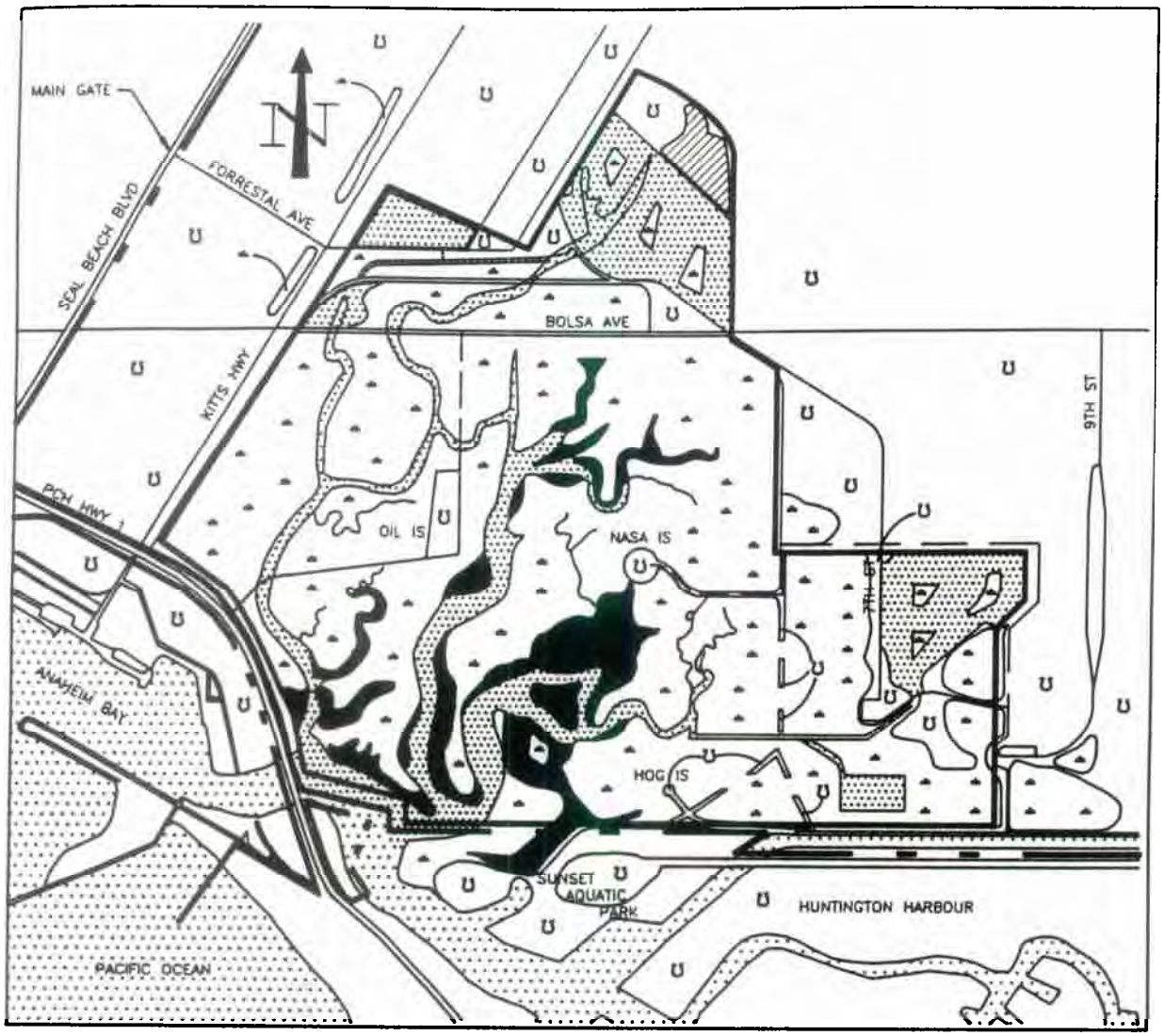
STATION BOUNDARY

700

0 1,400 2,800

SCALE (IN FEET)

APPENDIX C: WETLAND TYPES OF THE SEAL BEACH NATIONAL WILDLIFE REFUGE



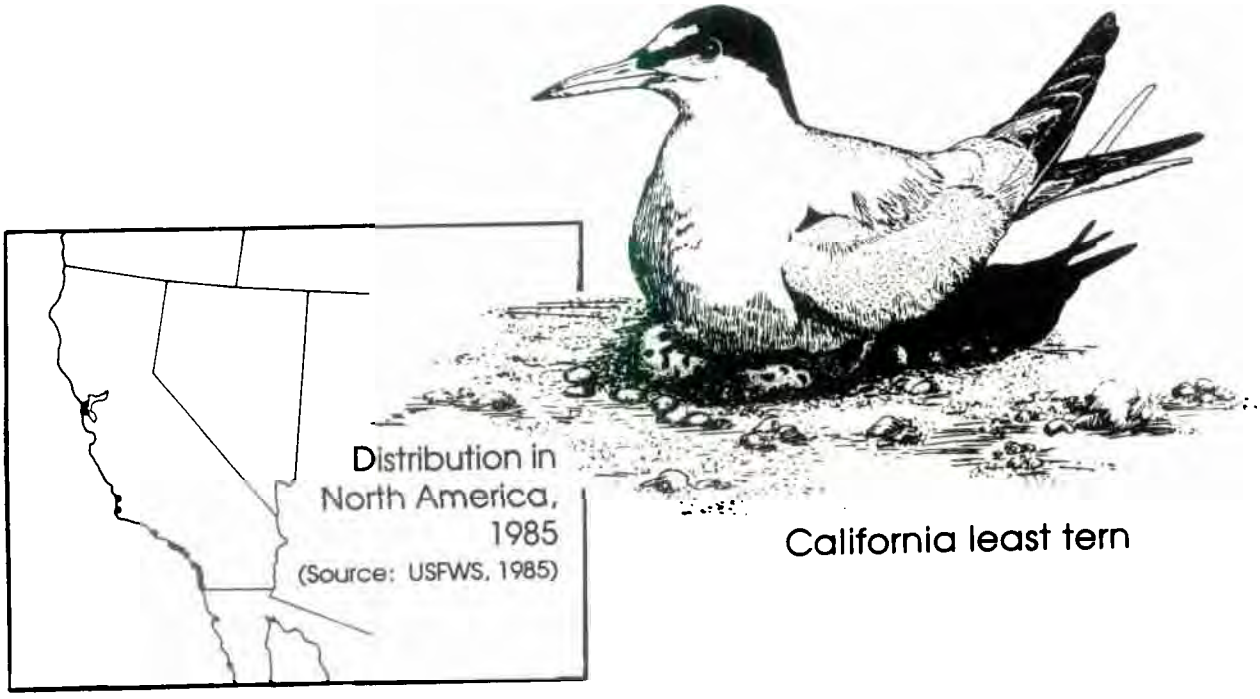
LEGEND

- CHANNELS & OPEN WATER (ESTUARINE)
- MUD FLATS
- SALT MARSH (EMERGENT)
- SEASONAL WETLAND
- U UPLAND

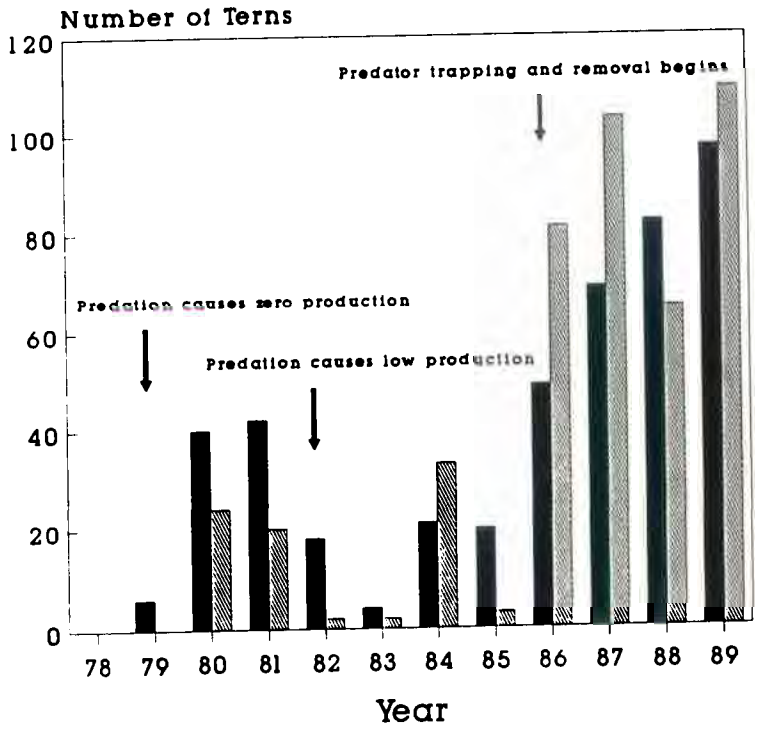
- REFUGE BOUNDARY
- STATION BOUNDARY
- PAVED ROADS
- DIRT ROADS

350
0 700 1,400
SCALE (IN FEET)

SOURCE: U.S. FISH AND WILDLIFE SERVICE, 1990



California least tern

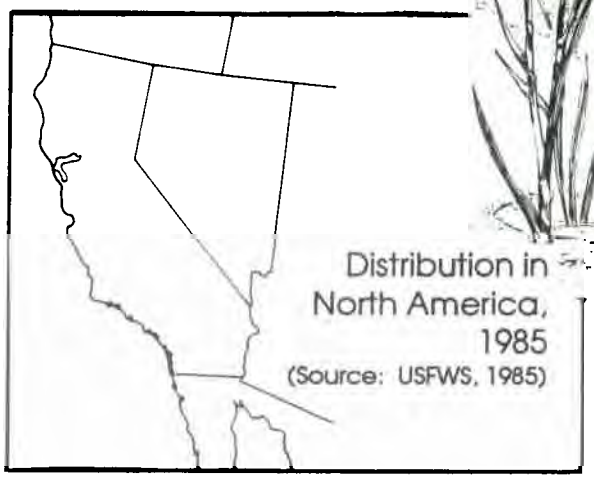


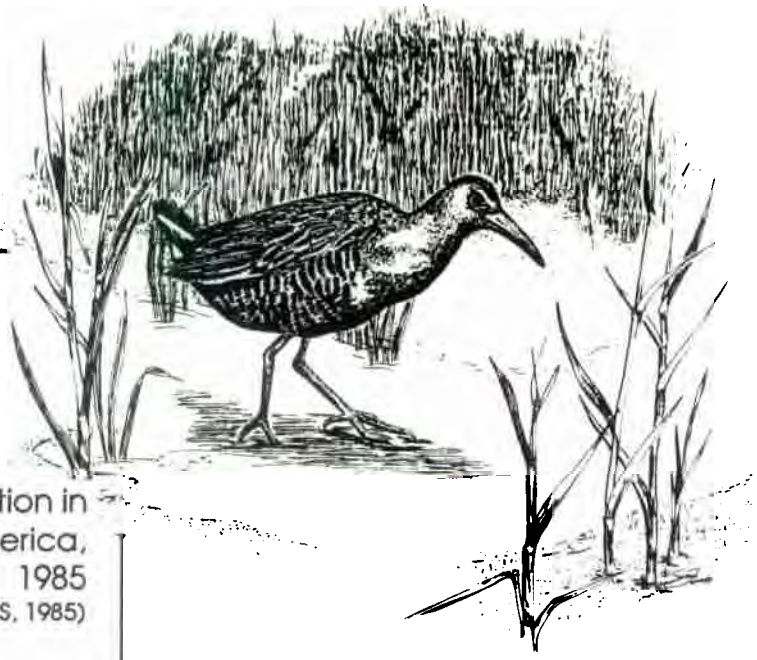
California Least Tern Colony Size & Fledging Success, Seal Beach NWR

No. of Pairs

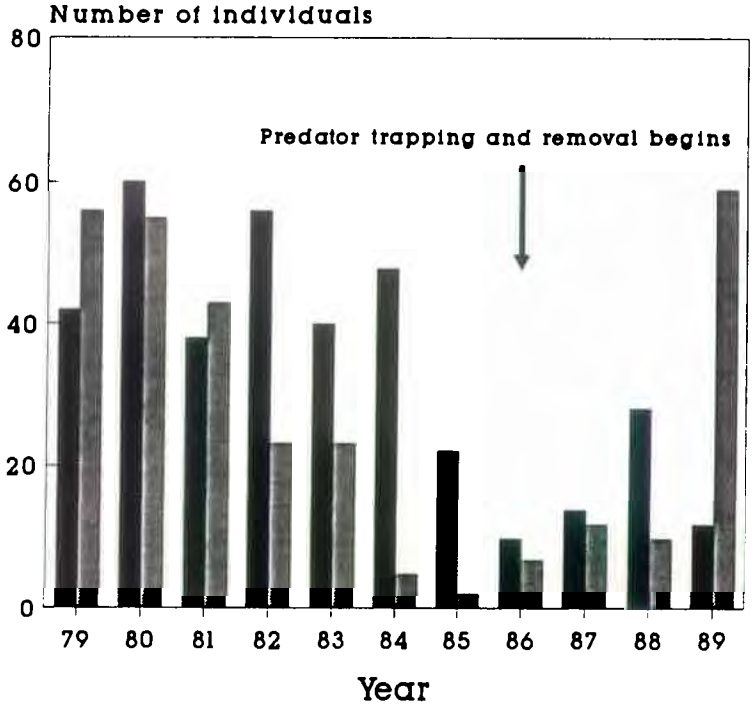
No. of Fledglings

Numbers are estimates.
See text for further explanation.





Light-footed clapper rail



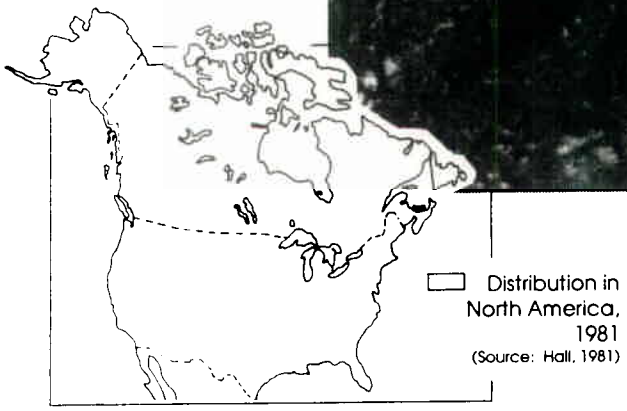
Counts of Clapper Rails on the Seal Beach NWR

Call Counts

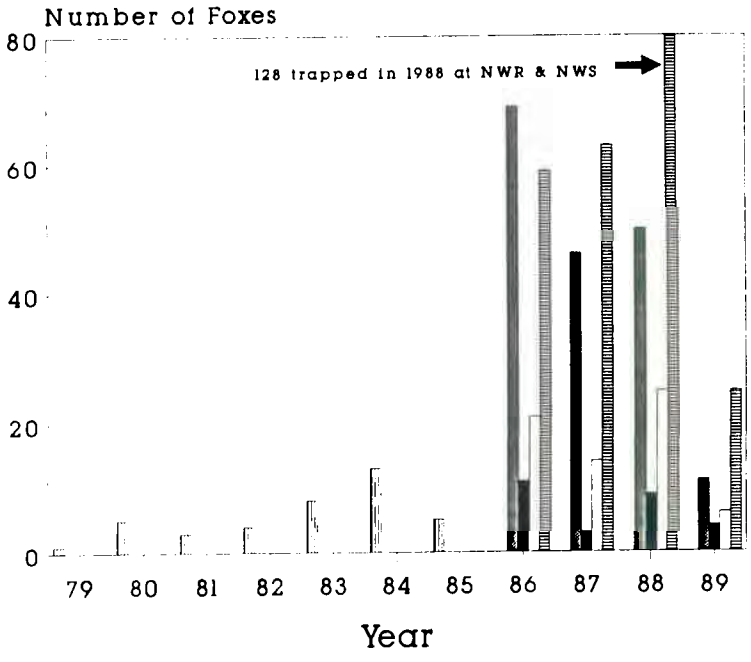
Tide Counts

High tide counts are annual peak nos. Call counts indicate spring breeding populations.

APPENDIX F: RED FOX INFORMATION



Red fox
(with Northern pintail hen)

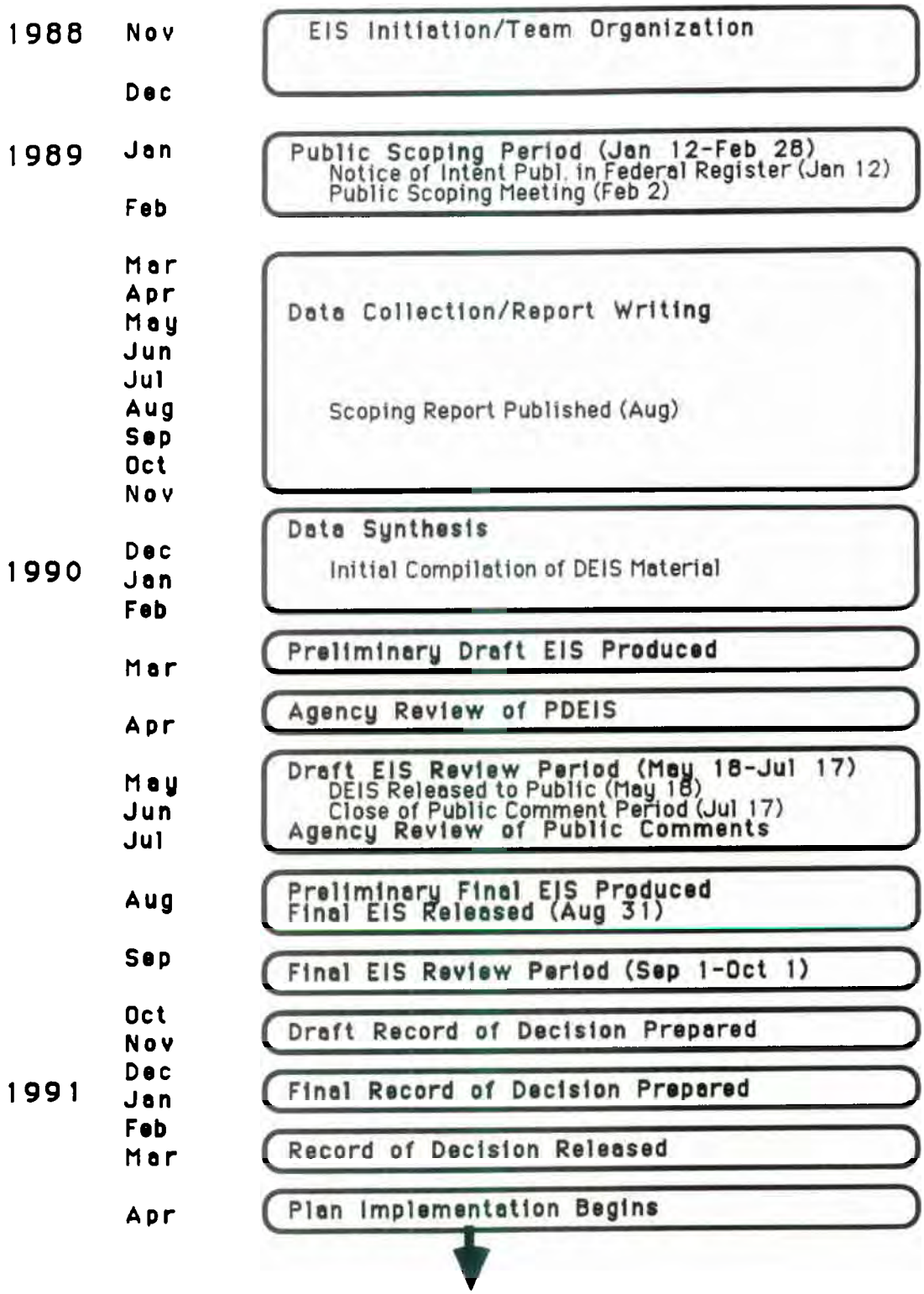


Red Foxes Observed and Trapped on the Seal Beach NWR & NWS

- #/Yr.- Days NWR
- #/Yr.- Night NWR&NWS
- #/Yr.- Night NWR
- # Trap/Yr.- NWR
- # Trap/Yr.- NWR&NWS

Observations are annual peak nos.
Trap nos. are annual totals.
See text for further explanation.

APPENDIX G: SEAL BEACH EIS PROCESS DIAGRAM



Appendix H: Issue-oriented Comparison of Alternatives

ISSUES	ALTERNATIVE A	ALTERNATIVE B
EFFECTS ON ENDANGERED SPECIES	**Moderate benefits** due to: • Goals of recovery actions likely to be achieved for all species. • Seasonal protection of species through predator control.	**Significant impacts** due to: • Light-footed clapper rail likely extirpated from the Station. • California least tern impacted by periodic predation events. • Meeting of recovery goals not likely.
EFFECTS ON PREDATORY MAMMALS AND OTHER PREDATORS	**Potential Significant impacts** to predatory mammals, particularly non-native species due to episodic predator control activities. Population of predatory mammals, particularly non-native species may fluctuate seasonally.	**Potential Benefits and insignificant impacts** to predatory mammals. However, incidence of disease more likely with high populations of mammals. Off-site dispersal of predatory mammals likely.
EFFECTS ON OTHER WILDLIFE	**Moderate benefits** due to predator control and other management actions.	**Significant impacts** to some species due to high predation rates. Other species have low benefits through various management actions.
EFFECTS ON PHYSICAL FACTORS	**Moderate benefits** due to limited wetland restoration and potential for improved water quality. Expanded knowledge base of physical factors and management of physical environment.	**Potential benefits** to water quality with expanded knowledge of physical factors.
EFFECTS ON THE LOCAL COMMUNITY AND GENERAL PUBLIC	**Moderate benefits** to those members of the public concerned for overall welfare of native wildlife and particularly the protection and enhancement of endangered species and their habitats. **Moderate benefits** to local community due to reduced presence of canids in neighborhoods and potential for adverse contact. **Insignificant impacts** to local community due to those citizens concerned about predator control activities and potential to view canids in their neighborhoods.	**Significant impacts** to those members of the public concerned for overall welfare of native wildlife and particularly the protection and enhancement of endangered species and their habitats. **Moderate impacts** to local community due to increased presence of canids in neighborhoods and potential for adverse contact. **Low benefits** to local community due to those citizens concerned about predator control activities and the elimination of trapping and euthanasia of predatory mammals and those wishing an opportunity to view canids in their area.

ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E
Significant impacts due to: • Both light-footed clapper rail and California least tern are likely extirpated from the Station. • Recovery goals not achieved.	**High benefits** due to: • Goals of recovery actions achieved for all species. • Maximizes wetland habitat enhancements and protection needs through year-round predator control.	**High benefits** due to: • Goals of recovery actions for all species would be achieved. • Maximizes habitat enhancement and protection actions. • Phases in ecosystem restoration. • Phases in year-round protection through predator control.
Potential benefits to all predator animals due to no active predator control. **Insignificant impacts** due possible higher incidence of disease more likely with high populations of mammals. Off-site dispersal of predatory mammals likely.	**Potential significant impacts** to predatory mammals, particularly non-native species due to continual (year-round) predator control activities. Population of predatory mammals maintained at reduced levels.	**Potential significant impacts** to predatory mammals, particularly predatory non-native species in short-term. Potential long-term benefit to native predators with more balanced populations of predatory species.
Significant impacts to some species due to high predation rates.	**High benefits**, particularly to wetland species due to predator control and other management actions.	**High benefits** to both wetland and upland species due to restoration activities, predator control and other management actions.
Insignificant impacts, potential for reduced knowledge base of physical factors.	**Moderate benefits** due to wetland restoration and potential for improved water quality. Expanded knowledge of physical factors and management of physical environment.	**Moderate benefits** due to wetland-upland restoration and potential for improved water quality. Expanded knowledge of physical factors and management of physical environment.
Significant impacts to those members of the public concerned for overall welfare of native wildlife and particularly the protection and enhancement of endangered species and their habitats. **Moderate impacts** to local community due to increased presence of canids in neighborhoods and potential impacts for adverse contact. **Low benefits** to local community due to those citizens concerned about predator control activities and the elimination of trapping and euthanasia of predatory mammals and those wishing an opportunity to view canids in their area.	**High benefits** to those members of the public concerned for overall welfare of native wildlife and particularly the protection and enhancement of endangered species and their habitats. **Moderate benefits** to local community due to reduced presence of canids in neighborhoods and potential for adverse contact. **Insignificant impacts** to local community due to those citizens concerned about predator control activities and potential to view canids in their neighborhoods. **Moderate benefits** to public due to expanded public information and environmental education opportunities.	**High benefits** to those members of the public concerned for overall welfare of native wildlife and particularly the protection and enhancement of endangered species and their habitats. **Moderate benefits** to local community due to reduced presence of canids in neighborhoods and potential for adverse contact as well as potential for reduced need of trapping predatory mammals. **Insignificant impacts** to local community due to those citizens concerned about predator control activities, the re-introduction of coyotes and potential to view canids in their neighborhoods. **Moderate benefits** to public due to expanded public information and environmental education opportunities.

APPENDIX I: PLAN COMPONENTS

This section provides an overview of the major components of the selected plan. Appendix J presents the general phases of the Plan.

POPULATION MONITORING

Population monitoring actions are designed to determine abundance and population trends of various species within the Refuge and Station. The objective of monitoring is to provide information on which to base management decisions. Sudden changes or negative trends may be noted which can signal needs for responsive and proactive management actions as opposed to reactive, less well-informed decisions and actions. Monitoring would continue to be conducted on a regular basis by Service and contract biologists.

Phase 1

Populations of California least terns will continue to be monitored during the tern breeding season residence period each year on the Refuge. Refuge personnel begin monitoring the NASA Island nesting colony site each year by the first week of April. Monitoring their population at least two consecutive days per week will continue until they have left the site to migrate south, generally in August or early September. Data will be collected regarding numbers of birds, breeding cycle, number and distribution of nests, eggs per nest, number of young produced, presence of banded terns, sign of predators or predation and other pertinent information.

Monitoring of light-footed clapper rails is accomplished using two methods. High tide counts will be conducted at least once per year during daytime +6.7 foot or higher tides in order to estimate total numbers. Call counts will be conducted yearly during early phases of rail breeding, usually in March, in order to estimate their total numbers, composition and breeding status. Also, nests are located and monitored for breeding success, predation, predator sign and other breeding biology information useful for their management.

For Phase 1, other endangered and candidate species, raptors, water-associated birds and predatory and other large mammals are generally counted once per month. Nocturnal mammals and birds will continue to be counted once per month on night surveys as part of the roadside count method. Animals counted in this manner represent only a portion of the area's entire population.

Phase 2

Monitoring of terns will be expanded to entail observations of the colony two to three days each week from April through August or while the terns are present on the Refuge.

Monitoring of light-footed clapper rails will be expanded to include high tide counts once or twice yearly. Call counts will continue to be conducted once each year. Additionally, monitoring will include two to five hours of observation in each identified clapper rail territory during the appropriate season for counting chicks, and/or fall counts will be done. An index of reproductive outcome will be established to evaluate trends in clapper rail populations. A complete accounting of chick production is not realistic given the secretive behavior of the rails.

Predator and other wildlife populations will be monitored at least monthly with night and day surveys using methods described in Phase 1 and improved techniques as identified. As part of expanded monitoring, "track stations" will be established at several key points where predatory mammals are likely to enter the marsh area. The stations will be regularly monitored for sign, primarily tracks, of predatory mammals crossing the areas.

Phase 3

Predator and other wildlife populations will be monitored at least monthly with night and day surveys using methods as described in Phase 1 and improved techniques as identified. At least one expanded night survey will be conducted annually to examine predator populations for the Station and surrounding open areas. This expanded survey will be coordinated with the California Department of Fish and Game.

California least tern surveys will be expanded from Phase 2 to occur three to five days per week during the terns' presence at the Refuge.

High tide counts of the rails will continue to be conducted once or twice annually. Call counts of rails will continue to occur once per year. Additional monitoring of clapper rail territories for counting chicks and/or fall call counts will continue. A yearly reproductive outcome index will be developed and used to evaluate trends in clapper rail populations.

ENDANGERED SPECIES STUDIES

Phase 1

California least terns appearing at the Refuge that have been color-banded at other nesting sites are identified and recorded as part of a large-scale banding program. Information is used to help determine site use, survival, and movement between colonies.

Studies of rail population dynamics and habitat use, including vegetational and physical association characteristics, will continue on the Refuge. Radio telemetry technology will continue to be applied to help determine rail movement patterns. Ongoing studies of rail breeding biology and use and effectiveness of floating nesting rafts will continue on the Refuge to aid expansion of the rail population.

Phase 2

Video technology and/or time lapse photography will be employed to monitor individual least tern nests and the colony. Based on analysis of study results, management actions will be implemented to maximize benefits for the terns. Within three to five years, banding activities and studies will be reinitiated for least terns on the Refuge. Chicks and as many adults as possible will be banded and the return and status of banded individuals will be monitored. Banding studies will yield important information on movement and activity that will be used to guide management decisions for the terns at the Refuge and throughout their range.

Video or photographic monitoring of clapper rail nests will be employed if predation remains a problem. Nesting behavior will be studied and predation monitored. Alternative designs and sites for rail nests will continue to be explored and constructed and the nests monitored and their use studied.

Phase 3

Monitoring and study of restored support habitats in uplands surrounding the Refuge marsh will be conducted. Other endangered species studies will be identical with those for Phase 2.

When mammalian predation effects are determined to no longer be major, consideration will be given to initiating a captive propagation program for the rails. Details of such a study would be coordinated with Service and California Department of Fish and Game advisory and recovery groups. Conceptually, the program may

involve: 1) Some or perhaps all the first clutch eggs of selected nests will be collected, hatched and the chicks reared to independent adulthood and placed in the Refuge; 2) One egg from each of seven rail nests at Upper Newport Bay would also be hatched and the rails released to the Refuge; 3) The program would be held in abeyance once the Refuge spring population of rails exceeded 40 pairs with no more than 3 unmated individuals.

ENDANGERED SPECIES PROTECTION

Phase 1

All methods used for controlling predators from the Station or Refuge will conform to government regulations and approval subject to U.S. Fish and Wildlife Service and U.S. Department of Agriculture, Animal Damage Control (ADC) guidelines and requirements. Predator control activities will be conducted based on the mutual concurrence of the Service, Navy, and ADC and initiation of all activities will be coordinated with California Department of Fish and Game (CDFG).

A combined barrier and electric fence encircling the NASA Island least tern nesting colony will continue to be maintained. Improvements to the fence will be implemented as appropriate. The 8-foot high chain link security fence surrounding the majority of the Station will continue to be maintained for security purposes though it serves as only a minor deterrent to predatory mammal penetration.

Suitable cover to help protect endangered species' nests, chicks and adults will continue to be provided and maintained. For clapper rails, protection of nest areas by moats, isolation, and provision of cover and nest sites above inundation levels (including floating rafts and soil mounds) will continue to be employed. To reduce avian predation, perching deterrents will continue to be employed near endangered species nesting areas.

Predatory mammals will be actively controlled using techniques for trapping and relocation, trapping and euthanization, and other methods as appropriate. For predatory mammals such as red foxes, the primary method of capture will be by padded leghold traps. Cage traps or other methods may be employed to capture other predatory mammals (such as feral cats, opossums, or striped skunks) when it is determined that such techniques are effective and appropriate. When suitable relocation sites or facilities have been identified, captured animals will be transported and released to those locations. Relocation will occur based on stringent criteria outlined in the EIS and would be to the suitable locations in the wild or to accredited zoos or other approved facilities.

In the absence of suitable relocation sites, captured predatory mammals will be euthanized at the trap site. The principal means of euthanasia will be by lethal injection. Other effective, safe and humane means of predator control may also be employed, as identified in the EIS.

Animals trapped that are not considered to pose a significant threat to endangered species because of the time of year trapped, total estimated numbers on the Station, or other factors, may be released at the trap site or to an area away from the marsh based on criteria and guidelines to be developed as described in Appendix K ("Predator Control Action Index").

Techniques for controlling avian predators include live capture and release off-site, live capture and euthanization, shooting, and toxicant application. Live capture of predatory birds will be by baited foot noose harnesses or modified pole traps. In the event that common ravens or American crows become problem predators of endangered species on the Refuge in the future, a toxicant, starlicide (DRC-1339), may be used for their control. Shooting of avian predators will be used only in rare cases where a problem bird cannot be trapped or returns after release away from the Station and continues to prey on endangered species. Techniques for avian predator control will adhere to agency policies for safety and humane treatment of animals.

If native reptiles such as gopher snakes, that are a threat to eggs and young of endangered species, are discovered in or near the marsh around or during the birds' breeding season, they will be captured and released away from the marsh.

Phase 2

The barrier and electric fence around the NASA Island least tern nesting colony will be maintained as needed and enhanced as improved designs are identified. The Station's perimeter security fence will be maintained. Improvements to the perimeter fence such as the addition of a horizontal ground level extension to discourage burrowing under by predators will be made as the fence is repaired or replaced. Other Phase 1 habitat modification items and actions will continue in Phase 2.

Population management activities for controlling predators will be based on monitoring activities as described above. An index will be established to aid management of predator populations on the Station and Refuge (see "Predator Control Action Index" Appendix K). Species of predators will be controlled based on location, seasonality, and numbers of predator sign or sightings on the Station and Refuge. The type, extent, timing, and duration of control activities for targeted species will be based on this index

and on the population status and trends evident for endangered species at the time. As new information becomes available and knowledge gained, indices will be periodically revised. If significant or repeated predation of endangered species occurs, immediate emergency control measures will be implemented. A purpose of the index is to avoid the need for enacting emergency control measures for protecting endangered species.

Establishment of a permanent full-time ADC agent in Orange County will be pursued. Responsibilities of the agent will include implementation of measures to protect endangered species, as necessary, in accordance with Service guidelines and in coordination with the CDFG.

Other activities for endangered species protection in Phase 2 will continue from Phase 1.

Phase 3

Enhancement of the Station's perimeter security fence to reduce possibilities for predatory mammals to burrow under it would be completed during Phase 3. Other habitat modification efforts described in Phase 2 would continue in Phase 3.

Endangered species protection measures for Phase 3 will continue to employ activities described for Phases 1 and 2 as needed. Habitat restoration conducive to supporting the reintroduction of the native top carnivore coyote, will provide the means for establishment of a more self-sustaining and naturally-functioning ecosystem on the Station and Refuge (see "Habitat Restoration and Enhancement", Phases 2 and 3, below). Research efforts will study the potential for coyote reintroduction. Should reestablishment of coyotes on the Station prove feasible, it is possible that a more naturally-balanced ecosystem, including more natural suppression of predators, might allow a lower degree, or perhaps the elimination, of active predator control efforts such as trapping. Various studies and observed situations indicate that coyotes naturally suppress or displace smaller predators (mesopredators) to levels at which endangered species can survive and improve their numbers. A small amount of predation may be expected and may be considered acceptable in an ecologically balanced marsh environment providing populations of endangered species and other wildlife are secure and productive.

HABITAT MANAGEMENT

Phase 1

Several habitat management activities are ongoing and linked to the general security and safety operations for the Station. Security regulations which restrict public access to the Station help reduce disturbance of habitat and wildlife by people. To protect endangered species and other wildlife from adverse impacts, potentially damaging Navy projects will continue to be coordinated with the Service during the planning phases of such projects. To protect endangered species and other wildlife from the effects of hazardous floating materials, such as oil spills, that might enter the Refuge, the Navy will continue to maintain a spill contingency plan and spill prevention, control, and countermeasure plan. The Navy will continue to maintain emergency booms that can be placed at key tidal entry locations and it will continue to conduct periodic emergency practice and readiness drills. To improve habitat management for wildlife on the Station, a program to upgrade the shooting range to reduce potential safety impacts is underway.

Habitat management for the terns will continue to entail annual preparation of the nesting site at NASA Island by mechanical removal of vegetation and surface dragging, and periodic (generally once every two to three years) herbicide applications in strict accordance with safety and health concerns for birds and people. Low strength applications of the herbicide permit emergence of sparse vegetation for chick cover. A combined electric and barrier fence surrounding the perimeter of the nesting area will continue to help provide protection from intrusion by people and predators. Also a cable barrier across the entry road to the nesting area helps reduce human disturbance of the tern colony.

Habitat management for the rails will continue to include protection of existing habitat and provision and maintenance of floatable nest rafts and associated cover.

Phase 2

A non-point source pollution study will be initiated for the Station's agricultural outleases. The study will monitor and analyze tailwater from the Station's irrigated agricultural operations for potential impacts to endangered species and other wildlife due to sediment loading, pesticides, herbicides, and fertilizers. Outlease management changes could result from the study. Irrigation tailwater determined to be of suitable quality will be discharged into the marsh if determined that it will be

beneficial to habitat and wildlife. The Navy will advertise to encourage low chemical input agricultural outleases on the Station providing other facets of competitive bidding remain equal.

Plans will be developed for construction of another protected nesting colony site for least terns as funding becomes available.

To reduce noise levels in the marsh near Oil Island that are potentially impacting to light-footed clapper rails, either a block wall, berm, or combination wall and berm will be installed as a sound barrier or noise will be reduced directly through mechanical alterations to the pumps.

Phase 3

The habitat management activities described in Phases 1 and 2 will continue in Phase 3. Lands adjacent to the Refuge will be managed as productive coastal sage scrub habitat with additional food sources provided as support for coyotes. Development of additional nesting sites for both California least terns and light-footed clapper rails will be completed during this phase.

HABITAT RESTORATION AND ENHANCEMENT

Phase 1

Habitat restoration and enhancement efforts will be undertaken as funding and staff become available. Efforts will be initiated to examine the feasibility of cleanup and restoration of the Oil Island site to a use more compatible with the Refuge purpose. An 8-acre wetland parcel, located on the Station but currently outside the Refuge boundary, will be considered for inclusion as part of the Refuge. The 116-acre Port of Long Beach mitigation project, completed in Summer 1990 on the Refuge, will continue to be monitored for its effectiveness in providing fish and wildlife habitat. Other completed restoration projects on the Refuge will continue to be monitored for their effectiveness.

Phase 2

The feasibility will be examined of providing agricultural tailwater and local runoff to the marsh to enhance the production of vegetation beneficial to endangered species and other native birds and wildlife. Suitable freshwater influence is primarily intended to enhance nesting habitat for clapper rails. Monitoring the water quality and its effectiveness for habitat enhancement will be performed. Diversion of the Bolsa Chica flood control and

drainage channel through the marsh will be explored. Uplands adjacent to the marsh determined suitable for conversion to wetlands, along with suitable Refuge lands, will be converted to wetlands as determined feasible. A debris boom will be installed across the Refuge's main tidal channel in order to minimize entry of potentially hazardous floating debris such as from off-shore oil spills.

Phase 3

Habitat restoration and enhancement activities for Phases 1 and 2 will continue in Phase 3. A research program will be initiated to explore restoration of upland areas to native shrublands supportive of coyotes and a more naturally balanced predator-prey relationship conducive to endangered species' survival and population increase. The largest portion of the total area of the Station would remain as open grassland. Cultivated fruits and other foods that might serve as alternative and attractive foods for coyotes will be grown.

Research of methods and problems associated with reintroducing coyotes to the Station will be performed. If research indicates reintroduction may be viable and appropriate, limited, carefully controlled and monitored reintroductions of coyotes will be attempted on an experimental basis on the Station. Restoration projects will be planned, researched, and coordinated between the Service, Navy, and other concerned interests to insure that the actions will be appropriate and conducive to safety and security concerns.

Enhancement and maintenance of existing and potential corridors for wildlife travel to and from the Station will be explored with various local agencies and interests. Habitat restoration for areas adjacent to the Station and nearby in Orange County will be encouraged, especially for areas supportive of wetland environments and that may provide linkages for gene flow for species of concern. Actions initiated in Phases 1 and 2 will be implemented as determined appropriate and feasible in Phase 3. These may include implementation of findings of studies for restoring Oil Island, providing tailwater and other freshwater inflows to the marsh, and reintroduction of coyotes on either a limited or long-term experimental basis.

The Service and Navy will continue to work together to identify potential projects and plans for habitat restoration and enhancement on the Station and Refuge. A multi-agency, interdisciplinary team will be formed to guide identification and development of habitat restoration and enhancement projects. Key agencies represented will include the Service, Navy, CDFG, and others based on specific project needs. As an example, for the coyote reintroduction research study, a team will consist of the

representatives from the above agencies with the addition of Animal Damage Control and perhaps local government agency representatives. Projects will be implemented as determined appropriate and feasible. Some projects may require further NEPA compliance documentation and coordination with other agencies prior to initiation.

MONITORING AND RESEARCHING ENVIRONMENTAL QUALITY

Phase 1

The Navy's multi-phase Installation Restoration Program to evaluate and correct potential problems associated with past hazardous waste disposal activities on the Station will be continued. The Navy will continue to work on the program in association with the California Department of Health Services, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the County of Orange. A contaminant study that has been initiated on the Refuge as a cooperative study between the Service and Navy will be expanded. The study will determine whether contaminants from the various sites identified in the Installation Restoration Program are being bioaccumulated and, if so, to what extent they may impact endangered species and other wildlife. If appropriate, remedial action will be initiated. As part of the Mussel Watch Program operated by the California State Water Resources Control Board, levels of contaminants in mussels from the Refuge will continue to be analyzed annually in order to monitor the health of the marsh environment. Water quality studies examining coliform bacteria levels in waters adjacent to the Refuge will continue to be conducted by Orange County solely at the County's discretion. Studies of the occurrence and effects of subsidence and uplift on the Refuge and its ecosystems will continue.

Phase 2

This phase will entail continuation of the various environmental quality monitoring and research activities described in Phase 1. These will include Continuation of the Installation Restoration Program, the Mussel Watch Program, water quality studies by Orange County at its discretion, and subsidence studies. The biological sampling studies conducted by the Service and Navy will continue any necessary remedial action will be identified and initiated. Additional contaminant studies related to water quality will be initiated on the Refuge and actions identified to rectify any problems discovered. Efforts will be made to coordinate identification and correction of water quality problems in the area surrounding the Refuge with state and local agencies.

Phase 3

Environmental quality monitoring and research actions described in Phases 1 and 2 will be continued in Phase 3 as necessary. Additionally, monitoring will be conducted and goals will be established for cover values and timing of shrubland development as part of habitat restoration efforts on the Station.

PUBLIC USE AND EDUCATION

Phase 1

Public education programs and presentations regarding the ecology of the Refuge and its environs currently conducted by Service personnel and the Station's environmental coordinator will be continued. Based on identified need, a marsh clean-up program involving the public and volunteers from local conservation groups will continue to be conducted one day each year.

Phase 2

In addition to the public education programs and presentations and marsh clean-up program described in Phase 1, public involvement will be increased to include public tours of the Refuge at least one day each year and a symposium on poignant environmental issues for the Refuge every other year. Periodic publication of brochures on ecological topics for the Refuge will be pursued.

Phase 3

Activities described for Phases 1 and 2 will continue for Phase 3. The public information program will be expanded to address issues related to the role and reintroduction of coyotes on the Station. Possibilities of developing a visitor interpretation and wildlife observation facility will be explored.

STAFF AND FUNDING

Under the Preferred Alternative, staff and funding changes would be phased in along with other program changes and modifications. Funding for the Seal Beach Refuge is controlled by Congress and agency allocations to geographical regions and specific national wildlife refuges. Past funding for the Refuge has fluctuated and may again fluctuate in the future based on variable allocations.

Phase 1

Under Phase 1 of the Plan implementation, annual total support staff from Service and Navy personnel is expected to be equivalent to 1.5 staff years, at an approximate cost of $67,500 per year, in 1989 dollars.

Phase 2

Phase 2 of the Preferred Alternative will be phased in for implementation as staff and funds become available. During Phase 2, annual funding is expected to be approximately $182,000 (in 1989 dollars), which would include 4.5 Navy and Service staff positions. Active management personnel, support, and administration are included. Major projects such as new studies, site development, and fencing improvements would be funded through regular Navy or Service sources. Additional funding may be secured through solicitation of restoration funds. Additional nominal costs would be associated with tours, symposia, and brochures that would be shared jointly by the involved parties.

Phase 3

Implementation of Phase 3 will occur as staff and funds become available. The total cost of the Preferred Alternative, at full development, would include annual funding of about $225,000 (in 1989 dollars), which includes 5.5 Navy and Service staff positions. The initial cost of the shrubland development and coyote relocation is estimated at about $250,000.

Appendix J: Conceptual Phases for the Selected Plan.

ACTION	PHASE 1	PHASE 2	PHASE 3
POPULATION MONITORING	• Monthly Night Surveys • 2 Days per Week CLT Surveys • 1 per Year LFCR High Tide Counts • 1 per Year LFCR Call Counts • Monthly Surveys of Other Endangered Species and Wildlife	• At Least Monthly Night Surveys • 2-3 Days per Week CLT Surveys • 1-2 per Year LFCR High Tide Counts • 1 per Year LFCR Call Counts • Monthly Surveys of Other Endangered Species and Wildlife	• At Least Monthly Night Surveys • 3-5 Days per Week CLT Surveys • 1-2 per Year LFCR High Tide Counts • 1 per Year LFCR Call Counts • Expanded LFCR Seasonal Monitoring • At Least Monthly Surveys of Other Endangered Species and Wildlife
ENDANGERED SPECIES STUDIES	• CLT - Population Studies • LFCR - Population Dynamics and Habitat Use	• CLT - Population Studies, Banding • LFCR - Population Dynamics, Habitat Use, Video Applications	• CLT - Population Studies, Banding, Video Applications • LFCR - Population Dynamics, Habitat Use, Video Applications, Captive Propagation
ENDANGERED SPECIES PROTECTION	• General- Maintain: - NASA Island Fence - Cover - Nest Platforms - Perching Deterrents • Active Control of Predatory Mammals by 1) Trap and Relocate, 2) Trap and Euthanize, 3) Other Means as Appropriate • Active Control of Predatory Birds by 1) Trap and Relocate, 2) Other Appropriate Means	• General - Maintain and Enhance: - NASA Island Fence - Cover - Nest Platforms - Perching Deterrents • Initiate NWS Perimeter Fence Enhancement • Active Control of Predatory Mammals by 1) Trap and Euthanize, 2) Other Means as Appropriate • Active Control of Predatory Birds by 1) Trap and Relocate, 2) Other Appropriate Means	• General - Maintain and Enhance: - NASA Island Fence - Cover - Nest Platforms - Perching Deterrents • Complete NWS Perimeter Fencing Enhancement • Active Control of Predatory Mammals by 1) Natural Suppression (Dependant Upon Results of Research - See Phases 2 and 3 of Habitat Restoration and Enhancement), 2) Trap and Euthanize, 3) Other Means as Appropriate • Active Control of Predatory Birds by 1) Trap and Relocate, 2) Other Appropriate Means

ACTION (cont.)	PHASE 1 (cont.)	PHASE 2 (cont.)	PHASE 3 (cont.)
HABITAT MANAGEMENT	• CLT Habitat Management, NASA Island Maintenance • LFCR Habitat Management, Nesting Site Maintenance	• CLT Habitat Management, NASA Island Maintenance • LFCR Habitat Management, Nesting Site Maintenance • Develop Plans for Additional CLT and LFCR Nesting Sites	• CLT Habitat Management, NASA Island Maintenance • LFCR Habitat Management, Nesting Site Maintenance • Complete Development of Additional CLT and LFCR nest sites
HABITAT RESTORATION AND ENHANCEMENT	• Monitor Completion of Port of Long Beach Mitigation Project • Maintain and Monitor Existing Restoration Work	• Monitor Port Mitigation Project • Wetland Restoration and Enhancement • Study Upland Habitat Restoration • Study Agricultural Tailwater/Freshwater Systems • Develop Research Plan and Begin Study of Options, Means, Benefits and Impacts for Reintroducing Coyotes to the Naval Weapons Station • Study Options for Phase Out of Oil Island Operations	• Wetland and Upland Habitat Restoration Enhancement • Implement Findings of Agricultural Tailwater/Freshwater Inflow Study • Implement Findings (as Appropriate) of Coyote Reintroduction Study • Implement Findings (as Appropriate) of Oil Island Study
MONITORING AND RESEARCHING ENVIRONMENTAL QUALITY	• Continue NWS Installation Restoration Program • Continue Mussel Watch Program • Continue Water Quality Studies • Continue Subsidence Study • Biological Sampling	• Continue NWS Installation Restoration Program • Continue Mussel Watch Program • Continue Water Quality Studies • Continue Subsidence Study • Expand Biological Sampling and Initiate Contaminant Studies	• Continue NWS Installation Restoration Program • Continue Mussel Watch Program • Continue Water Quality Studies • Continue Subsidence Study as Necessary • Continue Biological Sampling and Contaminant Studies as necessary
PUBLIC USE AND EDUCATION	• Public Education Programs • Annual Marsh Clean-up	• Expand Public Education Programs • Annual Marsh Clean-up	• Expand Public Use, Marsh Clean-up, and Education Programs • Public Viewing Opportunities and Interpretation

APPENDIX K: PREDATOR CONTROL ACTION INDEX

As a part of expanded wildlife management programs at Seal Beach, the Service and the Navy will endeavor to develop an index for predator control actions. The purpose of this index is to provide effective and efficient protection of endangered species on the Refuge and Station by enacting a prompt and responsive program of predator control. Additional objectives of this action is to prevent reduction of predator populations to levels lower than necessary to assure protection and perpetuation of endangered species and minimize the need for emergency predator control measures on the Refuge. These issues were of concern to some of the commentors on the EIS.

To institute this type of management program, additional data collection and personnel will be required. Additional information will be collected with the implementation of the early phases of the Endangered Species Management and Protection Plan. As discussed in the EIS, these data will provide Service biologists and managers with: 1) better population estimates of problem and potential problem predators on the Station and Refuge; 2) expanded information on the local ranges of these predatory species; and 3) estimates of reasonable carrying capacities for endangered species, native predators and other important wildlife on the Station and Refuge.

The following factors would be incorporated into the development of the index for predator control actions on the Station and Refuge.

1) Predatory species by type (including nature and degree of threat to endangered species)
2) Estimates of predator population numbers
3) Location of predator sightings and sign (including proximity to endangered species habitat, e.g., Refuge, Station lands south of Westminster Ave., Station lands north of Westminster Ave.)
4) Seasonality (e.g., pre-breeding, breeding, or non-breeding season for endangered species)
5) Endangered species vulnerability (including status on nature, health, and population of each endangered species)

Based on specific criteria associated with the above factors, various actions would be taken to assure that endangered species protection and population objectives are achieved while avoiding excessive removal of predatory animals. Population ranges for particular predatory species may be established in line with estimated carrying capacities. Native species such as skunks would have a desirable population level established with acceptable low and high ranges which would indicate the need and

degree of initiating control actions. Non-native species such as red foxes and feral cats would not have carrying capacities established, but may have population levels (e.g., ranges of population numbers in low, moderate, high categories) established which, in concert with the other index factors, would indicate the potential degree of problems between these predators and native, endangered species.

A matrix or other means of indexing will be developed with these criteria to establish a clear course of action when the population levels of certain predatory species, under specific conditions warrant action. The actions could consist of the following:

1) No additional action (monitoring, etc. continues).
2) Expand monitoring programs.
3) Initiate predator control actions (typically trapping and euthanasia, possibly other actions).
4) Expand control actions (which could be to expand trapping or to include other measures such as shooting predators).
5) Treatment (e.g., release, relocation, euthanization) of non-target species which may be captured during control operations.

This part of the management program will be developed in the early phases of plan implementation. The predator control action index development will take time and additional agency funding to collect information as well as to verify data and criteria for a successful program. Adjustments will be made in the index for predator control actions with the availability and analysis of new information.

An example of what this effort may entail follows for one of the predatory species on the Station, the Virginia opossum.

1) Predatory species: Virginia opossum. Threat: Opportunistic predator of eggs and young birds.

2) Estimates of population numbers: Population levels of this animal on the Refuge and Station are currently estimated through monthly night surveys. Populations of Virginia opossum are generally low on the Refuge and Station. Expanded surveys are recommended for better population estimates.

3) Location: Population estimates for opossums will be collected for the Refuge and the north and south areas of the Station. Individuals in and near the Refuge present the greatest degree of threat to the endangered species.

4) Seasonality: Since opossums are egg eaters and will also consume young birds, the endangered species' breeding season (generally spring and summer) presents the most concern.

5) Endangered species vulnerability: California least terns have experienced predation of eggs by opossums. The present fence at NASA Island will protect the least terns from opossum predation under most circumstances. The light-footed clapper rail is most vulnerable to opossum predation during the periods of egg laying, hatching and rearing of young. When the endangered species populations are secure and other threats are low, generally the threats created by the opossum are low. If endangered species populations are significantly below objective levels and threats such as egg predation may further jeopardize endangered species survival, opossums would be a major concern.

6) Actions: Under this example a series of actions may occur dependant on the various factors. For example if a control program of trapping and removing red foxes was in place on the Station, it would be possible that an opossum could also be trapped, even though it was not targeted. If this capture of the non-targeted animal occurred during the spring season, in the Refuge during a time of high vulnerability of the endangered species, the opossum could be euthanized or relocated to a suitable site. On the other-hand, if this capture occurred during a period when endangered species and habitat conditions were at or near objective levels, vulnerability low, and opossum populations were within the acceptable range on the Station, the opossum could be released.

The matrix or indexing technique used with the various criteria established would provide Refuge management with a clear decision path for control actions and options for treatment of animals which may be captured during control operations.

APPENDIX L: NEW DATA

Further support for the selection of the Preferred Alternative is provided by new information on the success of the predator control program in protecting endangered species on the Station and Refuge. In 1990, the spring call count for light-footed clapper rails on the Refuge resulted in a total of 16 breeding pairs being identified. Furthermore, a preliminary high tide count of clapper rails, during less than ideal conditions, documented 57 clapper rails on the Seal Beach Refuge in October 1990. Then, under better conditions, a high tide count in November, 1990, resulted in a tally of 69 clapper rails. This is the highest count of clapper rails ever recorded on the Station since the time when systematic counting techniques were begun, i.e., since 1975. (See Appendix E for prior years comparison.)

For California least terns, 1990 also exhibited increased populations and production for this endangered species. The NASA Island colony was estimated at 102 pairs with an estimated 147 birds fledged. These expanded populations are encouraging for both species, especially when compared to the mid-1980's when nesting success was poor for both of these species. (See Appendix D for prior years comparison.)

During 1990 (January-September), a peak number of eight red foxes were observed during monthly night surveys on the Station. A total of ten red foxes were trapped on the Station during the January-September 1990 period. (See Appendix F for prior years comparison.)

Predator control has been the only significant environmental change known to have occurred on the Refuge and Station in recent years except for improvements in the least tern nesting colony fence. The agencies' current management program (Alternative A, Interim Management), is also the first phase of the Preferred Alternative and has been successful in increasing clapper rail and least tern populations.

APPENDIX M: ISSUE CLARIFICATION

Very few issues were raised following the release of the Final EIS. The four minor issues that surfaced are identified and discussed.

Issue 1: Trapping Techniques

Ms. Christine Stevens, President of the Animal Welfare Institute contacted the Service's Seal Beach EIS Team Leader to clarify the types of traps being used to capture mammalian predators. It was explained that steel-jawed traps were not being used at Seal Beach. Padded leg hold traps are the principal means of capturing species such as the red fox. These traps are checked 2 to 3 times daily. Ms. Stevens asked if the agencies would consider the use of snares. She was informed that snares generally were not as effective as padded leg hold traps and more likely to cause injury. Ms. Stevens stated that she wished the agencies to consider use of the EZYONEM (Easy on 'em) snare. The Service has requested USDA Animal Damage Control to provide a report on the potential use of this snare. Early indications are that the snare will potentially cause more injury to trapped mammals than the padded leg hold trap.

Issue 2: Mosquito Control

Mr. Gilbert Challet, District Manager for the Orange County Vector Control District contacted the Service's EIS Team Leader in response to statements in the Final EIS regarding past and potential impacts to the wandering skipper (Panoquina errans), a candidate butterfly species for listing under the Endangered Species Act. Mr. Challet requested clarification regarding statements in the Final EIS which had indicated that mosquito control pesticide applications had impacted this species. It must be clarified that at the time the wandering skipper was identified as a candidate species for listing under the Endangered Species Act in 1975, it was included on a list with other butterflies. This entire group of lepidopteran species was considered for protection under the Endangered Species Act due to a number of factors throughout their population ranges. At that time, habitat destruction and insecticide spraying for mosquitos, among other factors, were considered to be some of the reasons for all these butterflies to be listed as candidate species. These types of general statements were made in Chapter Two of the EIS regarding the life history of this invertebrate species. The statements were not directed at recent activities at Seal Beach Refuge.

There has been no indication that mosquito control at the Seal Beach Refuge has been a cause for concern for wandering skippers or other invertebrate species. As Mr. Challet pointed out, typically the only pesticide used in the Seal Beach Refuge is Bacillus thuringiensis israelensis (BTI). BTI is a bacterial toxin that effects a limited number of invertebrates. Within BTI's limited focus, it is an environmentally effective control of mosquito larvae. Other pesticides which may be required for mosquito control at Seal Beach must be determined to be compatible with Refuge Management Programs. A pesticide use proposal must be provided to the Service and an Endangered Species Section 7 Consultation could also be required. Of principal concern to the Service are potential impacts to invertebrate food items for migratory birds, and in particular, endangered species. The Service and the Navy concur with the Orange County Vector Control District that there is probably no impact to the wandering skipper by current mosquito control pesticide application program (use of BTI) at Seal Beach Refuge.

Issue 3: Fault Lines

Mr. Kirk Evans of the Mola Development Corporation contacted the Service and Navy regarding the source of information for the fault lines indicated on Figure 2-6, Geophysical Features, in the Final EIS. Mr. Evans was concerned because the City of Seal Beach reportedly used this information to deny the Mola Development Corporation a permit to develop property adjacent to the Naval Weapons Station-Seal Beach. Mr. Evans has been informed that the source of this information was a geological map prepared by Jack West. He was advised that the fault lines are deemed to be accurately mapped. Furthermore, Mr. Evans has been advised that interpretation of the fault lines and zones beyond the boundaries of the Naval Weapons Station should be done with care, and that Mola Development Corporation would be advised to conduct their own site specific fault line survey and to coordinate such a survey with the City of Seal Beach.

Issue 4: Frequency of Attempts to Relocate Red Foxes

A few agencies and organizations have asked the Service and the Navy how often they would be making contacts with zoos, other states, or other potential sites to relocate trapped red foxes on the Station. An exhaustive effort was conducted by the Service during the last year to find suitable sites or facilities, and none were identified. At this time, the Service plans to contact appropriate agencies and organizations at least once every two years.

Printed By
Navy Publishing and Printing Service
Long Beach, California

MEMORANDUM OF UNDERSTANDING
AMONG
THE U.S. DEPARTMENT OF DEFENSE
AND
THE U.S. FISH AND WILDLIFE SERVICE
AND
THE INTERNATIONAL ASSOCIATION OF FISH AND WILDLIFE AGENCIES
FOR A
COOPERATIVE INTEGRATED NATURAL RESOURCE MANAGEMENT PROGRAM
ON MILITARY INSTALLATIONS

A. PURPOSE

The purpose of this Memorandum of Understanding (MOU) is to establish a cooperative relationship between the U.S. Department of Defense (DoD), the U.S. Department of the Interior, Fish and Wildlife Service (FWS), and the State fish and wildlife agencies as represented by the International Association of Fish and Wildlife Agencies (IAFWA) in preparing, reviewing, and implementing integrated natural resource management plans (INRMPs) on military installations.

B. BACKGROUND

In recognition that military lands have significant natural resources, Congress enacted the Sikes Act in 1960 to address wildlife conservation and public access on military installations. The 1997 amendments to the Sikes Act require the DoD to develop and implement an INRMP for each military installation with significant natural resources. The INRMP must be prepared in cooperation with the FWS and the State fish and wildlife agency (States) and reflect the mutual agreement of the parties concerning conservation, protection, and management of fish and wildlife resources on military lands.

INRMPs provide for the management of natural resources, including fish, wildlife, and plants. They incorporate, to the maximum extent practicable, ecosystem management principles and provide the landscape necessary for the sustainment of military land uses. INRMPs allow for multipurpose uses of resources, including public access necessary and appropriate for those uses, provided such access does not conflict with military land use requirements. Effective partnering among the DoD, the FWS, and the States, initiated early in the planning process at national, regional, and the military installation levels, is essential to the development and implementation of comprehensive INRMPs. When such partnering involves the participation of all parties and synchronization of INRMPs with existing FWS and State natural resource management plans, the mutual agreement of all parties is achieved more easily. Consistent with the use of military installations to ensure the readiness of the Armed Forces, the purpose of INRMPs is to provide for the conservation and rehabilitation of natural resources on military lands. Thus, a clear understanding of land use objectives for military lands should enable DoD, the FWS, and the States to share a common understanding of land management requirements while preparing and reviewing INRMPs.

This MOU addresses the responsibilities of the Parties to facilitate optimum management of natural resources on military installations. It replaces a DoD-FWS MOU on "Ecosystem-based Management of Fish, Wildlife and Plant Resources on Military Lands" which expired May 17, 2004.

C. AUTHORITIES

This MOU is established under the authority of the Sikes Act, as amended, 16 U.S.C. 670a-670f, which requires the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations in cooperation with the FWS and the State fish and wildlife agencies. The DoD's primary mission is national defense. DoD manages approximately 30 million acres of land and waters under the Sikes Act to conserve and protect biological resources while supporting sustained military land use.

The FWS manages approximately 96 million acres of the National Wildlife Refuge System, and administers numerous fish and wildlife conservation and management statutes and authorities, including: the Fish and Wildlife Coordination Act, the Migratory Bird Treaty Act of 1918, the Endangered Species Act, the Marine Mammal Protection Act, the Bald and Golden Eagle Protection Act, the Anadromous Fish Conservation Act, the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, the Federal Noxious Weed Act, the Alien Species Prevention Enforcement Act of 1992, the North American Wetland Conservation Act, and the Coastal Barrier Resources Act.

The States in general possess broad trustee and police powers over fish and wildlife within their borders, including – absent a clear expression of Congress' intent to the contrary – fish and wildlife on Federal lands within their borders. Where Congress has given Federal agencies certain conservation responsibilities, such as for migratory birds or species listed as threatened or endangered under the Endangered Species Act, the States, in most cases, have cooperative management jurisdiction.

The Sikes Act (16 U.S.C. 670c-1) allows the Secretary of a military department to enter into cooperative agreements with States, local governments, nongovernmental organizations, and individuals to provide for the maintenance and improvement of natural resources, or to benefit natural and cultural resources research, on DoD installations.

The Sikes Act (16 U.S.C. 670f(b)) also encourages the Secretary of Defense, to the greatest extent practicable, to enter into agreements to use the services, personnel, equipment, and facilities, with or without reimbursement, of the Secretary of the Interior in carrying out the provisions of this section.

The Economy Act (31 U.S.C. 1535 and 1536) allows a Federal agency to enter into an agreement with another Federal agency for services, when those services can be rendered in a more convenient and cost effective manner by another Federal agency.

The Intergovernmental Cooperation Act of 1968 (P.L. 90-577 (82 Stat. 1098)) allows the "improvement of the administration of grants-in-aid to the States, to permit provision of reimbursable technical services to State and local government.

D. RESPONSIBILITIES

The Parties to this agreement hereby enter into a cooperative program of INRMP development and implementation with mutually agreed-upon fish and wildlife conservation objectives to satisfy the goals of the Sikes Act.

1. **The DoD, the FWS and IAFWA (the Parties) mutually agree, in accordance with all applicable Federal, State and local laws and regulations:**

   a. To meet at least annually to discuss implementation of this MOU. The DoD will coordinate the annual meeting and any other meetings related to this MOU. Proposed amendments to the MOU should be presented in writing to the parties at least 15 days prior to the annual meeting. The terms of this MOU and any proposed amendments may be reviewed at the annual meeting. The meeting may also review mutual Sikes Act accomplishments, research and technology needs, and other emerging issues.

   b. To establish a Sikes Act Tripartite Working Group consisting of representatives from the Parties. This Working Group will meet at least quarterly to discuss and develop projects and documents to assist in the preparation and implementation of INRMPs and to discuss Sikes Act issues of national importance.

   c. The Sikes Act Tripartite Working Group will encourage the establishment of INRMP Development and Implementation Teams to facilitate early communication during preparation, review, revision or implementation of an INRMP and to ensure that such INRMPs are comprehensive and implemented as mutually agreed.

   d. Supplemental Sikes Act MOUs or other agreements may be developed at the regional and/or State level.

   e. To recognize the current DoD and FWS Sikes Act Guidelines on http://www.fws.gov and http://www.denix.osd.mil as the guidance for communication and cooperation of the Parties represented by this MOU.

   f. That none of the Parties to the MOU is relinquishing any authority, responsibility, or duty as required by law, regulation, policy, or directive.

g. To engage in sound management practices for natural resource protection and management pursuant to this MOU with due regard for military readiness, the welfare of the public, native fish and wildlife, threatened and endangered species, and the environment.

h. Consistent with DoD's primary military mission and to the extent reasonably practicable, to promote the sustainable multipurpose use of natural resources on military installations, to include hunting, fishing, trapping, and nonconsumptive uses such as wildlife viewing, boating, and camping.

i. To designate the individuals listed below as the national representative from each signatory to participate in the activities pursuant to this MOU. Representatives may also be designated at the regional and local levels to participate in similar Sikes Act planning or coordination activities.

    i. DoD: Conservation Team Leader, ODUSD (I&E) EM, 1225 Clark Street Suite 1500, Arlington, VA 22202-4336

    ii. FWS: National Sikes Act Coordinator, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Room 400, Arlington, VA 22203.

    iii. IAFWA: Executive Vice-President, IAFWA, 444 North Capitol Street, NW, Suite 544, Washington, DC 20001.

2. DoD agrees to:

a. Communicate the establishment of this MOU to all DoD Components.

b. Take the lead in the development of policies related to INRMP development and implementation and seek the cooperation of the FWS and the State fish and wildlife agencies during development, review, and implementation.

c. Ensure distribution of the DoD and revised FWS Sikes Act Guidelines to all appropriate DoD offices at every level of command.

d. Encourage military installations to invite appropriate FWS and State fish and wildlife agency offices to participate in developing and updating the INRMPs. All such invitations should be extended well in advance of the needed date for the product or work in order to facilitate meaningful participation by all three Parties.

e. Encourage military installations to take advantage of FWS and State fish and wildlife agency natural resources expertise through the use of Economy Act transfers and cooperative agreements. Priority should be given to projects that:

i. Sustain the military mission;

ii. Consider the strategic planning priorities of the FWS and the State fish and wildlife agency; and

iii. Effectively apply the principles of ecosystem management.

f. Encourage military installation to identify INRMP project requirements and give priority to those that:

i. Ensure conservation of natural resources while sustaining military mission activities;

ii. Achieve compliance with Federal, State, and local laws; and

iii. Provide adequate staffing for the development and implementation of the INRMP.

g. Discuss with the FWS and the State fish and wildlife agencies all issues of mutual interest related to the protection, conservation, and management of fish and wildlife resources on DoD installations, and obtain the mutual agreement of the FWS and the States regarding all INRMP provisions related to activities within their legal jurisdiction.

h. Subject to mission, safety and security requirements, provide public access to military installations to facilitate the sustainable multipurpose use of its natural resources.

i. Identify DoD natural resource research needs, and develop research proposals with input from FWS and/or the IAFWA.

j. Encourage the Military Services to establish natural resources management liaisons to facilitate:

i. Coordination and mutual agreement of INRMPs;

ii. Development and implementation of cooperative regional and local natural resource conservation partnerships and conservation initiatives with FWS and State fish and wildlife agency offices; and

iii. Natural resources conservation technology transfer and training initiatives between the Military Services, Federal land management agencies, and State fish and wildlife agencies.

3. **FWS agrees to:**

a. Communicate the establishment of this MOU to each FWS Regional Office and appropriate field stations in close proximity to military installations.

b. Distribute the DoD and revised FWS Sikes Act Guidelines to each FWS Regional Office and appropriate field station in close proximity to military installations.

c. Designate regional and field station FWS liaisons to develop partnerships and assist the DoD in implementing joint management of ecosystem-based natural resource management programs.

d. Identify FWS personnel needs for the development, review, updating, and implementation of INRMPs and expedite the fulfillment of those needs, as appropriate, based on funding and FWS priorities.

e. Provide technical assistance to the DoD in managing Federal trust resources such as endangered species, migratory birds, interjurisdictional fisheries, invasive species, contaminants, wetlands, coastal resources, law enforcement, or other natural resource issues within the scope of FWS responsibilities, funding constraints and expertise.

f. Work with the DoD to coordinate military natural resource research efforts and the creation of a consolidated source of information, with a particular emphasis on research on listed species and species at-risk.

g. Disseminate upcoming proposed listing and critical habitat designations to DoD Headquarters offices and potentially affected installations as part of outreach efforts before the Federal Register publication of such proposed designations.

h. Provide law enforcement support to protect fish, wildlife and plant resources on military installations within the jurisdiction of the FWS.

4. **IAFWA agrees to:**

a. Communicate the establishment of this MOU to each State fish and wildlife agency director and appropriate field offices.

b. Distribute the DoD and revised FWS Sikes Act Guidelines to each State fish and wildlife agency director and appropriate field offices.

c. Facilitate and coordinate with the States to encourage them to:

i. Participate in the development, review, updating and implementation of INRMPs upon request of military installations.

ii. Designate State liaisons to assist in developing partnerships and to assist the DoD in implementing natural resource conservation and management programs.

iii. Identify State wildlife management areas in close proximity to military installations and, where appropriate, participate in the joint management of ecosystem-based natural resource management projects.

iv. Provide technical assistance to the DoD in managing natural resource issues such as endangered species, migratory birds, interjurisdictional fisheries, invasive species, contaminants, wetlands, coastal resources, law enforcement, outdoor recreation, or other natural resource issues within the scope of State responsibility and expertise.

v. Identify State personnel needs for the development, review and implementation of INRMPs and expedite the fulfillment of these needs as appropriate based on available funding and State priorities.

vi. Coordinate current and proposed State natural resource research efforts with those that may relate to DoD installations.

vii. Coordinate with DoD installations in development of comprehensive state wildlife conservation plans.

E. STATEMENT OF NO FINANCIAL OBLIGATION

This MOU does not impose any financial obligation on the part of any signatory.

F. ESTABLISHMENT OF COOPERATIVE AGREEMENTS

The Parties are encouraged to enter into cooperative agreements to coordinate and implement natural resource management on military installations. If fiscal resources are to be transferred in support of this MOU, the Parties must develop a separately funded cooperative agreement. Such cooperative agreements may be entered into under the authorities of the Sikes Act (16 U.S.C. 670a-670f, as amended) and the Economy Act (31 U.S.C. 1535 and 1536). Each funded cooperative agreement shall include a work plan and a financial plan that identify goals, objectives, and a budget and payment schedule. A cooperative agreement to accomplish a study or research also will include a study design and methodology in the work plan. It is understood and agreed that any monies allocated via these cooperative agreements shall be expended in accordance with its terms and in the manner prescribed by the fiscal regulations and/or administrative policies of the party making the funds available.

G. AMENDMENTS

This MOU may be amended at any time by mutual agreement of the parties in writing.

H. TERMINATION

Any party to this agreement may remove itself from this MOU upon sixty (60) days written notice to the other parties.

I. EFFECTIVE DATE AND DURATION

This MOU will be in effect upon date of final signature and will continue for five years from date of final signature. The parties will meet 6 months prior to the expiration of this MOU to discuss potential modifications and renewal terms.

1/31/06 — Alex A. Beehler
Date
Assistant Deputy Under Secretary of Defense
(Environment, Safety and Occupational Health)
U.S. Department of Defense

1/31/06 — H Dale Hall
Date
Director
Fish and Wildlife Service
U.S. Department of Interior

1/31/06 — [signature]
Date
Executive Vice-President
International Association of Fish and Wildlife Agencies

INRMP STRATEGIC ACTION PLAN

Department of Defense, Fish and Wildlife Service and International Association of Fish and Wildlife Agencies

A Comprehensive Plan for Using Integrated Natural Resource Management Plans at Active Military Installations and Ranges to Sustain Readiness

February 3, 2005

PURPOSE

This *Comprehensive Plan for Using Integrated Natural Resource Management Plans at Active Military Installations and Ranges to Sustain Readiness* (Plan) describes a set of activities related to the implementation of INRMPs that will ensure the Department of Defense's (DoD's or the Department's) ability to properly manage the valuable natural resources entrusted to its care and to sustain the readiness of its force.

This Plan is designed to be a living document. It will be updated and refined as it is coordinated throughout the Department and with the DoD natural resource stakeholder community.

BACKGROUND

Military installations and ranges that are used for training and testing provide a foundation for military readiness. Training ranges offer an opportunity to expose our troops to realistic threats and tactics of war. Test sites ensure that weapons systems are effective and safe. At the same time, most of these installations and ranges are ecologically significant. They provide habitat for a broad spectrum of rare and federally listed threatened and endangered (T&E) plants and animals and contain many significant natural resources such as wetlands, native prairies, and caves. Consequently, military installations and ranges are managed both for their military value and for their natural resources.

Two federal laws include requirements that provide an opportunity for the Department of the Interior to be involved in DoD's management of its natural resources at military ranges and installations. Section 7 of the Endangered Species Act (ESA), requires DoD to consult with the Department of the Interior (Interior) when any activity authorized, funded or carried out by the Department may affect a listed species or designated critical habitat. The Sikes Act, which requires the Department to carry out a program for the conservation and rehabilitation of natural resources on military installations, also requires DoD to prepare Integrated Natural Resource Management Plans (INRMPs) for all installations with significant natural resources. These plans must be prepared in cooperation with U.S. Fish and Wildlife Service (USFWS), an Interior agency, as well as the head of each relevant State fish and wildlife agency. Approximately 380 DoD installations and ranges are required to prepare an INRMP.

An INRMP is the primary tool used by DOD installations and ranges, to identify those activities that are needed to ensure the successful management of natural resources on the installation. By law they are required to provide for:

- Fish and wildlife management, land management, forest management and fish and wildlife-oriented recreation
- Fish and wildlife habitat enhancement or modifications
- Wetland protection, enhancement and restoration, where necessary for support of fish, wildlife, or plants
- Integration of, and consistency among, the various activities conducted under the plan
- Establishment of specific natural resource management goals and objectives and time frames for proposed action

- Sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources
- Public access to the military installation that is necessary or appropriate and the use described in the bullet above subject to requirements necessary to ensure safety and military security
- Enforcement of applicable natural resource laws and regulations
- No net loss in the capability of military installations lands to support the military mission of the installation
- Such other activities as the Secretary of the military department determines appropriate

The National Defense Authorization Act (2003 Authorization) for Fiscal Year 2003 exempts the DoD from the Migratory Bird Treaty Act for the incidental take of migratory birds as a result of otherwise authorized military readiness activities until the Secretary of Interior prescribes regulations authorizing such take. With the passage of this 2003 Authorization, Congress has signaled that the DoD shall give appropriate consideration to the protection of migratory birds when planning and executing military readiness activities. The Department of Interior is currently finalizing this authorization in coordination with the DoD. As indicated in the proposed rule, migratory bird conservation will be incorporated into INRMPs, where applicable, to mitigate where needed and to protect migratory birds and their habitats.

The National Defense Authorization Act (NDAA) for Fiscal Year 2004 made important changes to the ESA regarding INRMPs, which were justified on the basis of the need to promote military readiness while protecting listed species. Under new Section 4(a)(3)(B)(i) of the ESA, the Secretary of the Interior or the Secretary of Commerce, as appropriate, is precluded from designating critical habitat on any areas owned, controlled, or designated for use by DoD where an INRMP has been developed that, as determined by the Interior or Commerce Secretary, provides a benefit to the species for which critical habitat designation is proposed.

The participation of local and regional USFWS field offices and appropriate State fish and wildlife agencies is crucial to the successful development and use of INRMPs to achieve mission readiness. These organizations have a statutory obligation to review and coordinate on INRMPs. More importantly, along with installation fish and wildlife staff, they have the technical expertise to identify programs and projects that will ensure the viability of species and the protection and restoration of critical habitat. Successful execution of INRMPs depends on adequate resourcing of DoD, USFWS and State fish and wildlife programs to support the INRMP process.

The ESA amendments and the 2003 Authorization are likely to result in greater scrutiny of INRMPs and their implementation given their increased importance in critical habitat designations. Therefore, DoD, USFWS and the states must be diligent in properly implementing the provisions of the Sikes Act, the Migratory Bird Treaty Act and the ESA. It is equally important to follow through on the commitments embodied in INRMPs, including with respect to high priority conservation and mitigation strategies.

In 2000, Congress passed the Conservation and Reinvestment Act, which amended the Federal Aid in Wildlife Restoration Act to establish the Wildlife Conservation and Restoration Account. States and territories must prepare wildlife conservation and restoration programs in order to receive funds from the account. If a state or territory receives funds from the account, they are also required to submit a Comprehensive Wildlife Conservation Strategy (CWCS) by

October 2005. These State CWCSs will be a blueprint for the future management of each state's wildlife. They will also present an opportunity for installations to integrate their conservation strategies into a larger state and national strategy.

Individual state efforts may involve:

- Threats assessment and identification of threats
- Ecosystem/landscape mapping
- Priority setting (but not ranking) of species in greatest need of conservation
- Metrics to assess progress in meeting strategic goals
- Recommended strategies (research, monitoring, mitigation/recovery strategies etc.)
- Programs and mechanisms to engage key partners, including federal agencies

STRATEGIC GOALS

Well-developed and effectively implemented INRMPs protect and enhance the natural resources on military installations, inspire confidence in DoD's stewardship of its natural resources and reduce the need for statutory and regulatory mandates with respect to such resources. This will result in a sustained ability to test and train, contributing to military readiness. The objectives and specific actions that are identified in this plan to meet the strategic goals will be defined and refined throughout the development and ongoing update of this document.

Management of Natural Resources to Enhance Military Readiness

The recent implementation of the new legislative authority to allow INRMPs to substitute for critical habitat designation has provided important opportunities for DoD to use new or revised INRMPs to avoid designation of critical habitat on military land where effective INRMPs are in place. Accordingly, DoD's natural resource management program should make use of this new authority where appropriate to provide more operational flexibility.

Likewise, a new regulation authorizing take of migratory birds as a result of military readiness activities puts a greater emphasis on the need to address migratory bird conservation in INRMPs to avoid potential violations of the Migratory Bird Treaty Act.

Responsible and Credible Implementation of New Authorities

The Administration placed a high priority on obtaining a change to the ESA to permit DoD the flexibility to manage its lands to benefit listed species using INRMPs. Under its purview, an INRMP may substitute for the designation by DOI of critical habitat on military installations. Some non-governmental environmental organizations opposed this legislation (i.e., new ESA section 4(a)(3)(B)(i)) and have indicated that they will monitor carefully the implementation of this new authority. As a consequence, installation commanders wishing to forestall critical habitat designation using this authority must ensure that the installation's approved INRMP now provides—or is revised to provide--the requisite benefit for any species proposed for designation, and that sufficient funding is sought and obtained to achieve the management goals and objectives specified in the plan within the time frames proposed for action. Failure to do so could open the door to crippling lawsuits and undermine the successful use of this authority.

Stakeholder Support for Strategy

Stakeholder support for DoD's INRMP strategy is important to the success of DoD's efforts to ensure the readiness of its forces. The actions of external stakeholders will help determine the success of these efforts. To the extent that they understand or perceive DoD to be transparent, responsible and trustworthy, they are more likely to allow DoD to move forward aggressively and effectively in undertaking actions to protect installations and ranges and the activities that take place on them over the long term.

INRMP OBJECTIVES AND TASKS

This section identifies specific objectives to achieve the goals or outcomes identified in the prior section. They serve as a point of departure and may be refined and updated throughout the development of this plan. Some objectives and specific actions will meet multiple strategic goals; others target only one goal.

Objective 1: Improve quality and consistency of INRMPs

1. Update DoD Guidance to facilitate consistent review of INRMPs. DoD will issue guidance to clarify the required INRMP review process for military installations; to outline the triggers and process for engaging the public in reviewing any required revisions; and to specify the process for consulting with USFWS and state fish and wildlife agency personnel to ensure the continued "mutual agreement" of the parties to the INRMP.

2. Issue/Finalize Policy and Guidance that will facilitate application of new authorities. The USFWS will prepare updated guidance, *Guidelines for Coordination with the DoD and Implementation of the Sikes Act*, in consultation with DoD and the International Association of Fish and Wildlife Agencies (IAFWA) to address criteria for substituting INRMPs for designations of critical habitat and requirements and procedures related to the 5 year review provisions of the Sikes Act. The guidance will also address responsibilities and procedures related to Sikes Act implementation, and creation of INRMP development and implementation teams.

3. Clarify the roles, responsibilities and timelines of the various tri-partite organizations to enhance program effectiveness and timeliness of actions. A new Memorandum of Understanding (MOU) between DoD, USFWS and International Association of Fish and Wildlife Agencies (IAFWA) will define the various roles and responsibilities of the parties, formalize the Sikes Core Group as a forum for identifying and resolving issues related to INRMPs and to facilitate information exchange, data collection and studies.

4. Develop New Metrics to assess progress towards improving the effectiveness of INRMPs in protecting and enhancing mission readiness. DoD will improve and expand metrics to track implementation of its INRMPs. The existing metrics track accomplishments towards meeting the requirements to establish the initial INRMP and review existing INRMPs within 5 years, coordinate with all the appropriate parties, obtain public input on INRMPs, and ensure adequate funding for Class 0 and Class 1 projects. Additional metrics are being reviewed:

- INRMP effectiveness towards protecting and enhancing mission readiness (i.e., see Marine Corps guidance)

- General conservation metrics (i.e., from the Navy's Charleston, SC meeting)
- USFWS three proposed criteria for benefiting species (in guidance relating to the Section 318 amendment of the ESA)
- How well the INRMP team at the local level works together
- What will help commanders/leadership measure success?
- Supports other Federal, State and Regional missions (i.e. species recovery plans, conservation initiatives)
- Actions that result in the decision to not list a species as T&E
- Actions that result in decision to avoid designation of new critical habitat.

5. *Report metrics results in Annual Report.* To create incentives for meeting statutory review requirements for INRMPs and provide a process for identification of issues, shortcomings, or successes as a result of INRMP implementation and use the USFWS and DoD Annual Reports to report metrics results. Although results contained in the annual report could be based on quantitative data, display results in the report itself in more qualitative fashion (red, yellow, green coding).

6. *Develop an INRMP template.* The military services are developing INRMP templates to promote more efficient, timely and consistent review of INRMPs. DoD will consider the services' templates, and if appropriate will develop a DoD INRMP template. While standardized in many ways, the template should incorporate some degree of flexibility to accommodate installation specific needs. The template should link to the comprehensive range management plans where such plans are required. The template should include an executive summary section to use with the public, NGOs and other stakeholders.

Objective 2: Develop effective training and educational materials and programs on INRMP implementation.

1. *Develop and implement targeted training/educational workshops or programs.* Both broad and specific topic-oriented educational materials, courses or workshops will be useful to promote greater consistency among INRMPs, strengthen the connection between INRMPs and training and testing requirements, and improve overall INRMP planning and implementation. Training will be targeted at the individual needs of installation, local USFWS, and State fish and wildlife agency staff. A range of venues and approaches will be explored including use of the USFWS National Conservation Training Center to host a Sikes Act Training course, traveling workshops and use of existing military training schools, Service military officers training schools, regional workshops, teleconference workshops, add-ons to existing conferences, etc. Consideration will be given to developing appropriate educational and training materials for Federal land managers.

Objective 3: Finish delinquent INRMPs/Facilitate even flow of INRMP reviews and updates to USFWS.

1. *Finish Delinquents INRMPs.* The Sikes Act requires INRMPs to be finalized or reviewed within 5 years for those installations where an INRMP is required. Most of the first round of INRMPs is completed but a few are left to be finalized. Those installations with INRMPs that are not yet finalized are currently in the process of completing final coordination and signatures.

2. *Publish Guidance Clarifying Statutory INRMP Review Obligations.* DoD will amend its existing *Guidance for Implementation of the Sikes Act Improvement Act* and the USFWS' *Guidelines for Coordination with the DoD and Implementation of the Sikes Act* to correct any misunderstandings regarding the

statutory responsibility to review existing INRMPs "as to operation and effect." This clarification is expected to result in a revised and reduced estimate of the number of INRMPs necessitating revision.

Potential Gaps

Given the new statutory authorities and need for some INRMPs to be updated, what is the best way to manage the FWS incoming workload notwithstanding the recent clarification on updates/review?

Objective 4: Ensure funding of INRMP projects.

1. *In Progress Reviews (IPR)Review of Funding Status.* Continue to track the status of funding for all Class 0 and 1 (Class 0/1) projects in the In Progress Reviews (IPRs).

2. *Service Definition of Class 0 and 1 projects.* The most recent IPR revealed possible differences among the military services in their respective definitions of Class 0/1 projects. Upcoming IPRs should ask the military services to define these to ensure projects are being funded consistently across the military services. In addition, the military services should be asked to explain any apparent shortfalls in full funding of Class 0/1 projects.

3. *Evaluate investment strategy.* The Conservation Committee in coordination with the Range Sustainment Working Integrated Product Team will evaluate the comprehensive range management plans, current/revised INRMPs, and revised metrics and determine what prudent investments support mission accomplishment, enhance readiness, provide for long-term sustainment of resources, ensure cost effective compliance, and maximize the existing resource capability. In addition, the Committee should make recommendations to change funding guidance, if appropriate.

Objective 5: Strengthen public comment process for INRMPs

DoD will revise its existing INRMP guidance to specify that when an installation proposes to make revisions to an existing INRMP that necessitate supplemental or new analysis under the National Environmental Policy Act, the installation will provide the public with a reasonable opportunity to review and comment upon the revised INRMP before it is approved and implemented.

Objective 6: Overcome misperceptions and build understanding of DoD's Natural Resource management efforts and accomplishments.

1. Where feasible, host tours for stakeholders of military ranges. DoD has hosted tours of military ranges and installations in southern California and North Carolina with key non-governmental organizations, some with special interests in protection of critical habitat and T&E species. The tours were successful on many fronts and went a long way to dispelling false impressions regarding DoD's training operations and the constraints on these activities. The tours also helped to build an appreciation of the significant resources invested at military ranges and installations to conserve and mitigate impact to critical habitat and T&E species.

2. Attend and participate in appropriate conferences. Sponsoring or attending appropriate conferences will increase visibility and opportunities to partner with a broader array of stakeholders, as well as promote a better understanding of stakeholder concerns.

3. Develop and maintain informational materials for the public. Develop appropriate new fact sheets and educational materials and update fact sheets already in place in concert with USFWS to help educate stakeholders on relevant topics.

Objective 7: Develop strategies to make use of new authorities to defer designation of critical habitat.

1. Interface with State parties on development of Comprehensive Wildlife Conservation Strategies. By communicating with state personnel early in the CWCS development process, DoD and USFWS personnel can provide input to the states to address applicable INRMP concerns. Such input may also enable the states to include information that will amplify the efforts toward INRMP conservation goals while building a foundation for their CWCSs. Input should help ensure the CWCSs provide for adequate protection outside of military installations and ranges for candidate and listed species found on military installations.

Tripartite Agreement
between the U.S. Navy, the
U.S. National Park Service, and the
California Dept. of Parks and Recreation

Purpose and Authority

This tripartite agreement by and between the Department of Defense functioning through the installation Officer-in-Charge, Naval Ordnance Center, Pacific Division, Fallbrook Detachment under the authority contained in 16 USC 670a-670f, hereinafter referred to as the "Detachment" the Department of the Interior functioning through the Field Director of the National Park Service, under the authority contained in 16 USC 670c, hereinafter referred to as the "Service," and the State of California functioning through the Director, California Department of Parks and Recreation, Interagency Committee for Outdoor Recreation, under state authority, hereinafter referred to as the "State," is entered into for the purpose of providing the installation Officer-in-Charge, Fallbrook Detachment, with professional and technical information necessary to coordinate actions pertaining to the operation, development, management, and protection of outdoor recreation resources on Detachment. This agreement is within the purview of the policies set forth in Public Law 91-190, National Environmental Policy Act (42 USC 4321, 4331-4335, and 4341, 4347), Public Law 88-29, Outdoor Recreation - Federal State Program (16 USC 460L-460L-3), Public Law 86-797 as amended by Public Law 90-465 and Public Law 93-452, Conservation Programs on Military Reservations (16 USC 670a-670f), Public Law 90-542, Wild and Scenic Rivers Act (16 USC 1271-1287), Public Law 90-543, National Trails System Act (16 USC 1241-1249), Public Law 89-665, National Historic Preservation Act (16 USC 470-470m), Executive Order 11644, Use of Off-Road Vehicles on the Public Lands, and under the principles of multiple use and sustained yield as defined in Public Law 86-517 (16 USC 528-531). Outdoor recreation as used in this agreement includes the natural resources which provide or may provide opportunities for outdoor recreation. It does not include highly developed recreation facilities normally associated with urban developments as playgrounds, golf courses, athletic fields/courts, and swimming pools. Outdoor recreation is dependent upon the natural environment. Fish and wildlife conservation is covered by Public Law 86-797 (16 USC 670a-670b, 10 USC 2571) and is not included in this agreement.

Responsibilities

Whereas, the Officer-in-Charge, Naval Ordnance Center, Pacific Division, Fallbrook Detachment has jurisdiction over the Detachment and has the trusteeship responsibility to develop, enhance, operate, protect, maintain, and control public access to the outdoor recreation resources thereon; and

Whereas, the Service is the agency of the Federal Government primarily responsible for the development and coordination of outdoor recreation opportunities, resources, and plans with exclusive Federal responsibility for the administration of the Land and Water Conservation Fund; and

Whereas, the Interagency Committee for Outdoor Recreation was created under the laws of the State of California to provide an adequate and flexible system of enhancement, and development, operation, and maintenance of outdoor recreation resources in California; and

Whereas, it is the mutual desire of the Detachment, the Service, and the State to work in harmony for the common purpose of developing, enhancing, and maintaining the outdoor recreation resources at the Detachment in the best interest of the people served by these resources;

Therefore, it is mutually agreed that:

SECTION I. JOINT ACTIVITIES OF THE DETACHMENT, SERVICE, AND STATE.

1. The Service and State will act in an advisory capacity to the Detachment on matters pertaining to the management of outdoor recreation resources on lands administered by the Detachment. Actual management of the outdoor recreation resource will remain the responsibility of the Officer-in-Charge.

2. An interdisciplinary approach shall be promoted by all interested parties to resolve problems relating to multiple use management of natural resources.

3. All parties will cooperate in preparing and periodically revising an Outdoor Recreation Section of the Natural Resources Management Plan that will be an integral part of this Agreement and will be provided as Attachment (1) when finalized. This Tripartite Agreement, when accompanied by Attachment (1), will constitute an Outdoor Recreation Cooperative Plan.

4. All parties will jointly meet as needed to discuss matters relating to conservation and management of outdoor recreation resources on or affecting the lands administered by the Detachment, such as law enforcement, education and interpretive programs, cooperative studies, plans, surveys, fee collection, and other matters as might be relevant to outdoor recreation resource management within the concept of multiple use management.

5. Nothing in this tripartite agreement is intended to modify in any manner the present cooperative program with other public agencies, conservation groups, or educational institutions, or modify any rights by treaty or otherwise to any native American tribe or member thereof. In the event of a conflict of this Tripartite Agreement and Memorandum of Understanding between the Departments of the Interior and Defense, provisions in the Memorandum of Understanding will prevail.

SECTION II. DETACHMENT RESPONSIBILITIES.

Within the limitations of the assigned military mission and the availability of funds and manpower, the Detachment agrees to:

1. Provide access to authorized agents and employees of the Service and the State in the execution of this tripartite agreement, unless security or other military exigency should prevent the granting of such access.

2. Maintain, operate, and manage outdoor recreation resources and activities, in accordance with the approved Fallbrook Detachment Outdoor Recreation Management Plan.

3. Protect and preserve special interest areas.

4. Provide information on the development of the Fallbrook Detachment Outdoor Recreation Management Plan to the Service, State, and SOUTHWESTNAVFACENGCOM.

SECTION III. SERVICE RESPONSIBILITIES.

Consistent with its primary objectives and responsibilities, the Service agrees, within the limitations of funds and personnel, to:

1. Provide technical consulting assistance in developing the outdoor recreation resources and activities for the aesthetic, recreation, and economic benefits of the public.

2. Provide technical assistance in the resolution of special problems that may arise subsequent to the execution of this agreement.

3. Participate in recreation resource surveys and make recommendations on protecting, developing, and interpreting special interest areas.

4. Further an understanding of recreation and recreation resources by providing related research and assisting in related training programs.

5. Provide copies of related activities, studies, and evaluations to the Fallbrook Detachment Officer-in-Charge, and the State.

SECTION IV. STATE RESPONSIBILITIES.

Within the availability of funds and personnel, the State agrees to:

1. Assist in the determination of project demands by the Detachment personnel for various outdoor recreation activities, and provide management recommendations for restoring, maintaining, developing, or enhancing recreational facilities and activities.

2. Assist in determination of carrying capacity (level of recreational use) to avoid damage to public health, safety, the resources themselves, and other resource values.

3. Provide copies of related activities, studies, and evaluations to the Detachment and the Service.

4. Provide assistance in related training programs.

5. Furnish one copy of the State Comprehensive Outdoor Recreation Plan to the Detachment.

SECTION V. PUBLIC ACCESS.

It is the policy of the Department of Defense to permit public access to outdoor recreation resources to the greatest degree possible, consistent with the Detachments safety and security requirements, and the Department's available manpower and natural resources to support such activities without degradation or impairment of environmental qualities or of military programs.

SECTION VI. AMENDMENTS OR TERMINATION.

This Cooperative Agreement will become effective upon the date subscribed by the last signatory and shall continue in full force indefinitely. This Agreement may be terminated, modified, or amended in writing by mutual agreement of the authorized representatives of the three agencies. However, the

Officer-in-Charge, upon written notice to the Service and the State, shall have the right to terminate this Agreement, in whole or in part, at any time when his opinion indicates the Detachment's missions or other national security requirements render termination or modification a necessity.

SECTION VII. SIGNATURES

DEPARTMENT OF THE NAVY

Date 16 Oct 95

By _____
J. V. DE SIMONE
Commander, U.S. Navy
Officer-in-Charge

DEPARTMENT OF THE INTERIOR

Date December 1, 1995

By _____
ACTING Field Director
Pacific West Area
National Park Service

STATE OF CALIFORNIA

Date 12/15/95

By _____
Director, California Department
of Parks and Recreation

DUPLICATE ORIGINAL

Appendix E: Navy Natural Resource Metrics

This Page Intentionally Blank

FY11 Defense Environmental Programs Annual Report to Congress (DEPARC) – Natural Resources Data Summary

Introduction

In accordance with DoDI 4715.03, *Natural Resources Conservation Program,* and the Sikes Act Improvement Act, the Deputy Under Secretary of Defense (Installations and Environment) requires environmental management information to support Congressional reporting and ensure DoD is on track to meet its environmental management goals. Consequently, the Navy Natural Resources (NR) Metrics were developed to support the annual Natural Resources Program reviews between the Navy and its Sikes Act partners, the USFWS and State Fish and Wildlife agencies. These NR Metrics can be used to gather and report essential information required by Congress, Executive Orders, existing U.S. laws, and the Department of Defense. There are seven Focus Areas that comprise the NR Metrics to be evaluated during the annual review of the Natural Resources Program/INRMP.

1. Ecosystem Integrity
2. Listed Species and Critical Habitat
3. Fish and Wildlife Management for Public Use
4. Partnership Effectiveness
5. Team Adequacy
6. INRMP Project Implementation
7. INRMP Impact on the Installation Mission

Each of the seven Focus Areas contains questions that can be evaluated. Questions are weighted, with responses to questions having different values, ranging from 0.0 to 1.0. Each Focus Area is scored, using a rating scheme of Green (1.0-0.67), Yellow (0.66-0.34), and Red (0.33-0.0), resulting in a comprehensive scorecard for the entire NR Metrics for each Navy installation (Figure 1).

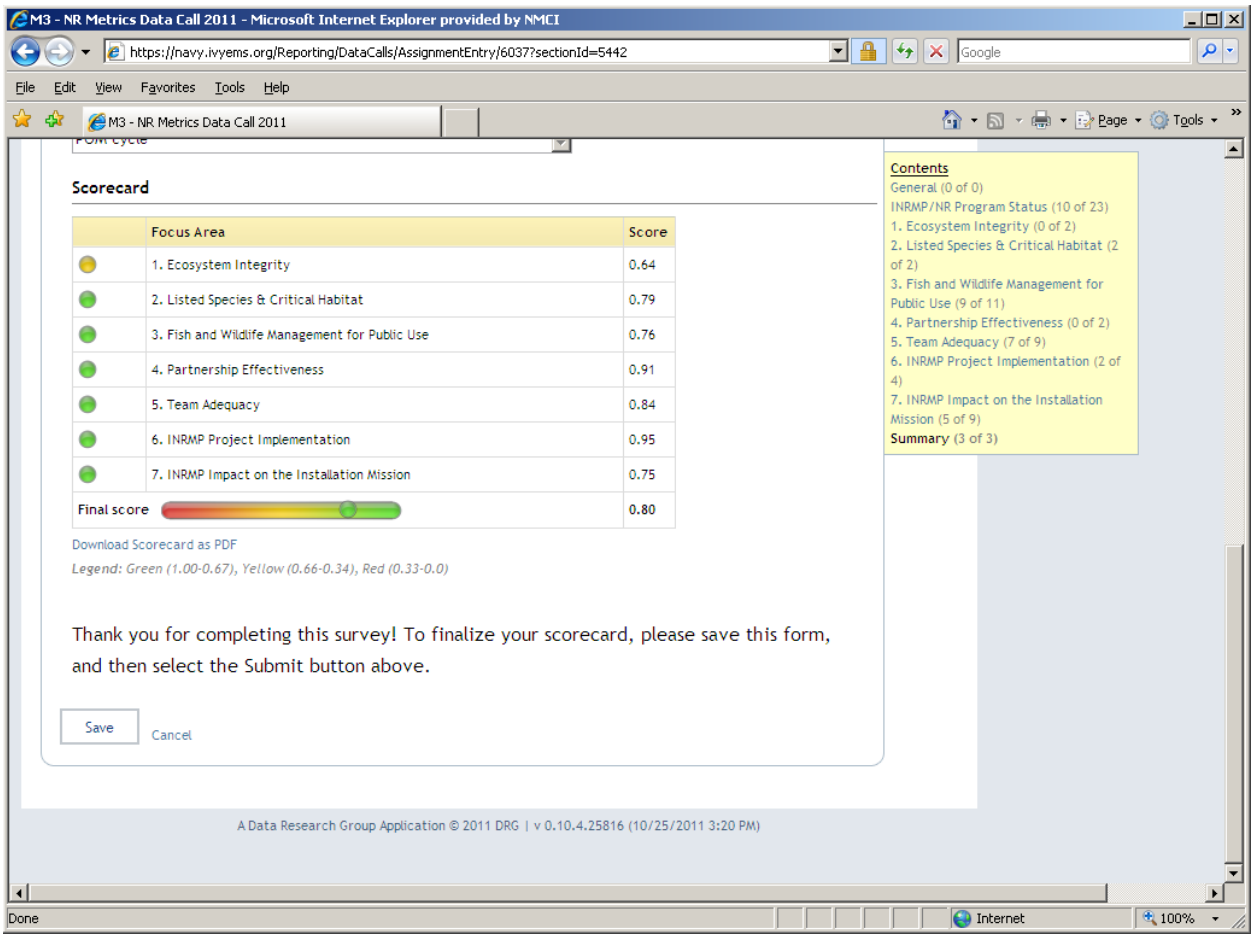


Figure 1. Example of NR Metrics Scorecard.

The questions asked in each Focus Area of the NR Metrics are intended to measure how well the Navy managed natural resources at each installation during any given year as well as the status of project implementation. In FY11, the Navy revised the questions to reflect the updated DoDI 4715.03 and draft OPNAVINST 5090, currently under revision. In addition, the field was asked to respond for all Navy-owned sites, which includes installations and special areas, in the Navy's real property database, iNFADS. Of the approximately 829 sites within iNFADS, 314 sites were found to have significant natural resources. These sites were then rolled up based on main installations, e.g. all special areas associated with an installation and covered under the same INRMP. Unique special areas having their own INRMP were counted separately. This list of sites was then correlated to the CNIC Base Command list.

Summary of NR Metrics by Focus Area

Per FY11 NR Metrics, many of the installations appear to have healthy NR programs (as indicated by the numerous green scores for the various Focus Areas), which reflects their ability to successfully implement projects identified in their existing INRMPS. Further, responses to questions in the Ecosystem Integrity and Listed Species & Critical Habitat Focus Areas indicate that existing INRMPs are sufficient in accomplishing ecosystem based management and protection of listed species. The questions *scored* in the NR Metrics that were used to evaluate

the health of the NR program and effectiveness of the INRMP at each installation are listed below by Focus Area.

Focus Area 1: Ecosystem Integrity –

According to the DoDI 4715.3, the goal of ecosystem management is to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations. This Focus Area is intended to define the ecosystems that occur on the installation and assess the integrity of these ecosystems. The term, integrity, refers to the quality of state of being complete, unbroken condition, wholeness, entirety, unimpaired, without significant damage, good condition, or general soundness. Terrestrial ecosystems, as defined by Nature Serve's "Ecological Systems of the United States: A Working Classification of US Terrestrial Systems" and marine ecosystems, as defined by NOAA's "Coastal and Marine Ecological Classification Standard" (including only the Benthic Biotic Component, Surface Geology Component, and Water Column Component of the classification scheme) were selected from a list and assigned to each installation. Locally-defined ecosystems were added, if necessary. Once the ecosystems were assigned to the installation, the following questions [4 out of 5 new in FY11] were asked for each of the ecosystems identified as being present on the installation.

1. To what extent is the ecological system on the installation fragmented due to land conversion? (0-5)

   Answers:
   0 = Ecosystem fragmentation is the result of five (5) of the phenomena (0)
   1 = Ecosystem fragmentation is the result of four (4) of the phenomena (0.20)
   2 = Ecosystem fragmentation is the result of three (3) of the phenomena (0.40)
   3 = Ecosystem fragmentation is the result of two (2) of the phenomena (0.60)
   4 = Ecosystem fragmentation is the result of one (1) of the phenomena (0.80)
   5 = No fragmentation (1.00)

2. Is the ecosystem effectively managed to sustain viable populations of species? (0-3)

   Answers:
   0 = Not effectively managed (0)
   1 = Minimally effective management (0.33)
   2 = Moderately effective management (0.67)
   3 = Effectively managed (1.00)

3. To what degree is the ecological system vulnerable to stressors? (0-5)

   Answers:
   0 = Completely Vulnerable (0)
   1 = Severely Vulnerable to Stress (0.20)
   2 = Highly Vulnerable to Stress (0.40)

3 = Moderately Vulnerable to Stress (0.60)
4 = Slightly Vulnerable to Stress (0.80)
5 = Not Vulnerable to Stress (1.00)

4. To what degree has the installation's INRMP/Natural Resources Program provided an overall benefit to ecological integrity? (0-3)

   Answers:
   0 = No Benefit (0)
   1 = Minor Benefit (0.33)
   2 = Moderate Benefit (0.67)
   3 = Significant Benefit (1.00)

Each of these questions in the Ecosystem Integrity Focus Area is equally weighted by a value of 1. This means that no one question contributes more to the overall score of the Focus Area than any other question. However, question #4 is the most relevant in terms of assessing the importance of the INRMP on Ecosystem Integrity. The score of each question, as well as the overall score of the Focus Area, can't exceed 1.00. This means that the score calculated for each question is the product of the numerical value associated with the answer provided and the weight (=1). For example, if the answer provided for question #4 is "No Benefit", then the score for that question is [0 x 1 = 0]. But, if the answer provided for question #4 is "Significant Benefit", then the score for that question is [1.00 x 1 = 1.00]. Therefore, if the INRMP has a significant benefit to ecological integrity, then the response of "Significant Benefit" to this question increases the potential for a higher overall score for this Focus Area, which may contribute to the Focus Area being coded as green.

Note: The numerical value associated with each answer is the result of the total potential score for the question (1.00) divided by the number of possible answers, except for zero. If NA is chosen, the question drops out of the calculation. For example, for question #4, there are three possible answers (other than "No Benefit", which is zero) so [1.00/3 = 0.33]. The answers are ranked according to importance, e.g. an INRMP with a "Significant Benefit" has more importance on the overall benefit to ecological integrity than an INRMP with a "minor benefit". Therefore, an answer of "Significant Benefit" to question #4 is weighted by 3, resulting in a score of 1.00 for the question.

Focus Area 2: Listed Species & Critical Habitat -

This Focus Area is intended to identify the federally listed species that occur on a Navy installation and/or special area, as well as determine if conservation efforts are effective and if the INRMP provides the conservation benefits necessary to preclude designation of critical habitat for particular species. Federally listed species were selected from the USFWS list of federally threatened and endangered species and assigned to each installation. Once the listed species were assigned to the installation, the following questions [1 out of 6 new in FY11] were asked for each of the federally listed species identified as being present on the installation.

1. To what extent do INRMP projects & programs provide a benefit to this species? (0-4, NA)

   Answers:
   0 = No benefit (0)
   1 = Minor benefits (0.25)
   2 = Moderate benefit (0.50)
   3 = Major benefit (0.75)
   4 = Significant benefit (1.00)
   NA

2. To what degree have projects been funded in support of this species? (0-4, NA)

   Answers:
   0 = No funding (0)
   1 = 1% to 25% funded (0.25)
   2 = 26% to 50% funded (0.50)
   3 = 51% to 75% funded (0.75)
   4 = 76% to100% funded (1.00)
   NA

3. To what extent are quantifiable goals, parameters, and monitoring requirements in place to assess conservation effectiveness? (0-4, NA)

   Answers:
   0= None (0)
   1= Minimal (0.25)
   2= Moderate (0.50)
   3= Good (0.75)
   4= Excellent (1.00)
   NA

4. Do existing surveys provide adequate data on habitat conditions? (Y/N)

   Answers:
   N (0)
   Y (1.00)

5. Do existing surveys provide adequate data on population presence and numbers? (Y/N)

   Answers:
   N (0)
   Y (1.00)

The questions in the Listed Species & Critical Habitat Focus Area are not equally weighted. Questions #1 and #3 are weighted the most at 1.1; question #2 is weighted 1.0; and questions #4 and #5 are weighted the least at 0.9. In particular, question #1 speaks directly to the effect of the INRMP on listed species. Therefore, if the answer provided for question #1 is "Significant Benefit", then the score for that question is [1.00 x 1.1 = 1.1]. Therefore, if the INRMP has a

significant conservation benefit to a listed species, then the response to this question increases the potential for a higher overall score for this Focus Area, which may contribute to the Focus Area being coded as green.

Focus Area 3: Fish and Wildlife Management for Public Use –

The purpose of this Focus Area is to evaluate the availability of public recreational opportunities, such as fishing and hunting, given the existing security requirements for the installation. While recreational opportunities may be available at an installation, they may be restricted for security reasons. The following questions [6 out of 9 new in FY11] were asked.

1. Are recreational opportunities available on the installation? (Y/N)

   Answers:
   N (0)
   Y (1.00)
   NA (landscape doesn't support recreational opportunities)

2. If recreational opportunities are available, are they limited/restricted for security reasons? (Y/N/NA)

   Answers:
   Y (0)
   N (1.00)
   NA (recreational opportunities are not available)

3. If recreational opportunities are available, are they offered to the public?

   Answers:
   N (0)
   Y (1.00)
   NA (recreational opportunities are not available)

4. If recreational opportunities are available, are they offered to DoD personnel?

   Answers:
   N (0)
   Y (1.00)
   NA (recreational opportunities are not available)

5. If recreational opportunities are available, are they accessible by disabled veterans/Americans?

   Answers:
   N (0)
   Y (1.00)

NA (recreational opportunities are not available)

6. Are Sikes Act fees collected for outdoor recreational opportunities? (Y/N/NA)

   Answers:
   N (0)
   Y (1.00)
   NA (recreational opportunities do not include hunting and fishing)

7. Is there an active natural resources law enforcement program on the installation? (Y/N/NA)

   Answers:
   N (0)
   Y (1.00)
   NA (recreational opportunities do not include hunting and fishing)

8. Are sustainable harvest goals addressed in the INRMP and effective for the management of the species' population? (0-4, NA)

   Answers:
   0 = Not effective (0)
   1 = Minimal effectiveness (0.25)
   2 = Moderate effectiveness (0.50)
   3= Effective (0.75)
   4 = Highly effective (1.00)
   NA (recreational opportunities do not include hunting and fishing)

9. Is public outreach/educational awareness provided? (0-4, NA)

   Answers:
   0 = No public outreach provided (0)
   1 = Low outreach (0.25)
   2 = Moderate outreach (0.50)
   3 = Good outreach (0.75)
   4 = Excellent outreach (1.00)
   NA

The questions in the Fish and Wildlife Management for Public Use Focus Area are not equally weighted. Question #1 is weighted the most at 1.2; questions #2-5, #8, and #9 are weighted 1.0; and questions #6 and #7 are weighted the least at 0.9. Overall the questions in this Focus Area are relatively evenly weighted due to the fact that there are many contributing factors to whether or not recreational opportunities are available at an installation. Specifically, security restrictions often limit access to recreational opportunities. However, question #1 speaks to whether recreational opportunities are available on the installation. Therefore, if the answer provided for question #1 is "Yes", then the score for that question is [1.00 x 1.2 = 1.2]. Therefore, if the installation offers recreational opportunities, as prescribed by the Sikes Act, then the response to this question increases the potential for a higher overall score for this Focus Area, which may

contribute to the Focus Area being coded as green. Similarly, question #2 asks if available recreational opportunities are limited or restricted for security reasons. Therefore, if the answer provide for question #2 is "Yes", then the score for that question is [0 x 1 = 0]. This will reduce the overall score for this Focus Area, which may contribute to the Focus Area being coded yellow or red.

Focus Area 4: Partnership Effectiveness –

The purpose of this Focus Area is to determine to what degree partnerships are cooperative and result in effective implementation of the INRMP. Partnerships and/or initiatives actively participated in by installation NR staff were identified. Once they were identified, the following questions [4 out 10 new in FY11] were asked for each of the partnerships and/or initiatives identified as relevant to the installation.

1. Does your Natural Resources program support the regional conservation efforts of the USFWS? (Y/N)

   Answers:
   N (0)
   Y (1.00)

2. Does your Natural Resources program support State conservation goals identified in State Wildlife Action Plans (SWAPs)? (Y/N)

   Answers:
   N (0)
   Y (1.00)

3. Does your Natural Resources program support regional NOAA/NMFS conservation objectives/efforts? (Y/N/NA)

   Answers:
   N (0)
   Y (1.00)
   NA

4. Does your Natural Resources program support other Conservation Initiatives? (Y/N)

   Answers:
   N (0)
   Y (1.00)

5. Is there adequate collaboration/cooperation between partners? (0-4)

   Answers:
   0 = None (0)
   1 = Minimal cooperation (0.25)
   2 = Satisfactory cooperation (0.50)
   3 = Effective cooperation (0.75)
   4 = Highly effective cooperative (1.00)

6. Are NR program executions meeting USFWS & State expectations? (0-4)

   Answers:
   0 = Dissatisfied (0)
   1 = Minimally satisfied (0.25)
   2 = Somewhat satisfied (0.50)
   3 = Completely satisfied (0.75)
   4 = More than satisfied (1.00)

7. Did the USFWS participate in the INRMP/Natural Resources Program annual review? (Y/N)

   Answers:
   N (0)
   Y (1.00)

8. Did the State participate in the INRMP/Natural Resources Program annual review? (Y/N)

   Answers:
   N (0)
   Y (1.00)

9. Did the NOAA/NMFS participate in the INRMP/Natural Resources Program annual review, if applicable? (Y/N/NA)

   Answers:
   N (0)
   Y (1.00)
   NA

10. To what extent has the INRMP/Natural Resources Program successfully supported other mission areas? (e.g. encroachment, BASH, range support, port operations, air operations, facilities management, etc.) (0-4)

    Answers:
    0 = Not supported (0)
    1 = Minimally supported (0.25)
    2 = Satisfactorily supported (0.50)

3 = Well supported (0.75)
4 = Very well supported (1.00)

The questions in the Partnership Effectiveness Focus Area are not equally weighted. Questions #5 and #7-9 are weighted the most at 1.1; questions #1-3 and #6 are weighted 1.0; and questions #4 and #10 are weighted the least at 0.8. In particular, questions #7-9 speak directly to stakeholder participation in the annual Sikes Act review of the INRMP and NR Program at each of the installations. Specifically, question #7 asks if the USFWS participated in the INRMP/Natural Resources Program annual review. Therefore, if the answer provided for question #7 is "Yes", then the score for that question is [1.00 x 1.1 = 1.1]. Likewise, if the answers to question #8 (regarding State Fish and Wildlife agency participation in the review) is "Yes" and question #9 (regarding NOAA/NMFS participation in the review, when applicable) is "Yes", then the score for each of these questions is [1.00 x 1.1 = 1.1]. Therefore, if our Sikes Act partners are actively engaged in the annual review of our INRMPs, then the response to these questions increases the potential for a higher overall score for this Focus Area, which may contribute to the Focus Area being coded as green.

Focus Area 5: Team Adequacy –

The purpose of this Focus Area is to assess the effectiveness and adequacy of the Navy natural resources team in accomplishing the goals and objectives of the INRMP and Natural Resources Program at each installation. Team refers to the Navy staff only. The following questions [1out of 7 new in FY11] were asked.

1. Is there a Navy professional Natural Resources Manager assigned by the Installation Commanding Officer? (Y/N)

   Answers:
   N (0)
   Y (1.00)

2. Is there an on-site Navy professional Natural Resources Manager? (Y/N)

   Answers:
   N (0)
   Y (1.00)

3. Is HQ and Regional support adequate, e.g. reach back support for execution, policy support, etc.)? (0-4)

   Answers:
   0 = No support (0)
   1 = Minimal support (0.25)
   2 = Satisfactory support (0.50)
   3 = Well supported (0.75)
   4 = Very well supported (1.00)

4. Is there adequate Natural Resources staff to properly implement the INRMP goals and objectives? (Y/N)

   Answers:
   N (0)
   Y (1.00)

5. The team is enhanced by the use of contractors. (0-4)

   Answers:
   0 = Disagree (0)
   1 = Somewhat agree (0.25)
   2 = Neutral (0.50)
   3 = Agree (0.75)
   4 = Strongly Agree (1.00)

6. The team is enhanced by the use of volunteers. (0-4, NA)

   Answers:
   0 = Disagree (0)
   1 = Somewhat agree (0.25)
   2 = Neutral (0.50)
   3 = Agree (0.75)
   4 = Strongly Agree (1.00)
   NA

7. The Natural Resources team is adequately trained to accomplish its duties to ensure compliance. (0-4)

   Answers:
   0 = Disagree (0)
   1 = Somewhat agree (0.25)
   2 = Neutral (0.50)
   3 = Agree (0.75)
   4 = Strongly Agree (1.00)

The questions in the Team Adequacy Focus Area are not equally weighted by a value of 1. Questions #4 and #7 are weighted the most at 1.1; questions #1-3 are weighted 1.0; and questions # and #6 are weighted the least at 0.9. In particular, questions #4 and #7 speak directly to having sufficient NR staff and adequately trained NR staff to properly implement the INRMP goals and objectives at each of the installations. Therefore, if the answers to question #4 (regarding sufficient NR staff) is "Yes" and question #7 (regarding adequately trained NR staff) is "Yes", then the score for each of these questions is [1.00 x 1.1 = 1.1]. Therefore, the likelihood of getting a higher overall score for this Focus Area increases if there is sufficient NR staff that is adequately trained at the installation, which may contribute to the Focus Area being coded as green.

Focus Area 6: INRMP Project Implementation –

The purpose of this Focus Area is to assess how the goals and objectives of the INRMP have been met through the projects implemented during the previous fiscal year. Projects were selected from a list of EPRWeb projects and evaluated based on the type of funding received, the status of the project, and whether projects realized their intended goals. In addition, benefits to ecosystem integrity or a listed species, previously identified as a part of the installation, were noted for each project, if applicable. The following questions [9 out of 10 new in FY11] were asked for each project identified as being implemented during FY11 at each installation.

1. Is project accomplishment on schedule? (Y/N)

   Answers:
   N (0)
   Y (1.00)

2. What is the Project Status? (0,1)

   Answers:
   0= On-Hold; Funds Not Yet Received (0)
   1= In EPRWeb; In POM; Emergent; Funding Received; SOW Prepared; Awarded/Executed; Now In-Progress; Completed (1.00)

3. Which Natural Resources Program Area was most benefitted from the project? (0,1)

   Answers:
   0=None (0)
   1= Flora; Fauna; Habitat; At Sea; INRMP; Listed Species; Wetlands; Invasives; Soil; Forestry; Outdoor Recreation; Training; Other NR Requirements (Misc) (1.00)

4. The project design met the goals and objectives of the INRMP. (0-4)

   Answers:
   0 = Disagree (0)
   1 = Neither agree nor disagree (0.25)
   2 = Somewhat Agree (0.50)
   3 = Fully Agree (0.75)
   4 = Strongly Agree (1.00)

The questions in the INRMP Project Implementation Focus Area are equally weighted by a value of 1. In general, these questions are intended to evaluate the status of INRMP project implementation. Because there are some many factors outside the control of the NR program manager, it is difficult to score this Focus Area. It wouldn't be fair to penalize the NR program manager because many times the implementation status is due to a lack of funding or delays in execution. As long as the NR program manager has done their part in getting projects POMed and designed to meet the goals and objectives of the INRMP, then this should be reflected in the

score for this Focus Area. For example, if the answer to question #2 (regarding status of the project) is "In EPRWeb; In POM; Emergent; Funding Received; SOW Prepared; Awarded/Executed; Now In-Progress; or Completed" and question #4 (regarding project design) is "Strongly Agree", then the score for each of these questions is [1.00 x 1 = 1.00]. Therefore, the likelihood of getting a higher overall score for this Focus Area increases, which may contribute to the Focus Area being coded as green.

Focus Area 7: INRMP Impact on Installation Mission –

This Focus Area is designed to measure the level to which existing natural resource compliance requirements and associated actions support the installation's ability to sustain the current operational mission. Per the Sikes Act, the goals and objectives of an INRMP should achieve no net loss of the mission at an installation. The following questions [0 are new in FY11] were asked.

1. Has Coordination between natural resources staff and other installation departments and military staff been successful/effective? (0-4)

   Answers:
   0 = No coordination (0)
   1 = Minimal coordination (0.25)
   2 = Satisfactory coordination (0.50)
   3 = Effective coordination (0.75)
   4 = Highly effective coordination (1.00)

2. To what extent has the INRMP successfully supported other mission areas? (e.g. encroachment, BASH, range support, port operations, air operations, facilities management, etc.) (0-4)

   Answers:
   0 = Not supported (0)
   1 = Minimally supported (0.25)
   2 = Satisfactorily supported (0.50)
   3 = Well supported (0.75)
   4 = Very well supported (1.00)

3. To what extent has there been a net loss of training lands or mission-related operational/training activities? (0-4)

   Answers:
   0 = Mission is fully impeded; training activities cannot be conducted (0)
   1 = Mission/Training activities are somewhat impeded with workarounds (0.25)
   2 = Neutral (0.50)
   3 = No loss occurred (0.75)
   4 = Mission has seen benefits (1.00)

4. Does the Natural Resource program effectively consider current mission requirements? (0-4)

   Answers:
   0: Strongly disagree
   1: Disagree
   2: Neutral
   3: Agree
   4: Strongly Agree

The questions in the INRMP Impact on Installation Mission Focus Area are equally weighted by a value of 1. In general, these questions are intended to evaluate the effectiveness of the installation's NR program on mitigating and/or avoiding natural resource impacts on the installation's military mission. For example, if the answer to question #3 is "Mission has seen benefits, then the score for this question is [0.75 x 1 = 0.75]. Therefore, the INRMP satisfies a fundamental requirement of the Sikes Act, no net loss of the mission, contributing to a higher overall score for this Focus Area, which may contribute to the Focus Area being coded as green.

Summary of INRMP and Sikes Act Questions

In addition to the NR Metrics questions, some additional questions were asked to assess the status of INRMPs at installations. In general, if an installation is reported as having significant natural resources, then it was counted as an installation requiring an INRMP. Per the DoDI 4715.03, significant natural resources are defined as resources identified as having special importance to an installation and/or its ecosystem. Natural resources may be significant on a local, regional, national, or international scale. All threatened, endangered and at-risk species are significant natural resources that normally require an INRMP. Installations that actively manage fish and wildlife, forestry, vegetation and erosion control, agricultural outleasing or grazing, or wetlands protection should be evaluated for significance, but normally will require an INRMP. An evaluation for significance should also consider the degree of active management, special natural features, aesthetics, outdoor recreational opportunities, and the ecological context of the installation. There are 73 Navy installations requiring INRMPs, all of which currently have an INRMP.

However, not all Navy installations with an INRMP have a compliant INRMP. A compliant INRMP is defined as "a complete plan that meets the purposes of the Sikes Act (§101(a)(3)(A-C)), contains the required plan elements (§101(b)(1)(A-J)), and has been reviewed for operation and effect within the past 5 years (§101(2)(b)(2))." Therefore, a compliant INRMP must be Sikes Act compliant and less than 5 years old. If the INRMP is greater than 5 years old, then it must have undergone a review for operation and effect within the past 5 years. A review for operation and effect is defined as "a comprehensive review by the Parties, at least once every 5 years, to evaluate the extent to which the goals and objectives of the INRMP continue to meet the purpose of the Sikes Act, which is to carry out a program that provides for the conservation and rehabilitation of natural resources on military installations. The outcome of this review will assist in determining if the INRMP requires a revision (§101(f)(1)(A)). (CNO-N45) The annual review can qualify for the 5-year review for operation and effect, which is legally required by the Sikes Act, if mutually agreed upon by both partners (i.e. USFWS and State)." According to this

definition, there are 41 compliant INRMPs and 32 noncompliant INRMPs. But, if you qualify the annual review of the Natural Resource Program/INRMP with the USFWS and State Fish and Wildlife agencies as a sufficient review for operation and effect, then the total number of noncompliant INRMPs decreases to only 4. Therefore, the remaining 28 INRMPs could be considered partially compliant because they meet the condition of a noncompliant INRMP, but the USFWS participated in the annual NR Metrics review during the last reporting period (FY11).

INRMP implementation refers to projects that meet the goals and objectives of the INRMP. In FY11, total funds expensed toward implementing all 73 INRMPs equal $29,475,223. These funds include O&MN, MIS, Ag-Outlease, Forestry Reserve Account, Legacy, and Special Projects funds. Of this, $4,502,462 was spent on federally listed species, which accounts for approximately 15% of the total INRMP implementation costs. There are 75 critical habitat designations across all Navy installations, with 37 of these granted critical habitat designation exclusion under the ESA (Sec. 4. (a)), per NDA 2004. Further, 31 of those critical habitat designation exclusions were granted due to an INRMP.

Further Consideration

Given the results of the FY11 NR Metrics, it appears that there may be a discrepancy between the health of the NR programs across the Navy and the POM-14 budget request. It is important to consider that the NR Metrics were designed to be subjective. So, it is difficult to try and interpret the answers provided to the NR Metrics in a way that will help justify something objective, like the budget. The two are not directly correlated. The POM-14 budget request is forward looking, e.g. what is needed to execute projects associated with INRMPs in the out-years. On the other hand, the NR Metrics reflect the past execution and implementation of INRMPs.

However, the increased request for funds may reflect the fact that many of the INRMPs need to be revised. According to this year's DEPARC data, there are 28 partially compliant INRMPs and 4 noncompliant INRMPs. Many of these may require a revision. There are likely many new projects associated with these noncompliant and partially compliant INRMPs that need to be implemented; hence, the increased request for funds.

Therefore, INRMP project tables should really be compared to projects in POM-14. This will highlight if there are still projects in INRMPs that need to be implemented, hence the INRMPs are not being successfully implemented and the goals and objectives of the INRMP may not be met. In the future, consideration should be given to framing questions in the INRMP Project Implementation Focus Area in a manner that asks about INRMP Implementation tables, instead of EPR Execution Reports. If the objective is to evaluate how well the current INRMP is being implemented and meeting the goals of the NR Program, then this is what should be driving requests for funds. The annual funds expensed will continue to be pulled from the EPR Execution Report.

Appendix F: Pesticides Approved for Use at NAVWPNSTA Seal Beach

This Page Intentionally Blank

Appendix F: Pesticides Approved for Use at NAVWPNSTA Seal Beach

Navy Online Pesticide Reporting System

Pesticides approved for Seal Beach, NWS

Robert Schallmann

11/20/2013 12:46

Pesticide Type	Formulation	Pesticide Name	Active Ingredient	EPA Number
Algaecide	Dust/Granule*	CUTRINE PLUS	COPPER SULFATE	8959-12
Algaecide/Fungicide	Granules/Pellets	Cabrio EG	Pyraclostrobin	7969-187
Algaecide/Fungicide	Dry Flowable	CAPTAN 80	CAPTAN 78.2%	66222-58-66330
Algaecide/Fungicide	Liquid*	SNIPER	BIFENTHRIN	34704-858
Fumigant	Fumigant - Solid	FUMITOXIN TABLETS	ALUMINUM PHOSPHIDE	72959-1
Fumigant	Liquid*	Pic-Clor 60EC	1,3 Dichloropropene / Chloropicrin	8536-43-11220
Fumigant	Fumigant - Liquid	VIKANE GAS FUMIGANT	SULFURYL FLORIDE	62719-4
Fungicide	Solution	ABOUND	AZOXYSTROBIN	100-1098
Fungicide	Suspension Concentrate	BADGE SC 20%	COPPER 20%	80289-3
Fungicide	Emulsifiable Concentrate	BANNER MAXX	PROPICONAZOLE	100-741
Fungicide	Liquid*	BOTRAN 5F	2,6-DICHLORO-4-NITROANILINE	10163-226
Fungicide	Liquid*	BRAVO WS	CHLOROTHALONIL	50534-188-100
Fungicide	Liquid*	CAPTEC 4L 37.4%	CAPTAN 37.4%	66330-239
Fungicide	Wettable Powder	CHAMPION WP	COPPER	55146-1
Fungicide	Liquid*	CUEVA 10%	COPPER OCTANOATE 10%	67701-2-70051
Fungicide	Solution	DACONIL WEATHER-STIK	CHLOROTHALONIL	50534-209
Fungicide	Granules/Pellets	DIPEL DF	BACILLUS THURINGIENSIS	73049-39
Fungicide	Granules/Pellets	DOUBLE NICKEL 55	Bacillus amyloliquefaciens strain D747*	70051-108
Fungicide	Wettable Granules*	ELEVATE 50WDG 50%	fenhexamid	66330-35
Fungicide	Suspension Concentrate	Fontelis	penthiopyrad	352-834
Fungicide	Dispersible Granules	HERITAGE	AZOXYSTROBIN	100-1093
Fungicide	Wettable Granules*	Insignia	Pyraclostrobin	7969-184
Fungicide	Solution	Instrata	Chlorothalonil / Propiconazole / Fludioxonil	100-1231
Fungicide	Solution	KALIGREEN 82%	Carbonic acid, monopotassium salt	70231-1
Fungicide	Concentrate	METTLE 125 ME	TETRACONAZOLE	80289-00008-AA-00000
Fungicide	Flowable Powder*	MILSTOP 85%	POTASSIUM BICARBONATE	70870-1

Appendix F: Pesticides Approved for Use at NAVWPNSTA Seal Beach

Navy Online Pesticide Reporting System

Pesticides approved for Seal Beach, NWS

Robert Schallmann

11/20/2013 12:46

Pesticide Type	Formulation	Pesticide Name	Active Ingredient	EPA Number
Fungicide	Concentrate	OXIDATE	HYDROGEN DIOXIDE	70299-00002-AA-00000
Fungicide	Dry Flowable	PRISTINE FUNGICIDE	BOSCALID+PYRACLOSTROBIN	07969-00199-AA-00000
Fungicide	Liquid*	QUADRIS 22.9%	AZOXYSTROBIN 22.9%	100-1098
Fungicide	Liquid*	Quintec 23.1%	Quinoxyfen	62719-375
Fungicide	Granules/Pellets	RALLY 40W	MYCLOBUTANIL	62719-410
Fungicide	Emulsifiable Concentrate	RIDOMIL GOLD EC	METALAXYL-M	100-801
Fungicide	Liquid*	SCALA SC 54.6%	PYRIMETHANIL	264-788
Fungicide	Wettable Powder	SERENADE	Bacillus subtilis QST 713 strain	69592-7
Fungicide	Wettable Powder	TOPSIN M TURF AND ORNAMENTALS FUNGICIDE	THIOPHANATE-METHYL	4581-288
Herbicide	Granules/Pellets	Alligare SFM 75	Sulfometuron methyl	81927- 26
Herbicide	Solution	Aquamaster / RODEO	Glyphosate	524-343
Herbicide	Solution	BARRICADE 4FL	Prodiamine	100-1139
Herbicide	Liquid*	BASAGRAN 44%	SALT OF BENTAZON	7969-45-66330
Herbicide	Solution	BASAGRAN HERBICIDE	BENTAZON	7969-45
Herbicide	Liquid*	CREDIT 41 EXTRA	GLYPHOSATE	71368-20
Herbicide	Suspension Concentrate	Cutrine-Plus	Copper Ethanolamine	8959-10
Herbicide	Dry Flowable	DEVRINOL 50 DF	napropamide	70506-38
Herbicide	Liquid*	Dual Magnum	S-metolachlor	100-816
Herbicide	Solution	GARLON 3A	TRICLOPYR	62719-37
Herbicide	Solution	Glyphosate 4	Glyphosate	73220-6-74477
Herbicide	Liquid*	GLYPHOSATE PRO 4	GLYPHOSATE	72112-4
Herbicide	Liquid*	GOAL 2XL 22.3%	oxyfluorfen	62719- 424
Herbicide	Liquid*	GRAMOXONE	PARAQUAT DICHLORIDE	100-1074
Herbicide	Solution	Habitat	Imazapyr	241-426
Herbicide	Dust/Granule*	KARMEX DF	DIURON	352-508
Herbicide	Dust/Granule*	KROVAR I DF HERBICIDE	BROMACIL / DIURON	352-505

Appendix F: Pesticides Approved for Use at NAVWPNSTA Seal Beach

Navy Online Pesticide Reporting System

Pesticides approved for Seal Beach, NWS

Robert Schallmann

11/20/2013 12:46

Pesticide Type	Formulation	Pesticide Name	Active Ingredient	EPA Number
Herbicide	Solution	Oryzalin 4 Pro	Oryzalin	72167-15-74477
Herbicide	Emulsifiable Concentrate	POAST HERBICIDE	SETHOXYDIM	7969-58
Herbicide	Emulsifiable Concentrate	Prosecutor Pro	Glyphosate	524-536-10404
Herbicide	Emulsifiable Concentrate	Ranger Pro	Glyphosate	524-517
Herbicide	Solution	Roundup Pro Concentrate	Glyphosate	524-529
Herbicide	Solution	SFM 75	Sulfometuron methyl	81927-26
Herbicide	Solution	Speed Zone	Carfentrazone-ethyl / 2,4-D / Mecoprop-p acid / Dicamba	2217-833
Herbicide	Emulsifiable Concentrate	Speed Zone	2,4-D / Dicamba / Mecoprop-p acid / Carfentrazone-ethyl	2217-835
Herbicide	Aqueous Solution*	Surflan AS	oryzalin	70506-44
Herbicide	Dry Flowable	Telar xp	chlorsulfuron	352-654
Insect Growth Regulator	Briquets	ALTOSID BRIQUETS	METHOPRENE	2724-375-64833
Insect Growth Regulator	Granules/Pellets	ALTOSID PELLETS	METHOPRENE	2724-448
Insect Growth Regulator	Wettable Powder	DIMILIN 25W 25%	DIFLUBENZURON	400-465
Insecticide	Wettable Powder	ACRIMITE 50WS	Bifenazate	400-503
Insecticide	Granules/Pellets	ACTARA	THIAMETHOXAM	100-938
Insecticide	Liquid*	Admire Pro / Gaucho 550	Imidacloprid	264-827
Insecticide	Gel	Advion Ant Gel	Indoxacarb	352-746
Insecticide	Solution	AGNIQUE MMF	POE isooctadecanol	53263-28
Insecticide	Emulsifiable Concentrate	AGRIMEK	Abamectin	100-898
Insecticide	ULV Concentrate	AquaAnvil	Sumithrin / Piperonyl Butoxide	1021-1807-8329
Insecticide	Solution	ASANA XL	ESFENVALERATE	352-515
Insecticide	Concentrate	AZERA	PYRETHRIN / AZADIRACHTIN	1021-1872
Insecticide	Solution	CORAGEN	CHLORANTRANILPROLE	352-729
Insecticide	Concentrate	DANITOL 2.4 EC	FENPROPATHRIN	59639-00035-AA-00000
Insecticide	Dust	DELTA DUST	Deltamethrin	432-772

Appendix F: Pesticides Approved for Use at NAVWPNSTA Seal Beach

Navy Online Pesticide Reporting System

Pesticides approved for Seal Beach, NWS

Robert Schallmann

11/20/2013 12:46

Pesticide Type	Formulation	Pesticide Name	Active Ingredient	EPA Number
Insecticide	Solution	Dimethoate	Dimethoate	34704-207
Insecticide	Flowable Powder*	ENTRUST 80%	SPINOSAD	62719-00282
Insecticide	Emulsifiable Concentrate	FujiMite	fenpyroximate 5%	71711-19
Insecticide	Liquid*	GEMSTAR LC .64%	HELICOVERPA	70051-45
Insecticide	Wettable Powder	Grandevo	chromobacterium subtsugae strain	84059-17
Insecticide	Liquid*	INTREPID 2F 22.6%	METHOXYFENOZIDE	62719-442
Insecticide	Granules/Pellets	JAVELIN WG	BACILLUS THURINGIENSIS	70051-66
Insecticide	Emulsifiable Concentrate	Lorsban-4E	CHLORPYRIFOS	62719-220
Insecticide	Solution	Masterline	Bifenthrin	73748-7
Insecticide	Gel	MAXFORCE FC	FIPRONIL	64248-14
Insecticide	Gel	MAXFORCE FC ROACH BAIT GEL	FIPRONIL	432-1259
Insecticide	Granules/Pellets	Maxforce Fine Granule Insect Bait	hydramethylnon	432-1262
Insecticide	Wettable Powder	Merit 75 WSP	Imidacloprid	432-1318
Insecticide	Emulsifiable Concentrate	MOVENTO	SPIROTETRAMAT	264-1050
Insecticide	Emulsifiable Concentrate	MUSTANG 1.5	ZETA-CYPERMETHRIN	279-3126
Insecticide	Tablets	Natular XRT	Spinosad	8329-84
Insecticide	Emulsifiable Concentrate	OBERON 2SC	SPIROMESIFEN	264-719
Insecticide	Solution	ORTHENE 75 S SOLUBLE POWDER	ACEPHATE	239-2418
Insecticide	Emulsifiable Concentrate	PROAXIS	GAMMA-CYHALOTHRIN	74921-3
Insecticide	Liquid*	PROAXIS 5.9%	GAMMA-CYHALOTHRIN	74921-3-34704
Insecticide	Solution	PROVADO 1.6	IMIDACLOPRID	264-763
Insecticide	Aerosol	PT Microcare	Piperonyl butoxide, n-octyl bicycloheptene dicarboximide, pyrethrins / PIPERONYL BUTOXIDE / n-octyl bicycloheptene dicarboximide	499-381
Insecticide	Emulsifiable Concentrate	PYGANIC 1.4 EC	PYRETHRINS	1021-1771

Appendix F: Pesticides Approved for Use at NAVWPNSTA Seal Beach

Navy Online Pesticide Reporting System

Pesticides approved for Seal Beach, NWS

Robert Schallmann

11/20/2013 12:46

Pesticide Type	Formulation	Pesticide Name	Active Ingredient	EPA Number
Insecticide	Liquid*	PYRELLIN EC .6%	Pyrethrins, rotenone, cube resins / Rotenone / Other Resins	30573-2
Insecticide	Emulsifiable Concentrate	RADIANT	SPINETORAM	62719-545
Insecticide	Dispersible Granules	Savey 50DF	hexythiazox	10163-250
Insecticide	Liquid*	SERENADE ASO 1.34%	BACILLUS SUBTILIS QST 713	69592-12
Insecticide	Granules/Pellets	SEVIN 5 BAIT	CARBARYL, AMYL ACETATE	2935-366
Insecticide	Emulsifiable Concentrate	SEVIN SL	CARBARYL	432-1227-10404
Insecticide	Liquid*	SIL-MATRIX 29%	POTASSIUM SILICATE	82100-1
Insecticide	Solution	SUCCESS	SPINOSAD	62719-292
Insecticide	Emulsifiable Concentrate	TalstarOne / Talstar P	Bifenthrin	279-3206
Insecticide	Suspension Concentrate	Temprid SC	Cyfluthrin / Imidacloprid	432-1483
Insecticide	Suspension Concentrate	Termidor SC	Fipronil	7969-210
Insecticide	Granules/Pellets	Vectobac G	BACILLUS THURINGIENSIS	73049-10
Insecticide	Concentrate	VETICA	FLUBENDIAMIDE / BUPROFEZIN	71711-32
Insecticide	Emulsifiable Concentrate	VYDATE L	OXAMYL	352-372
Insecticide	Liquid*	WARRIOR 11.4%	Lambda-cyhalothrin	100-1112
Insecticide	Aerosol	Wasp-Freeze	D-Trans Allethrin, Phenothrin / Phenothrin	499-362
Insecticide	Emulsifiable Concentrate	Wisdom TC Flowable	Bifenthrin	5481-520
Insecticide/Fungicide	Granules/Pellets	COSAVET DF	sulfur	70905-1
Insecticide/Fungicide	Liquid*	Debug turbo 65.8%	Oils Margosa	70310-5
Plant Growth Regulator	Emulsifiable Concentrate	Primo Maxx	Trinexapac-ethyl	100-937
Plant Growth Regulator	Emulsifiable Concentrate	Proxy	Ethephon	432-1230
Rodenticide	Bait - Solid	CONTRAC ALL WEATHER BLOX	BROMADIOLONE	12455-79
Rodenticide	Bait - Solid	GENERATION MINI BLOCKS	DIFETHIALONE	7173-218
Rodenticide	Bait - Solid	Gopher Getter AG Bait	strychnine	36029-7
Rodenticide	Bait - Solid	P.C.Q. PELLETED RODENT BAIT	Diphacinone	12455-50003

Appendix F: Pesticides Approved for Use at NAVWPNSTA Seal Beach

Navy Online Pesticide Reporting System

Pesticides approved for Seal Beach, NWS

Robert Schallmann

11/20/2013 12:46

Pesticide Type	Formulation	Pesticide Name	Active Ingredient	EPA Number
Rodenticide	Bait - Solid	PCQ	Diphacinone	12455-81
Rodenticide	Bait - Solid	RAMIK GREEN	Diphacinone	2393-498
Rodenticide	Bait - Solid	WILCO GOPHER GETTER	STRYCHNINE	36029-1

Appendix G: Land Leases, Easements, Outpermits, and Use Agreements Granted by the U.S. Navy

Table G-1 Land Leases, Easements, Outpermits, and Use Agreements Granted by the U.S. Navy

Type of Agreement	Area (if available)	Type of Agreement	Area (if available)
Leases		Use Agreements	
Sea Air Federal Credit Union	0.18 acres	Federal Aviation Administration Department of Transportation	0.25 acres
Agricultural Lease Parcel 4A01	970.8 acres	U.S. Coast Guard (Target Range in harbor)	
Agricultural Lease Parcel 4B01	1629 acres	Southern California Edison Company (Utility Planning Agreement)	
North Farm	1144.44 acres	Refuge Manager, USFWS (Interdepartmental Support Agreement)	
South Farm	1628.32 acres	Easements	
Orange County Environmental Management (license)	80 sq. ft.	City of Seal Beach	10.55 acres
Southern California Edison Company		State of California Division of Highways	28.25 acres
U.S. Submarine Vet Mem (license)	0.25 acres	City of Westminster	0.33 acres
City of Westminster (license)		Orange County Sanitation District	2.85 acres
Orange County Water District	100 sq. ft.	Southern California Edision	0.04 acres
Outpermits		Orange County Flood Control District	124.85 acres
City of Seal Beach	0.003 acres	County of Orange	2.24 acres
Southern Counties Gas Company of California	0.01 acres	Fred H. Bixby Ranch	5.91 acres
Breitburn Energy Corporation	75.90 acres	City of Los Angeles (Haines Generation Plant)	not in effect
		Southern Pacific Electric Company	
		Breitburn Energy Corporation	111.54 acres

This Page Intentionally Blank

Appendix H: Species List

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
TERRESTRIAL SPECIES			
Insects			
Apidae			12
Canaceidae			12
Carabids	predaceous ground beetles		10
Ceratoopogonidae			12
Chalcioidae			12
Chironomidae			12
Cicindela trifasciata sigmoides			12
Cicindelidae			12
Clunioninae			12
Coccoidea			12
Collembola			12
Corixidae			12
Culicoides sp.			12
Delphacidae			12
Dolichopodidae			12,10
Dolichopodids	long-legged flies		10
Embioptera			12
Ephemeroptera			12
Ephydridae			12,10
Ephydrids	shore flies		10
Eriococcidae			12
Formicidae			12
Heleidae			12
Hydraenidae			12
Hydrobaeninae			12
Panoquina errans	wandering skipper	CSC	6
Muscidae			12
Psocoptera			12
Psychodidae			12
Psyllidae			12
Scatopsidae			12
Staphylinidae			12,10
Staphylinids	rove beetles		10
Stratiomyidae			12
Syrphidae			12
Thysanoptera			12
Trichocorixa reticulata			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Amphibians			
Bufo boreas halophilus	California toad		
Hyla regilla	Pacific treefrog		5,6,10
Reptiles			
Sceloporus occidentalis	western fence lizard		5,6,10
Uta stansburiana	side-blotched lizard		5
Phrynosoma coronatum blainvillii	San Diego horned lizard	CSC	6,10
Gerrhonotus muliticarinatus	southern alligator lizard		6,10
Pituophis melanoleucus	gopher snake		6,10
Chelonia mydas	green sea turtle	FT	
Birds			
Anser albifrons frontalis	white-fronted goose		6,2*,10,11,12
Chen canagica	emperor goose		6,2,10
Chen caerulescens caerulescens	lesser snow goose		6,2,10,11,12
Branta bernicla	brant	CSC	5,6,9,2*,10,11,12
Branta canadensis	Canada goose		4,6,9,2,10,12
Cygnus columbianus	tundra swan		6,2*,10,11
Anas strepera strepera	gadwall		6,9,2,10
Anas penelope	Eurasian wigeon		7,2
Anas americana	American wigeon		4,5,6,9,2,10,11,12
Anas platyrhynchos platyrhynchos	mallard		4,5,6,9,2,10,11,12
Anas spp.	duck species		12
Anas discors	blue-winged teal		6,2,10,11,12
Anas crecca	green-winged teal		4,6,9,2,10,11,12
Anas cyanoptera septentrionalium	cinnamon teal		4,5,6,2,10,11,12
Anas clypeata	northern shoveler		4,6,9,2,10,11,12
Anas acuta	northern pintail		11
Aythya valisineria	canvasback		6,2,10
Aythya americana	redhead	CSC	2
Aythya collaris	ring-necked duck		2
Aythya marila	greater scaup		7,2,12
Aythya affinis	lesser scaup		4,5,6,9,2,10,11,12
Athya spp.	scaup species		12
Melanitta perspicillata	surf scoter		6,2,10,11,12
Melanitta fusca deglandi	white-winged scoter		6,2*,10,11
Clangula hyemalis	long-tailed duck		6,9,2*,10,11
Bucephala albeola	bufflehead		4,6,9,2,10,11,12
Bucephala clangula americana	common goldeneye		6,2,10,11,12
Mergus merganser americanus	common merganser		5,6,2,10,12
Mergus serrator	red-breasted merganser		4,6,9,2,10,11,12
Oxyura jamaicensis rubida	ruddy duck		4,5,6,9,2,10,11,12
Phasianus colchicus	ring-necked pheasant		6,2*,10,11
Gavia stellata	red-throated loon		7,2,12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Gavia arctica	Arctic loon		6,10,11
Gavia pacifica	Pacific loon		2
Gavia immer	common loon	CSC	6,2,10,11,12
Podilymbus podiceps podiceps	pied-billed grebe		4,5,6,9,2,10,11,12
Podiceps auritus cornutus	horned grebe		6,9,2,10,11,12
Podiceps nigricollis californicus	eared grebe		4,5,6,9,2,10,11,12
Aechmophorus occidentalis	western grebe		4,5,6,9,2,10,11,12
Aechmophorus clarkii	Clark's grebe		7,2,12
Fulmarus glacialis	northern fulmar		2*
Puffinus creatopus	pink-footed shearwater	FSC	2*
Puffinus griseus	sooty shearwater		2*
Puffinus opisthomelas	black-vented shearwater	FSC	2
Oceanodroma melania	black storm-petrel	CSC	2*
Oceanodroma microsoma	least storm-petrel		2*
Pelecanus erythrorhynchos	American white pelican	CSC	6,2,10,11,12
Pelecanus occidentalis californicus	California brown pelican	SD, FD, CFP	4,5,6,9,2,10,11,12
Phalacrocorax penicillatus	Brandt's cormorant		6,2,10,11
Phalacrocorax auritus albociliatus	double-crested cormorant		4,6,9,2,10,11,12
Phalacrocorax pelagicus	pelagic cormorant		2
Botaurus lentiginosus	American bittern		6,2,10,11
Ardea herodias wardi	great blue heron		4,5,6,9,2,10,11,12
Ardea alba egretta	great egret		4,5,6,9,2,10,11,12
Egretta thula thula	snowy egret		4,5,6,9,2,10,11,12
Egretta tricolor	tricolored heron		11
Egretta caerulea	little blue heron		6,2*,10,11
Egretta tricolor	tricolored heron		10
Egretta rufescens	reddish egret		7,2*,12
Bubulcus ibis	cattle egret		2
Butorides virescens	green heron		2,11
Butorides striatus	striated heron		5,6,10,12
Nycticorax nycticorax hoactli	black-crowned night heron		4,6,2,10,11,12
Plegadis chihi	white-faced ibis		6,2,10,11
Cathartes aura	turkey vulture		3,4,5,6,9,2,10,11,12
Phoenicopterus ruber	greater flamingo		10
Pandion haliaetus carolinensis	osprey		3,4,6,9,2,10,11,12
Elanus leucurus	white-tailed kite	FSC, CFP	3,4,5,6,7,9,10,2,11, 12
Circus cyaneus hudsonius	northern harrier	CSC	3,4,6,9,2,10,11,12
Accipiter striatus velox	sharp-shinned hawk		3,2
Accipiter cooperii	Cooper's hawk		3,6,2,10
Buteo lineatus elegans	red-shouldered hawk		3,6,2,10,11
Buteo swainsoni	Swainson's hawk	ST	3,2
Buteo jamaicensis	red-tailed hawk		3,4,5,6,9,2,10,11,12
Buteo regalis	ferruginous hawk		3,4,6,9,2,10,12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Buteo lagopus	rough-legged hawk		3,6,2*,10
Aquila chrysaetos canadensis	golden eagle	CFP, BEPA	3,6,2*,10
Falco sparverius	American kestrel		3,4,5,6,9,2,10,11,12
Falco columbarius	merlin		3,6,2,10,12
Falco peregrinus anatum	American peregrine falcon	FD, FSC, SE, CFP	3,6,2,12
Falco mexicanus	prairie falcon		3,6,2,10,12
Rallus longirostris levipes	light-footed clapper rail	SE, FE, CFP	6,2,10,11,12
Rallus limicola limicola	Virginia rail		6,2,10
Porzana carolina	sora		6,2,10,11
Fulica americana americana	American coot		4,5,6,9,2,10,11,12
Pluvialis squatarola	black-bellied plover		4,5,6,9,2,10,11,12
Pluvialis dominica	American golden plover		6,10,12
Pluvialis fulva	Pacific golden plover		7,9,2
Charadrius alexandrinus nivosus	western snowy plover	FT, CSC	6,2,10,11,12
Charadrius semipalmatus	semipalmated plover		5,9,2,10,11,12
Charadrius vociferus vociferus	killdeer		4,5,6,9,2,10,11,12
Charadrius montanus	mountain plover	FC, CSC	4,6,2,10,11
Haematopus bachmani	black oystercatcher	FSC	2
Himantopus mexicanus mexicanus	black-necked stilt		5,6,2,10,11,12
Recurvirostra americana	American avocet		4,5,6,9,2,10,11,12
Tringa melanoleuca	greater yellowlegs		4,5,6,9,2,10,11,12
Tringa flavipes	lesser yellowlegs		5,6,9,2,10,11
Tringa spp.	yellowlegs species		12
Tringa semipalmata	willet		4,5,6,9,2,10,11,12
Tringa incana	wandering tattler		6,2,10,11
Actitis macularius	spotted sandpiper		6,2,10,11,12
Numenius phaeopus hudsonicus	whimbrel	FSC	6,2,10,11,12
Numenius americanus	long-billed curlew	FSC	4,5,6,9,2,10,11,12
Limosa fedoa	marbled godwit	FSC	4,5,6,9,2,10,11,12
Arenaria interpres	ruddy turnstone		4,6,9,2,10,11,12
Arenaria melanocephala	black turnstone		6,2,10,11
Aphriza virgata	surfbird		2
Calidris canutus	red knot	FSC	5,6,2,10,11,12
Calidris alba	sanderling		5,6,2,10,11,12
Calidris sp.	sandpiper species		4,9,12
Calidris mauri	western sandpiper		4,6,9,2,10,11,12
Calidris minutilla	least sandpiper		4,6,9,2,10,11,12
Calidris bairdii	Baird's sandpiper		7,2
Calidris melanotos	pectoral sandpiper		6,2,10
Calidris alpina pacifica	dunlin		4,5,6,9,2,10,11,12
Limnodromus sp.	dowitcher species		4,9,12
Limnodromus griseus	short-billed dowitcher	FSC	5,6,9,2,10,11
Limnodromus scolopaceus	long-billed dowitcher		5,6,2,10,11

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Gallinago gallinago delicata	common snipe		4,6,2,10,11
Phalaropus tricolor	Wilson's phalarope		6,2,10,11
Phalaropus lobatus	red-necked phalarope		6,2,10,11,12
Phalaropus fulicarius	red phalarope		6,2,10,11
Larus spp.	gull specis		12
Larus philadelphia	Bonaparte's gull		6,2,10,11,12
Larus heermanni	Heermann's gull		6,2,10,11
Larus canus brachyrhynchus	mew gull		6,2,10,12
Larus delawarensis	ring-billed gull		4,5,6,9,2,10,11,12
Larus californicus	California gull		6,9,2,10,11,12
Larus argentatus smithsonianus	herring gull		6,9,2,10,11,12
Larus glaucescens	glaucous-winged gull		6,2,10,12
Larus occidentalis	western gull		5,6,9,2,10,11,12
Rissa tridactyla pollicaris	black-legged kittiwake		6,2*,10,11
Hydroprogne caspia	Caspian tern		5,6,9,2,10,11,12
Thalasseus maximus	royal tern		6,9,2,10,11,12
Thalasseus elegans	elegant tern		5,6,2,10,11,12
Sterna hirundo hirundo	common tern		6,2,10,11,12
Sterna forsteri	Forster's tern		4,5,6,9,2,10,11,12
Sternula antillarum browni	California least tern	SE, FE, CFP	5,6,2,10,11,12
Chlidonias niger surinamensis	black tern	FSC, CSC	6,2,10
Rynchops niger niger	black skimmer	FSC, CSC	6,2,10,12
Stercorarius pomarinus	pomarine jaeger		2
Stercorarius parasiticus	parasitic jaeger		6,2,10,11
Uria aalge	common murre		2*
Ptychoramphus aleuticus	Cassin's auklet	FSC, CSC	2*
Cerorhinca monacerata	rhinoceros auklet		2*
Columba livia	rock pigeon	E	4,5,6,7,9,2,10,12
Streptopelia chinensis	spotted dove	E	6,2,10
Zenaida macroura marginella	mourning dove		4,5,6,9,2,10,11,12
Columbina passerina	common ground-dove		2
Tyto alba pratincola	common barn owl		3,5,6,2,10,11
Bubo virginianus	great horned owl		3,6,2,10
Athene cunicularia hypugaea	burrowing owl	FSC, CSC	3,4,5,6,2,10,11
Asio flammeus flammeus	short-eared owl	CSC	3,6,2,10,11
Chordeiles acutipennis	lesser nighthawk		2*
Chaetura vauxi	Vaux's swift	CSC	12
Aeronautes saxatalis	white-throated swift		6,2,10
Archilochus alexandri	black-chinned hummingbird		2
Calypte anna	Anna's hummingbird		4,5,6,2,10,12
Calypte costae	Costa's hummingbird	FSC	2
Selasphorus rufus	rufous hummingbird		2
Selasphorus sasin	Allen's hummingbird	FSC	7,2

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Ceryle alcyon	belted kingfisher		4,6,9,2,10,11,12
Sphyrapicus ruber	red-breasted sapsucker		2
Picoides pubescens turati	downy woodpecker		4,2
Colaptes auratus	northern flicker		4,6,2,10,11
Contopus sordidulus	western wood-pewee		2
Empidonax hammondii	Hammond's flycatcher		2
Empidonax difficilis	Pacific-slope flycatcher		2
Sayornis nigricans semiatra	black phoebe		4,5,6,9,2,10
Sayornis saya	Say's phoebe		4,6,9,2,10,12
Myiarchus cinerascens cinerascens	ash-throated flycatcher		6,2,10,11
Tyrannus vociferans vociferans	Cassin's kingbird		6,2,10,12
Tyrannus verticalis	western kingbird		5,6,2,10,11,12
Lanius ludovicianus	loggerhead shrike	FSC, CSC	4,5,6,9,2,10,11,12
Vireo gilvus	warbling vireo		2
Aphelocoma californica	western scrub-jay		2
Corvus brachyrhynchos hesperis	American crow		4,5,6,2,10,11,12
Corvus corx clarionensis	common raven		5,6,2,10,12
Eremophila alpestris	horned lark		4,5,6,2,10,11,12
Tachycineta bicolor	tree swallow		6,2,10,12
Tachycineta thalassina thalassina	violet-green swallow		7,2
Stelgidopteryx serripennis	northern rough-winged swallow		12
Stelgidopteryx ruficollis	rough-winged swallow		6,2,10
Riparia riparia	bank swallow	ST	12
Petrochelidon pyrrhonota tachina	cliff swallow		5,6,2,10,11,12
Hirundo rustica erythrogaster	barn swallow		5,6,2,10,11,12
Salpinctes obsoletus	rock wren		2*
Thryomanes bewickii	Bewick's wren		2
Troglodytes aedon parkmanii	house wren		4,2
Cistothorus palustris	marsh wren		4,6,2,10,11,12
Regulus calendula	ruby-crowned kinglet		2
Polioptila caerulea	blue-gray gnatcatcher		2
Sialia mexicana	western bluebird		2
Sialia currucoides	mountain bluebird		2
Catharus ustulatus	Swainson's thrush		2
Catharus guttatus	hermit thrush		2
Turdus migratorius	American robin		2
Mimus polyglottos polyglottos	northern mockingbird		4,5,6,2,9,10,11,12
Oreoscoptes montanus	sage thrasher	FSC	7,2
Sturnus vulgaris	European starling	E	4,5,6,2,9,10,11,12
Anthus rubescens pacificus	American pipit		4,6,9,2,10,11,12
Bombycilla cedrorum	cedar waxwing		2
Phainopepla nitens	phainopepla		2
Vermivora celata	orange-crowned warbler		4,2,12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Vermivora ruficapilla	Nashville warbler		2
Dendroica petechia	yellow warbler	FSC, CSC	6,2,10,11
Dendroica coronata	yellow-rumped warbler		4,6,9,2,10,11,12
Dendroica nigrescens	black-throated gray warbler		4,6,2,10
Dendroica townsendi	Townsend's warbler		6,2,10
Dendroica occidentalis	hermit warbler		2
Oporornis tolmiei	MacGillivray's warbler		2
Geothlypis trichas	common yellowthroat		4,5,6,2,10,11,12
Wilsonia pusilla	Wilson's warbler		6,2,10,11,12
Piranga ludoviciana	western tanager		2
Pipilo maculatus	spotted towhee		2
Pipilo crissalis	California towhee		4,2
Spizella passerina	chipping sparrow		4,2
Spizella breweri	Brewer's sparrow	FSC	12
Chondestes grammacus	lark sparrow		2
Passerculus sandwichensis	savannah sparrow		6,9,2,10,11,12
Passerculus sandwichensis rostratus	large-billed savannah sparrow	CSC	6,2,10
Passerculus sandwichensis beldingi	Belding's savannah sparrow	SE	4,5,6,2,10,11,12
Passerella iliaca	fox sparrow		2
Melospiza melodia	song sparrow		4,5,6,2,10,11
Melospiza lincolnii	Lincoln's sparrow		2,12
Zonotrichia leucophrys	white-crowned sparrow		4,6,9,2,10,11,12
Zonotrichia atricapilla	golden-crowned sparrow		4,6,2,10,11
Junco hyemalis	dark-eyed junco		6,2,10
Pheucticus melanocephalus	black-headed grosbeak		2
Passerina caerulea	blue grosbeak		2
Passerina amoena	lazuli bunting		2
Agelaius phoeniceus	red-winged blackbird		4,5,6,9,2,10,11,12
Dolichonyx oryzivorus	bobolink		6,2,10
Agelaius tricolor	tricolored blackbird	FSC, CSC	6,2,10
Sturnella neglecta	western meadowlark		4,5,6,9,2,10,11,12
Xanthocephalus xanthocephalus	yellow-headed blackbird		6,10
Euphagus cyanocephalus	Brewer's blackbird		6,2,10,11
Molothrus ater	brown-headed cowbird		6,2,10,11,12
Icterus cucullatus	hooded oriole		2
Icterus bullockii	Bullock's oriole		2
Icterus galbula	Baltimore oriole		7
Carpodacus mexicanus frontalis	house finch		4,5,6,9,2,10,11,12
Carduelis psaltria hesperophlus	lesser goldfinch		5,2,12
Carduelis lawrencei	Lawrence's goldfinch	FSC	5,2*
Carduelis tristis salicamans	American goldfinch		5,6,9,2,10
Passer domesticus domesticus	house sparrow		5,6,7,2,10,11
Anser albifrons frontalis	white-fronted goose		6,2*,10,11,12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Mammals			
Didelphis virginiana	Virginia opossum		6,10
Sorex ornatus ornatus	ornate shrew		6,10
Chiroptera family	bats		6,10
Sylvilagus audubonii	audubon cottontail		10
Sylvilagus audubonii	cottontail rabbit		6
Lepus californicus	black-tailed jackrabbit		6,10
Lepus californicus bennettii	San Diego black-tailed jackrabbit	CSC	5
Spermophilus beecheyi	California ground squirrel		5,6,10
Thomomys bottae	botta's pocket mouse		10
Thomomys umbinus	Southern pocket gopher		6
Reithrodontomys megalotis longicaudus	Western harvest mouse		6,10
Peromyscus maniculatus	deer mouse		6,10
Microtus californicus	California meadow mouse		6,10
Microtus californicus sanctidiegi	California vole		5
Rattus norvegicus	Norway rat		6,10
Rattus rattus	black rat		3
Mus musculus	house mouse		6,10
Canis latrans	coyote		5,6,10
Vulpes vulpes	red fox		6,10
Urocyon cinereoargenteus	gray fox		6,10
Procyon lotor	raccoon		6,10
Mustela frenata	long-tailed weasel		6,10
Taxidea taxus	North American badger		6,10
Mephitis mephitis	striped skunk		5,6,10
Felis domesticus	feral cats		6,10
AQUATIC/MARINE SPECIES			
Fish			
Acanthogobius flarimanus	yellowfin goby		8,10,12
Amphistichus argenteus	barred surfperch		8,10
Anchoa compressa	deepbody anchovy		8,10,12
Anchoa delicatissima	slough anchovy		8,10,12
Anisotremus davidsoni	sargo		12
Atherinidae	silverside		12
Atherinops affinis	topsmelt		8,10,12
Atherinopsis californiensis	jacksmelt		12
Cheilotrema saturnum	black croaker		12
Citharichthys stigmaeus	specled sanddab		8,10
Clevelandia ios	arrow goby		8,10,12
Clupea harengus	Pacific herring		12
Cymatogaster aggregata	shiner surfperch		8,10,12
Cynoscion nobilis	white seabass		8,10,12
Damalichthys vacca	pile surfperch		8,10

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Dorosoma petenense	threadfin shad		8,10
Elops affinis	machete		12
Embiotoca jacksoni	black surfperch		8,10,12
Engraulis mordax	northern anchovy		8,10,12
Etrumeus teres	round herring		12
Fodiator acutus	sharpchin flyingfish		12
Fundulus parvipinnis	California killifish		8,10,12
Genyonemus lineatus	white croaker		8,10,12
Gillichthya mirabilis	longjaw mudsucker		8,10,12
Girella nigricans	opaleye		8,10
Gobiesocidae	clingfish		12
Hermosilla azurea	zebraperch		12
Heterostichus rostratus	giant kelpfish		12
Hippoglossina stomata	bigmouth sole		12
Hyperprosopon argenteum	walleye surfperch		8,10,12
Hypsopsetta guttulata	diamond turbot		8,10,12
Hypsurus caryi	rainbow surfperch		8,10
Hysoblennius gentilis	bay blenny		8,10,12
Ilypnus gilberti	cheekspot goby		8,10,12
Lepidogobius lepidus	bay goby		8,10
Leptocottus armatus	staghorn sculpin		8,10,12
Leuresthes tenuis	California grunion		12
Menticirrhus undulatus	California corbina		8,10,12
Mucil cephalus	striped mullet		8,10,12
Mustelus californicus	gray smoothound		8,10,12
Mustelus henlei	brown smoothound		8,10,12
Myliobatis californica	bat ray		8,10
Paralabrax maculatofasciatus	spotted sand bass		8,10,12
Paralabrax nebulifer	barred sand bass		8,10,12
Paralichthys californicus	California halibut		8,10,12
Parophrys betulus	English sole		8,10
Peprilus simillimus	Pacific butterfish		8,10
Phanerodon furcatus	white surfperch		8,10
Platyrhinoidis triseriata	thornback		8,10
Pleuronichthys verticalis	hornyhead turbot		8,10
Porichthys myriaster	specklefin midshipman		8,10,12
Porichthys notatus	Northern midshipman		8,10
Quietula y-cauda	shadow goby		8,10,12
Rhinobatos productus	shovelnose guitarfish		8,10,12
Roccus saxatillis	striped bass		8,10
Roncador stearnsi	spotfin croaker		8,10
Sarda chiliensis	Pacific bonito		8,10,12
Sardinops sagax	Pacific sardine		12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Seriphus politus	queenfish		8,10,12
Sphyraena argentea	California barracuda		12
Squatina californica	Pacific angel shark		8,10
Strongylurs exilis	California needlefish		12
Symphurus atricauda	California tonguefish		8,10
Syngnathus auliscus	barred pipefish		12
Syngnathus leptorhynchus	bay pipefish		8,10,12
Tilapia zilli	tilapia		12
Triakis semifasciata	leopard shark		8,10,12
Umbrina roncador	yellowfin croaker		8,10,12
Urolophus halleri	round stingray		8,10,12
Xenistius californiensis	salema		12
Crustaceans			
Accedomoera vagor			12
Acuminodeutopus heteruropus			12
Alienacanthomysis macropsis			12
Alpheus californiensis			12
Ampelisca agassizi			12
amphideutopus oculatus			12
Ampithoe sectimanus			12
Ampithoe sp.			12
Anatanais sp.			12
Anoplodactylus sp.			12
Aora inermis			12
Armadilloniscus coronacapitalis			12
Atylus sp.			12
Bathyleberis californica			12
Bemlos audbettius			12
Bemlos macromanus			12
Betaeus longidactylus			12
Calanoida			12
Caligus clemensis			12
Caligus sp.			12
Callianassa californiensis	ghost shrimp		
Cancer antennarius	common rock crab		12
Caprella equilibra			12
Caprella sp.			12
Caridea			12
Ceradocus sp.			12
Cerithidea californica	California horn shell		
Cirolana sp.			12
Cirolanidae			12
Corophium sp.			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Crangon alaskensis			12
Crangon alaskensis elongata			12
Crangon franiscorum	crangonid shrimp		12
Cumella sp.			12
Cyclopoida			12
Dexamine sp.			12
Diastylopsis tenuis			12
Dynamenopsis dianae			12
Dynamenopsis sp.			12
Elasmopus sp.			12
Eobrolgus spinosus			12
Ericthonius sp.			12
Erileptus spinosus			12
Eulaus herdmani			12
Euphilomedes carcharodonta			12
Euphilomedes producta			12
Excirolana sp.			12
Gammaridae			12
Gammaropsis thompsoni			12
Gibbergus (Megaluropus) meyersi			12
Grandidierella japonica			12
Harpacticoida			12
Hemigrapsus oregonensis			12
Heptacarpus paludicola			12
Heptacarpus stimpsoni			12
Heptacarpus taylori			12
Heterophoxus oculatus			12
Hippolyte californiensis			12
Hippolyte sp.			12
Hippolytidae			12
Hyale frequens			12
Hyale sp.			12
Ianiropsis sp.			12
Isopoda			12
Joeropsis sp.			12
Leptochelia dubia			12
Leptochelia sp.			12
Liljeborgia geminata			12
Lophopanopeus frontalis			12
Lophopanopeus leucomanus			12
Lophopanopeus sp.			12
Mayerella banksia			12
Megalopa/Zoea			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Metamysidopsis elongata			12
Monoculodes hartmanae			12
Monoculodes sp.			12
Mysid sp.			12
Mysida			12
Mysidella sp.			12
Neomysis kadiakensis			12
Neomysis sp.			12
Neotrypaea californiensis			12
Neotrypaea sp.			12
Opisa tridentata			12
Orchestia sp.			12
Oxyurostylis pacifica			12
Palaemon ritteri			12
Paracerceis sculpta			12
Paranthura elegans			12
Parasterope barnesi			12
Penaeus californiensis			12
Pinnotheridae			12
Podocerus cristatus			12
Podocerus sp.			12
Pontogeneia rostrata			12
Pontogeneia sp.			12
Portunus xantusii			12
Pyromaia tuberculata			12
Rhepoxynius menziesi			12
Rudilemboides stenopropudus			12
Scleroplax granulata			12
Serolis carinata			12
Sphaeroma pentodon			12
Synaptotanais motabilis			12
Talitroides sp.			12
Tethygenia opata			12
Tethygenia sp.			12
Upogebia macginitieorum			12
Zeuxo sp.			12
Echinoderms			
Amphipholis squamata			12
Leptosynapta sp.			12
Ophiuroidea			12
Molluscs			
Acteocina californica			12
Acteocina culcitella			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Acteocina eximia			12
Acteocina harpa			12
Acteocina inculta			12
Aglaja sp.			12
Alderia modesta			12
Alia carinata			12
Aplysia californica			12
Assiminea californica			12
Bivalvia			12
Bulla gouldiana			12
Caecum californicum			12
Cerithidea californica			12
Chione californiensis			12
Chione fluctifraga			12
Chione sp.			12
Chione undatella			12
Crepidula adunca			12
Crepidula onys			12
Crepidula sp.			12
Crucibulum spinosum			12
Cryptomya californica			12
Cumingia californica			12
Cylichnella sp.			12
Fartulum occidentale			12
Gastropoda			12
Geukensia demissa			12
Haminaea sp.			12
Haminaea vesicula			12
Haminaea virescens			12
Hydrobiidae			12
Irusella lamellifera			12
Kellia sp.			12
Laevicardium sp.			12
Laevicardium substriatum			12
Leptopecten latiauratus			12
Lima hemphilli			12
Lima subauriculata			12
Lyonsia californica			12
Macoma sp.			12
Mactra californica			12
Mactra sp.			12
Melampus olivaceus			12
Melampus olivaceus			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Melanochlamys diomedea			12
Melanochlamys diomedea			12
Modiolus sp.			12
Musculista senhousi			12
Mya arenaria			12
Mytilus galloprovincialis			12
Mytilus sp.			12
Nassarius fossatus			12
Nassarius sp.			12
Nassarius tegula			12
Navanax inermis			12
Neverita reclusiana			12
Nitidiscala sp.			12
Notoacmea dipicta			12
Nudibranchia			12
Ocenebra sp.			12
Octoplus bimaculoides			12
Octopus bimaculatus			12
Odostomia navisa			12
Odostomia sp.			12
Olivella baetica			12
Ovatella myosotis			12
Oxychilus cellarius			12
Parvilucina tenuisculpta			12
Petricola californiensis			12
Petricola sp.			12
Philine auriformis			12
Phyllaplysia taylori			12
Phyllaplysia taylori			12
Polinices lewisii			12
Polinices sp.			12
Protothaca sp.			12
Protothaca staminea			12
Rictaxis punctocaelatus			12
Rissoidae			12
Saxidomus nuttalli			12
Solen rosaceus			12
Solen sicarius			12
Tagelus affinis			12
Tagelus californianus			12
Tagelus politus			12
Tagelus sp.			12
Tagelus subteres			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Teinostoma supravallatum			12
Tellina carpenteri			12
Tellina sp.			12
Theora lubrica			12
Tresus nuttalli			12
Truncatella sp.			12
Venerupis lamellifera			12
Venerupis phillipinarum			12
Nematodes			
Nematoda			12
Others			
Acarina			12
Aglaophenia sp.			12
Amathia sp.			12
Amphiporus sp.			12
Arachnida			12
Araneida			12
Athenaria			12
Botyllus sp.			12
Bugula neritina			12
Carinoma mutabilis			12
Carinoma sp.			12
Carybdea sp.			12
Celleporina sp.			12
Ciona intestinalis			12
Corymorpha palma			12
Cryptocelis occidentalis			12
Diadumene sp.			12
Edwardsiidae			12
Emplectonema gracilis			12
Eugyra arenosa			12
Euphysa sp.			12
Euplana pacificola			12
Gillichthys mirabilis			12
Glottidia albida			12
Gobiidae			12
Halacaridae			12
Halcampa crypta			12
Halcampa sp.			12
Ilypnus gilberti			12
Kalyptorhynchia			12
Lepidogobius lepidus			12
Lineidae			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Lineus sanguineus			12
Membranipora sp.			12
Micrura sp.			12
Molgula manhattensis			12
Molgula sp.			12
Nemertea			12
Nemertopsis gracilis			12
Nolella sp.			12
Notoplana sp.			12
Paranemertes californica			12
Phoronida			12
Platyhelminthes			12
Prosthiostomum sp.			12
Rhabdocoela			12
Spinicirrus inequalis			12
Styela plicata			12
Styela sp.			12
Stylochidae			12
Stylochus exiguus			12
Stylochus sp.			12
Syngnathus sp.			12
Tetrastemma sp.			12
Thalamoporella californiа			12
Tubulanus polymorphus			12
Urochordata			12
Victorella sp.			12
Watersipora cucullata			12
Zoobotryon pellucida			12
Zygonemertes virescens			12
Polychaetes			
Acmira catherinae			12
Ampharetidae			12
Anotomastus gordiodes			12
Aphelochaeta multifilis			12
Aphelochaeta sp.			12
Apoprionospio pygmaea			12
Armandia brevis			12
Boccardia probosoidea			12
Boccardiella hamata			12
Boccardiella sp.			12
Brania sp.			12
Capitella capitata			12
Capitellidae			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Caulleriella alata			12
Caulleriella sp.			12
Chaetozone corona			12
Chaetozone setosa			12
Chone minuta			12
Cirratulidae			12
Cirriformia luxuriosa			12
Cirriformia sp.			12
Cirriformia spirabrancha			12
Cossura candida			12
Cossura sp.			12
Demonax pallidus			12
Demonax sp.			12
Eteone dilatae			12
Euchone limnicola			12
Euclymeninae			12
Eupolymnia heterobranchia			12
Eupolymnia sp.			12
Exogone sp.			12
Fabricinuda berkeleyi			12
Fabricinuda limnicola			12
Fabriciola berkeley			12
Glycera convoluta			12
Glycera nana			12
Goniada littorea			12
Goniada maculata			12
Goniada sp.			12
Halosydna brevisetosa			12
Halosydna johnsoni			12
Harmothoe hirsuta			12
Harmothoe imbricata			12
Jasmineira sp.			12
Leitoscoloplos pugettensis			12
Leitoscoloplos sp.			12
Lumbrineris erectus			12
Lumbrineris inflata			12
Lumbrineris minima			12
Lumbrineris sp.			12
Lumbrineris tetraura			12
Maldanidae			12
Marphysa sanguinea			12
Marphysa sp.			12
Mediomastus ambiseta			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Mediomastus californiensis			12
Mediomastus sp.			12
Megalomma pigmentum			12
Melinna oculata			12
Monticellina dorsobranchialis			12
Monticellina sp.			12
Monticellina tesselata			12
Neanthes acuminata			12
Nematonereis sp.			12
Nephtys caecoides			12
Nephtys cornata franciscana			12
Nephtys sp.			12
Nereididae			12
Nereis latescens			12
Nicolea sp.			12
Notomastus hemipodus			12
Notomastus sp.			12
Oligochaeta			12
Ophiodromus pugettensis			12
Ophryotrocha sp.			12
Orbiniidae			12
Pectinaria californiensis			12
Pista alata			12
Platynereis bicanaliculata			12
Polychaeta			12
Polycirrus californicus			12
Polydora ligni			12
Polydora limicola			12
Polydora logni			12
Polydora nuchalis			12
Polydora sp.			12
Polyophthalmus pictus			12
Prionospio heterobranchia			12
Prionospio lighti			12
Prionospio sp.			12
Pseudopolydora paucibranchiata			12
Rhyncospio glutea			12
Sabellidae			12
Sabellides sp.			12
Schistomeringos longicornis			12
Schistomeringos rudolphi			12
Scolelepis tridentata			12
Scoloplos acmeceps			12

Table H-1 Naval Weapons Station Seal Beach animal species list

Scientific Name	Common Name	Status	Source
Sphaerosyllis californiensis			12
Sphaerosyllis sp.			12
Spionidae			12
Spiophanes missionensis			12
Streblospio benedicti			12
Syllis armillaris			12
Syllis sp.			12
Terebellidae			12
Tharyx sp.			12

Status Codes:
BEPA= Bald and Golden Eagle Protection Act
CFP= California fully protected
CSC= California species of concern
E= Exotic species
FSC=Federal species of concern
FE= Federally endangered
FT= Federally threatened
FD= Federally delisted
SE= California state endangered
ST= California state threatened

Sources:
1- Base Exterior Architecture Plan 1985
2- USGS Bird Checklists of the United States (2* accidental)
3- Bloom 1995 cited in RECON 1997
4- 1995 Christmas Bird Count cited in RECON 1997
5- RECON 1996 cited in RECON 1997
6- USFWS 1990
7- National Wildlife Refuge volunteer census 1994-1996 cited in RECON 1997
8- RECON 1997
9- Census Summary 1994
10- Environmental Impact Statement 1990
11- P.D. Romero 1976 thesis, Bird use of Anaheim Bay
12- MEC 1995 (volume I & II)
13- NWR Collections
14- Field observations by Cory Davis, TDI biologist, on 2/13/03

Table H-2. Naval Weapons Station Seal Beach plant species list

Scientific Name	Common Name	Status	Source
ALGAE			
Cladophora microcladoides	green algae		2
Enteromorpha intestinalis	green algae		2
Ulva sp.	green algae		2
GYMNOSPERMS			
Family Cupressaceae			
Cupressus sempervirens	Italian cypress	Ho	1
MONOCOTS			
Family Arecaceae			
Cocos plumosa	queen palm	Ho	1
Phoenix canarienis	Canary Island palm	E	1,5
Washingtonia robusta	Mexican fan palm	E	1,5
Family Cyperaceae			
Cyperus niger	brown cyperus		5
Cyperus sp.	sedge		2
Eleocharis acicularis	slender spikerush		5
Eleocharis montevidensis	slender creeping spikerush		5
Scirpus americanus	three-square		5
Scirpus californicus	California bulrush		5
Scirpus robustus	prairie bulrush		5

Table H-2. Naval Weapons Station Seal Beach plant species list

Scientific Name	Common Name	Status	Source
Family Juncaceae			
Juncus bufonius	toad rush		5
Juncus mexicanus	Mexican rush		5
Family Juncaginaceae			
Triglochin concinna	slender arrowgrass		4
Triglochin maritima	sea arrowgrass		3
Triglochin maritimum	arrow weed		2
Family Poaceae			
Agropyron repens	quackgrass	E	3
Arundo donax	giant reed	I_H	4
Avena barbata	slender wildoat	IM	3,5
Bromus diandrus	ripgut grass	IM	3,5
Bromus hordeaceus	smooth brome	E	5
Bromus madritensis ssp. *rubens*	foxtail chess	I_H	5
Cortaderia selloana	selloa pampas grass	I_H	5
Cynodon dactylon	Bermuda grass	E	3,4,5
Distichlis spicata	salt marsh grass		2,3,4,5
Elytrigia pontica ssp. *pontica*	tall wheatgrass	E	5
Hordeum depressum	low barley		4
Hordeum murinum	barley	E	4,5
Hordeum vulgare	common barley	E	5
Leymus condensatus	giant ryegrass		5
Lolium multiflorum	Italian ryegrass	IM	5
Monanthochloe littoralis	shoregrass		2,4,5
Parapholis incurva	sickle grass	E	2,3,4,5
Paspalum dilatatum	dallis grass	E	3
Pennisetum setaceum	fountain grass	E	5
Phalaris lemmonii	lemmon canary grass		5
Phalaris minor	Mediterranean canary grass	E	5
Polypogon monspeliensis	rabbitfoot grass	E	3,4
Polypogon monspeliensis	annual beard grass	E	5
Spartina foliosa	cord grass		2,3,5
Vulpia microstachys var. *microstachys*	fescue		5
Family Typhaceae			
Typha angustifolia	narrow-leaved cattail		5
Typha sp.	cattail		2
Family Zosteraceae			
Zostera marina	eelgrass		3
DICOTS			
Aizoaceae			
Carpobrotus chilensis	sea-fig	E	4
Carpobrotus edulis	hottentot fig	I_H	4,5
Delospermum alba	white trailing ice plant	Ho	1

Table H-2. Naval Weapons Station Seal Beach plant species list

Scientific Name	Common Name	Status	Source
Mesembryanthemum crystallinum	ice plant	I_M	2,5
Mesembryanthemum nodiflorum	little ice plant	E	2,3,4,5
Tetragonia tetragonioides	New Zealand spinach	E	5
Amaranthaceae			
Amaranthus blitoides	pigweed		5
Anacardiaceae			
Harpephyllum caffrum	kaffir plum	Ho	1
Malosma laurina	laurel sumac		5
Schinus terebinthifollus	Brazilian pepper	E	1,5
Toxicodendron diversilobum	western poison oak		5
Apiaceae			
Apium graveolens	celery	E	5
Conium maculatum	poison hemlock	I_M	15
Apocynaceae			
Carissa grandiflora	natal plum	Ho	1
Nerium oleander	oleander	Ho	1
Vinca major	periwinkle	Ho	1
Asteraceae			
Ambrosia chamissonis	beach-bur		4,5
Ambrosia psilostachya	western ragweed		5
Artemisia californica	California sagebrush		3
Baccharis emoryi	chaparral broom		5
Baccharis salicifolia	mule fat		5
Centaurea iberica	starthistle	E	3
Centaurea melitensis	tocolote	I_M	5
Chrysanthemum coronarium	garland	E	5
Cirsium vulgare	bull thistle	I_M	5
Cotula coronopifolia	brass-buttons	E	5
Gazania sp.	African daisy	E	5
Gnaphalium canescens ssp. *beneolens*	fragrant everlasting		5
Gnaphalium microcephalum	cudweed		3
Gnaphalium palustre	lowland cudweed		5
Hedypnois cretica	Crete hedypnois	E	4
Helianthus gracilentus	slender sunflower		5
Hemizonia parryi var. *australis*	southern tarplant		
Heterotheca grandiflora	telegraph weed		3,4,5
Isocoma menziesii	goldenbush		4,5
Jaumea carnosa	jaumea		2,3,5
Lactuca serriola	prickly lettuce	E	3,5
Lasthenia glabrata ssp. *coulteri*	saltmarsh daisy	CNPS1B	5
Picris echioides	ox tongue	E	3,5
Silybum marianum	milk thistle	E	5
Sonchus asper ssp. *asper*	prickly sow thistle	E	5

Table H-2. Naval Weapons Station Seal Beach plant species list

Scientific Name	Common Name	Status	Source
Sonchus oleraceus	common sow-thistle	E	4,5
Taraxacum officinale	dandelion	E	5
Xanthium strumarium	cocklebur	E	5
Bataceae			
Batis maritima	saltwort		2,3,5
Bombacaceae			
Chorisia speciosa	floss silk tree	Ho	1
Boraginaceae			
Amsinckia menziesii	rancher's fireweed		5
Echium fastuosum	pride of madeira	Ho	1
Heliotropium curassavicum	seaside heliotrope	E	2,5
Brassicaceae			
Brassica nigra	black mustard	I_M	3,5
Cakile edentula	sea rocket	E	5
Cakile maritima	sea rocket	E	4,5
Capsella bursa-pastoris	shepherd's purse	E	5
Raphanus sativus	radish	E	5
Sisymbrium irio	London rocket	E	5
Capparaceae			
Isomeris arborea	bladderpod		5
Caprifoliaceae			
Lonicera japonica	Hall's honeysuckle	Ho	1
Caryophyllaceae			
Spergularia marina	salt marsh sand-spurry	E	4,5
Chenopodiaceae			
Atriplex coulteri	Coulter's saltbush		4
Atriplex lentiformis ssp. *lentiformis*	big saltbush		5
Atriplex leucophylla	seascale, beach saltbush		4,5
Atriplex patula	spear oracle	E	3
Atriplex semibaccata	Australian saltbush	E	3,5
Atriplex serenana nelson var. *davidsonii*	bracted saltbush		3
Atriplex triangularis	spearscale	E	5
Atriplex watsonii	Watson saltbush		2,4
Bassia hyssopifolia	fivehook bassia	E	3,4,5
Chenopodium album	lambs quarters	E	3,5
Chenopodium ambrosioides	Mexican tea	E	5
Chenopodium murale	nettle-leaved goosefoot	E	5
Kochia scoparia var. *subvillosa*	Mexican summer-cypress	E	3
Salicornia bigelovii	samphire	E	2,3
Salicornia subterminalis	glasswort		2,3,4,5
Salicornia virginca	fickleweed		2,3,4,5
Salsola pestifer	Russian thistle	E	3
Salsola tragus	Russian thistle	I_L	5

Table H-2. Naval Weapons Station Seal Beach plant species list

Scientific Name	Common Name	Status	Source
Suaeda californica	California seablite	E	2,3
Suaeda esteroa	estuary seablite	CNPS1B	5
Convolvulaceae			
Calystegia soldanella	morning-glory		4,5
Convolvulus arvensis	bindweed	E	5
Cressa truxillensis	alkali weed		2,3,5
Crassulaceae			
Crassula connata	pygmy weed		4
Cuscutaceae			
Cuscuta salina	salt marsh dodder		2,3,5
Elaeagnaceae			
Elaeagnus pungens	silverberry	Ho	1
Escalloniaceae			
Escallonia fradesii	escallonia	Ho	1
Fabaceae			
Calliandra haematocephala	pink powder puff	Ho	1
Erythrina caffra	kaffirboom coral tree	Ho	1
Medicago polymorpha	California burclover	E	4,5
Melilotus alba	white sweet clover	E	5
Melilotus indica	yellow sweetclover	E	3,4,5
Frankeniaceae			
Frankenia grandifolia	alkali heath	E	2,3
Frankenia salina	alkali-heath		4,5
Geraniaceae			
Erodium botrys	long-beak filaree/storksbill	E	4,5
Erodium cicutarium	red-stem filaree/storksbill	E	4,5
Lamiaceae			
Rosmarinus officinalis	dwarf rosemary	Ho	1
Loganiaceae			
Gelsemium sempervirens	Carolina jessamine	Ho	1
Lythraceae			
Lythrum hyssopifolium	grass poly		5
Malvaceae			
Hibiscus rosa-sinensis	tropical hibiscus	Ho	1
Malva parviflora	cheeseweed	E	5
Malvella leprosa	alkali-mallow		5
Moraceae			
Ficus benjamina	weeping Chinese banyan tree	Ho	1
Ficus microcarpa nitida	Indian laurel fig	Ho	1
Myoporaceae			
Myoporum laetum	myoporum	E	1,5
Myoporum parvifolium	prostrate myoporum	Ho	1

Table H-2. Naval Weapons Station Seal Beach plant species list

Scientific Name	Common Name	Status	Source
Myrtaceae			
Eucalyptus rudis	desert gum	Ho	1
Eucalyptus sideroxylon	rosey-red iron bark	Ho	1
Eucalyptus spp.	eucalyptus	E	5
Metrosideros excelsa	New Zealand christmas tree	Ho	1
Nyctaginaceae			
Abronia maritima	red sand-verbena	CNPS4	4,5
Abronia umbellata ssp. *umbellata*	beach sand-verbena		4
Onagraceae			
Camissonia cheiranthifolia ssp. *suffruticosa*	beach evening-primrose		4,5
Camissonia lewisii	Lewis' evening primrose	CNPS3	5
Camissonia micrantha	miniature suncup		4
Oenothera cheiranthifolia	evening primrose		2
Oxalidaceae			
Oxalis albicans ssp. *pilosa*	California oxalis		5
Oxalis pes-caprae	Bermuda buttercup	I_M	5
Pittosporaceae			
Pittosporum tobira	mock orange	Ho	1
Plantaginaceae			
Hebe sp.	veronica	Ho	1
Plantago coronopus	cut-leaf plantain	E	4,5
Plantago major	common plantain	E	5
Platanaceae			
Platanus racemosa	Western sycamore		5
Plumbaginaceae			
Armeria maritima	sea pink	Ho	1
Limonium californicum	sea lavender		2,3,5
Limonium perezii	sea lavender	Ho	1
Polygonaceae			
Polygonum argyrocoleon	knotweed	E	3
Polygonum lapathifolium	willow weed	E	5
Rumex crispus	curly dock	E	5
Portulacaceae			
Calandrinia maritima	seaside calandrinia	CNPS4	5
Primulaceae			
Anagallis arvensis	*scarlet pimpernel*	*E*	*4,5*
Rosaceae			
Raphiolepis indica	*indica hawthorn*	*Ho*	*1*
Rubiaceae			
Coprosma repens	variegated mirror plant	Ho	1
Galium aparine	goose grass	E	5
Salicaceae			
Salix gooddingii	Goodding's black willow		5

Table H-2. Naval Weapons Station Seal Beach plant species list

Scientific Name	Common Name	Status	Source
Salix laevigata	red willow		5
Salix lasiolepis	arroyo willow		5
Sapindaceae			
Cupaniopsis anacardioides	carrotwood	Ho	1
Solanaceae			
Nicotiana glauca	tree tobacco	I_M	5
Solandra maxima	cup-of-gold vine	H	1
Solanum americanum	nightshade	E	5
Ulmaceae			
Ulmus parvifolia	Chinese elm	H	1
Urticaceae			
Urtica urens	dwarf nettle	E	5
Verbenaceae			
Lantana montevidensis	lantana	H	1

Status Codes:
CNPS1B = California Native Plant Society List 1B
CNPS3 = California Native Plant Society List 3
CNPS4 = California Native Plant Society List 4
I = Invasive (Cal-IPC 2006)*
E = Exotic species
Ho = Horticultural/Landscaping**
*Subscript indicates level of invasiveness (H= High, M=Moderate, L= Limited).
**Not generally invasive away from landscaped areas.

Sources:
1- Base Exterior Architecture Plan 1985
2- P.D. Romero 1976 thesis, Bird use of Anaheim Bay
3- MEC 1995 (volume I & II)
4- NWR Collections
5- Field observations by Cory Davis, TDI biologist, on 2/13/03

This Page Intentionally Blank

Appendix I: Profiles of Focus Management Species

This Page Intentionally Blank

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
PLANTS				
THREEAWN (*ARISTIDA SP.*) **Federal Status: None** **California Status: None**	Grassland	Structure and Function	Widespread in California.	http://plants.usda.gov/java/county?state_name=California&statefips=06&symbol=ARIST
CANE BLUESTEM (*BOTHRIOCHLOA BARBINODIS*) **Federal Status: None** **California Status: None**	Grassland	Structure and Function	Found in western North America.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1113
ANNUAL HAIRGRASS (*DESCHAMPSIA DANTHONIOIDES*) **Federal Status: None** **California Status: None**	Grassland	Structure and Function	Endemic to California where it is widespread in predominately wetland areas.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2691
PRAIRIE JUNEGRASS (*KOELERIA MACRANTHA*) **Federal Status: None** **California Status: None**	Grassland	Structure and Function	Widespread in California, North America, and elsewhere in a variety of habitats.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=4539
NODDING NEEDLEGRASS (*NASSELLA CERNUA*) **Federal Status: None** **California Status: None**	Grassland	Structure and Function	Endemic to California where it is found in a variety of habitats, mostly in the western portion of the state.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=5764
PURPLE NEEDLEGRASS (*NASSELLA PULCHRA*) **Federal Status: None** **California Status: None**	Grassland	Structure and Function	Found in western North America, and is widespread in California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=5767
WESTERN BLUE-EYED GRASS (*SISYRINCHIUM BELLUM*) **Federal Status: None** **California Status: None**	Grassland	Structure and Function	Found throughout western North America, including California, where it is widespread.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7632
LEWIS' EVENING PRIMROSE (*CAMMISONIA LEWISII*) **Federal Status: None** **California Status: None**	Grassland; Sandy Beach	Diversity	Native to California and Baja California	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1434 and http://www.rareplants.cnps.org/detail/1604.html
TOAD RUSH (*JUNCUS BUFONIS*) **Federal Status: None** **California Status: None**	Freshwater Wetland	Structure and Function	Found in North America and elsewhere, mostly in wetlands.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=4441
COMMON BRASSBUTTONS* (*COTULA CORONOPIFOLIA*) **Federal Status: None** **California Status: None**	Freshwater Wetland	Structure and Function	It is native to South Africa, but is widespread in California. It is mostly found in wetlands, but can also be found in other plant communities.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2404 and http://ucjeps.berkeley.edu/cgi-bin/get_JM_treatment.pl?Cotula+coronopifolia

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
HOTTENTOT FIG* (*CARPOBROTUS EDULIS*) **Federal Status: None** **California Status: None**	Freshwater Wetland; Wetland/Upland	Structure and Function	Introduced to California	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1660
HYSSOP LOOSESTRIFE* (*LYTHRUM HYSSOPIFOLIUM*) **Federal Status: None** **California Status: None**	Freshwater Wetland	Diversity	Widespread in California	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=5259
DODDER (*CUSCUTA SALINA*) **Federal Status: None** **California Status: None**	Marsh Plain	Structure and Function	Found in western North America and is widespread in California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2540
ALKALI HEATH (*FRANKENIA SALINA*) **Federal Status: None** **California Status: None**	Marsh Plain; Wetland/Upland	Structure and Function	Found in western North America and is widespread in California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=3612
JAUMEA (*JAUMEA CARNOSA*) **Federal Status: None** **California Status: None**	Marsh Plain	Structure and Function	Found in western North America and is widespread in California, especially in coastal areas.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=4424
PERENNIAL PICKLEWEED (*SALICORNIA VIRGINIATA*) **Federal Status: None** **California Status: None**	Marsh Plain	Diversity	Found in North America but is widespread in California, especially in coastal areas.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7259
SALTWORT (*BATIS MARITIMA*) **Federal Status: None** **California Status: None**	Marsh Plain	Diversity	Native to California, but is also found in other areas of North America and elsewhere.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1061
MARSH ROSEMARY (*LIMONIUM CALIFORNICUM*) **Federal Status: None** **California Status: None**	Marsh Plain; High Marsh/Salt Pan	Diversity	Largely confined to California, but may also be found in surrounding areas.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=4839
ANNUAL PICKLEWEED (*SALICORNIA BIGELOVII*) **Federal Status: None** **California Status: None**	Marsh Plain	Diversity	Native to California, but is also found in other areas of North America and elsewhere	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7254
ESTUARY SEABLITE (*SUAEDA ESTEROA*) **Federal Status: None** **California Status: None**	Marsh Plain; Intertidal Creeks	Diversity	Found in California and Baja California	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7876
SLENDER ARROWGRASS (*TRIGLOCHIN CONCINNA*) **Federal Status: None** **California Status: None**	Marsh Plain	Diversity	Native to California, but is also found in other areas of North America and elsewhere	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=8111

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
CORDGRASS (*SPARTINA FOLIOSA*) **Federal Status: None** **California Status: None**	Low Marsh	Structure and Function	Found in western North America.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7701
TRIANGLE ORACHE (*ATRIPLEX TRIANGULARIS*) **Federal Status: None** **California Status: None**	Wetland/Upland	Structure and Function	Widespread in California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1010
SPREADING ALKALIWEED (*CRESSA TRUXILLENSIS*) **Federal Status: None** **California Status: None**	Wetland/Upland; High Marsh/Salt Pan	Structure and Function	Found in western North America and is widespread in California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2429
SALTGRASS (*DISTICHLIS SPICATA*) **Federal Status: None** **California Status: None**	Wetland/Upland; High Marsh/Salt Pan	Structure and Function	Widespread in California, and can be found in other areas of North America and elsewhere.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2743
DWARF BARLEY (*HORDEUM DEPRESSUM*) **Federal Status: None** **California Status: None**	Wetland/Upland; High Marsh/Salt Pan	Structure and Function	Found in western North America and is widespread in California, especially in wetlands.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=4221
EASTERN MOJAVE BUCKWHEAT (*ERIOGONUM FASCICULATUM*) **Federal Status: None** **California Status: None**	Wetland/Upland	Structure and Function	Found in western North America and is widespread in California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=3243
MENZIES' GOLDENBUSH (*ISOCOMA MENZIESII*) **Federal Status: None** **California Status: None**	Wetland/Upland	Structure and Function	Found in western North America.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=4370
JIMMYWEED (*ISOCOMA VENETA*) **Federal Status:** **California Status:**	Wetland/Upland	Structure and Function	Found in North America.	http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?413845
STICKY SANDSPURRY (*SPERGULARIA MACROTHECA*) **Federal Status: None** **California Status: None**	Wetland/Upland; Sandy Beach	Structure and Function	Found in western North America and is widespread in California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7709
WOOLY SEABLITE (*SUAEDA TAXIFOLIA*) **Federal Status: None** **California Status: None**	Wetland/Upland	Structure and Function	Native to California and Baja California, especially in wetlands.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7879
RED SAND-VERBENA (*ABRONIA MARITIMA*) **Federal Status: None**	Sandy Beach	Structure and Function	Native to California and Baja California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=14

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
California Status: None				
SEASIDE CALANDRINIA (*CALANDRINIA MARITIMA*) **Federal Status: None** **California Status: None**	Sandy Beach	Diversity	Native to California and Baja California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1251
COULTER'S GOLDFIELDS (*LASTHENIA GLABRATA SSP. COULTERI)* **Federal Status: None** **California Status: None**	Wetland/Upland; High Marsh/Salt Pan	Diversity	Native to California and Baja California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=4586
WATSON'S SALTBUSH (*ATRIPLEX WATSONII*) **Federal Status: None** **California Status: None**	High Marsh/Salt Pan	Structure and Function	Found in western North America, especially in wetlands.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1014
SHOREGRASS (*MONANTHOCHLOE LITTORALIS*) **Federal Status: None** **California Status: None**	High Marsh/Salt Pan	Structure and Function	Found in California, other areas of North America and elsewhere, especially in wetlands	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=5611
GLASSWORT (*SALICORNIA SUBTERMINALIS*) **Federal Status: None** **California Status: None**	High Marsh/Salt Pan	Structure and Function	Found in western North America and is widespread in California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7257
SWAYING BULRUSH (*SCHOENOPLECTUS SUBTERMINALIS*) **Federal Status: None** **California Status: None**	High Marsh/Salt Pan	Structure and Function	Found in California, other areas of North America and elsewhere, especially in wetlands	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=10360
SEEPWEED (*SUAEDA CALCEOLIFORMIS*) **Federal Status: None** **California Status: None**	High Marsh/Salt Pan	Structure and Function	Widespread in California, and can be found in other areas of North America and elsewhere.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7874
CURVED SICKLEGRASS (*PARAPHOLIS INCURVA*) **Federal Status: None** **California Status: None**	High Marsh/Salt Pan	Structure and Function	Found in California. It is not native.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=6059
SALT MARSH BIRD'S BEAK (*CORDYLANTHUS MARITIMUS SSP. MARITIMUS*) **Federal Status: FE** **California Status: SE**	High Marsh/Salt Pan	Diversity	Found in Orange County and other areas of California, especially in wetlands.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2341 and http://www.rareplants.cnps.org/detail/174.html
TARPLANT (*HEMIZONIA PARRYI VAR. AUSTRALIS*)	High Marsh/Salt Pan	Diversity	Found in California and Baja California.	http://www.rareplants.cnps.org/detail/144.html

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
Federal Status: None **California Status: None**				
APHANISMA (*APHANISMA BLITOIDES*) **Federal Status: None** **California Status: None**	Wetland/Upland	Diversity	Found in coastal areas of California.	http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=421
MARINE				
JAPANESE MUSSEL* (*MUSCULISTA SENHOUSIA*) **Federal Status: None** **California Status: None**	Shallow Vegetated; Shallow Unvegetated	Structure and Function	Found in California and elsewhere.	http://www.exoticsguide.org/species_pages/m_senhousia.html
CALIFORNIA HALIBUT (*PARALICHTHYS CALIFORNICUS*) **Federal Status: None** **California Status: None**	Shallow Unvegetated; Subtidal Channels	Diversity	Found in the eastern Pacific from Washington to Baja California, as well as in the Gulf of California.	http://www.fishbase.org/Summary/SpeciesSummary.php?id=4228
GHOST SHRIMP (*CALLIANASSA CALIFORNIENSIS*) **Federal Status: None** **California Status: None**	Shallow Unvegetated; Mudflat	Diversity	Found in the eastern Pacific.	http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=97737
HORNYHEAD TURBOT (*PLEURONICHTHYS VERTICALIS*) **Federal Status: None** **California Status: None**	Deep Water	Structure and Function	Found in the eastern Pacific from central California to Baja California, with an isolated population in the Gulf of California.	http://www.fishbase.org/summary/speciessummary.php?id=4254
ROUND STINGRAY (*UROLOPHUS HALLERI*) **Federal Status: None** **California Status: None**	Deep Water	Structure and Function	Found in the eastern Pacific from northern California to Panama.	http://www.fishbase.org/Summary/speciesSummary.php?ID=2580&genusname=Urobatis&speciesname=halleri&AT=Urolophus+halleri&lang=English
MARINE ALGAE (*CAULERPA TAXIFOLIA*) **Federal Status: None** **California Status: None**	Deep Water	Structure and Function	An invasive Mediterranean strain has been found in Huntington Harbor in Orange County.	http://swr.nmfs.noaa.gov/hcd/CAULERPA.htm and Section 4.7.2
SPOTTED SAND BASS (*PARALABRAX MACULATOFASCIATUS*) **Federal Status: None** **California Status: None**	Intertidal Creeks; Subtidal Channels; Mudflat	Structure and Function	Mainly found in the eastern central pacific.	http://www.fishbase.org/Summary/speciesSummary.php?ID=3336&genusname=Paralabrax&speciesname=maculatofasciatus&AT=Paralabrax+maculatofasciatus&lang=English
CALIFORNIA KILLIFISH (*FUNDULUS PARVIPINNIS*) **Federal Status: None** **California Status: None**	Intertidal Creeks	Diversity	Found in the eastern Pacific from California to Baja California.	http://www.fishbase.org/Summary/speciesSummary.php?ID=3200&genusname=Fundulus&speciesname=parvipinnis&AT=Fundulus+parvipinnis&lang=English
**SHINER SURFPERCH (*CYMATOGASTER*	Subtidal Channels	Structure and	Found in the eastern Pacific from Alaska to Baja California.	http://www.fishbase.org/Summary/speciesSummary.php?ID=3

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
***AGGREGATA*)** **Federal Status: None** **California Status: None**		Function		626&genusname=Cymatogaster&speciesname=aggregata&AT=Cymatogaster+aggregata&lang=English
GHOST ANEMONE (*DIADUMENE CF. LEUCOLENA*) **Federal Status: None** **California Status: None**	Artificial Hard Substrate	Structure and Function	Found in the eastern Pacific and western Atlantic.	http://www.sealifebase.org/summary/SpeciesSummary.php?id=42090
BREADCRUMB SPONGE (*HALICHONDRIA PANICEA*) **Federal Status: None** **California Status: None**	Artificial Hard Substrate	Structure and Function	Found in the northeast Atlantic and the Arctic.	http://www.sealifebase.org/Summary/speciesSummary.php?ID=51614&genusname=Halichondria&speciesname=panicea
FAUNA				
WANDERING SKIPPER (*PANOQUINA ERRANS*) **Federal Status: None** **California Status: CSC**	Wetland/Upland	Diversity	Its range is from the coastal region from Goleta in the north to the Cape Region of Baja California. Records of this species extend from Huntington Beach to Upper Newport Bay south to Capistrano Beach where an exceptionally large colony exists. The butterfly no doubt occurs along much of coastal Orange County. At NAVWPNSTA Seal Beach the wandering skipper occurs within the National Wildlife Refuge	
SANDY BEACH TIGER BEETLE (*CICINDELA LATESIGNATA LATESIGNATA*) **Federal Status: None** **California Status: CSC**	Sandy Beach	Diversity	Formerly found from Los Angeles County southward to Mexico, it is currently only known to occur in San Diego County.	
GLOBOSE DUNE BEETLE (*COELUS GLOBOSUS*) **Federal Status: None** **California Status: CSC**	Sandy Beach	Diversity	This beetle is found in scattered localities from Bodega Head, Sonoma County to Ensenada, Baja California, as well as the Channel Islands. Its population status has declined in recent years due to development of coastal areas and recreational use of remaining coastal dune habitats.	
GABB'S TIGER BEETLE (*CICINDELA GABBII*) **Federal Status: None** **California Status: CSC**	Sandy Beach; High Marsh/Salt Pan	Diversity	Coastal areas of southern California and northwestern Mexico. Current localities in California are San Diego and Orange Counties.	
FROST'S TIGER BEETLE (*CICINDELA SENILIS FROSTI*) **Federal Status: None** **California Status: CSC**	Sandy Beach; High Marsh/Salt Pan	Diversity	Presently known only from Ventura County, this species once ranged as far south as the Mexican border.	
MUDFLAT TIGER BEETLE (*CICINDELA TRIFASCIATA SIGMOIDEA*) **Federal Status: None**	Mudflat	Diversity	The mudflat tiger beetle currently persists at various localities in Ventura, Los Angeles, Orange, and San Diego Counties, including the Sweetwater Marsh National Wildlife Refuge.	

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
California Status: None				
ALEUTIAN CANADA GOOSE (*BRANTA CANADENSIS LEUCOPAREIA*) **Federal Status: FD** **State Status: None**	Agricultural Fields; Shallow Unvegetated	Structure and Function	Breeds in western Alaska and winters in central and southern California.	
MOUNTAIN PLOVER (*CHARADRIUS MONTANUS*) **Federal Status: FC** **California Status: CSC**	Agricultural Fields	Diversity	See section 3.6.2.4	See section 3.6.2.4
GOLDEN EAGLE (*AQUILA CHRYSAETOS CANADENSIS*) **Federal Status: FP** **California Status: CFP**	Grassland	Diversity	Found throughout the western U.S. Rare visitor to the Station, perhaps occasionally drawn to the open ground for hunting and the large concentration of large potential prey items, both mammalian and avian. It is not expected to visit the Station during the breeding season due to the lack of suitable breeding sites nearby.	
SHORT-EARED OWL (*ASIO FLAMMEUS FLAMMEUS*) **Federal Status: None** **California Status: CSC**	Grassland	Diversity	Breeds on grasslands throughout the U.S. This species is a regular winter visitor on the Station, where it primarily uses the marsh	
BURROWING OWL (*ATHENE CUNICULARIA HYPUGEA*) **Federal Status: FSC** **California Status: CSC**	Grassland	Diversity	See section 3.6.4.2	See section 3.6.4.2
SWAINSON'S HAWK (*BUTEO SWAINSONI*) **Federal Status: None** **California Status: ST**	Grassland	Diversity	See section 3.6.3.2	See section 3.6.3.2
NORTHERN HARRIER (*CIRCUS CYANEUS HUDONIUS*) **Federal Status: None** **California Status: CSC**	Grassland	Diversity	Found throughout the U.S. Common winter visitor on the Station, although some individuals remain year-round and may breed locally.	
WHITE-TAILED KITE (*ELANUS LEUCURUS*) **Federal Status: None** **California Status: CFP**	Grassland	Diversity	Restricted to the West Coast and portions of southern Texas and Florida. Regular resident of NAVWPNSTA Seal Beach and its environs.	
PEREGRINE FALCON (*FALCO PEREGRINUS ANATUM*) **Federal Status: FD** **California Status: SE**	Grassland; Sandy Beach	Diversity	Formerly endangered, has rebounded in scattered localities throughout the U.S. due to reintroduction programs and banning of DDT. Regular visitor to NAVWPNSTA Seal Beach, usually in winter, and is becoming more commonly seen. This	

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
			is probably due to the success of the peregrine recovery program along the Pacific coast. A non-breeding individual remained in the marsh during the summer of 1988 and winter sightings have become much more regular in recent years. At least three individuals were observed hunting the Refuge in January, 1989; at least one was still present in March.	
LOGGERHEAD SHRIKE (*LANIUS LUDOVICIANUS*) **Federal Status: FSC** **California Status: CSC**	Grassland	Diversity	Grassland breeding species found throughout the U.S. in declining numbers.	
TRICOLORED BLACKBIRD (*AGELAIUS TRICOLOR*) **Federal Status: FSC** **California Status: CSC**	Freshwater Marsh	Diversity	Endemic to freshwater marshes of California, where it breeds in large colonies. Found at NAVWPNSTA Seal Beach during the winter when it wanders in smaller groups.	
YELLOW WARBLER (*DENDROICA PETECHIA BREWSTERI*) **Federal Status: FSC** **California Status: CSC**	Freshwater Marsh	Diversity	Found in riparian and marsh areas, this subspecies is endemic to the coast from Washington to California.	
CALIFORNIA LEAST TERN (*STERNA ANTILLARUM BROWNI*) **Federal Status: FE** **California Status: SE**	Marsh/Upland; Intertidal Channels; Shallow Vegetated	Structure and Function; Diversity	See section 3.6.2.2	See section 3.6.2.2
WESTERN SNOWY PLOVER (*CHARADRIUS ALEXANDRINUS NIVOSUS*) **Federal Status: None** **California Status: ST**	Sandy Beach	Diversity	See section 3.6.2.3	See section 3.6.2.3
BELDING'S SAVANNAH SPARROW (*PASSERCULUS SANDWICHENSIS BELDINGI*) **Federal Status: None** **California Status: SE**	Marsh Plain	Diversity	See section 3.6.3.1	See section 3.6.3.1
LIGHT-FOOTED CLAPPER RAIL (*RALLUS LONGIROSTRIS LEVIPES*) **Federal Status: FE** **California Status: SE**	Low Marsh	Diversity	See section 3.6.2.1	See section 3.6.2.1
WHIMBREL (*NUMENIUS PHAEOPUS HUDSONICUS*) **Federal Status: FSC** **California Status: None**	Mudflat	Diversity	Breeds in the tundra of Alaska and northern Canada and winters along the coastline of the U.S. and Mexico. Found in large numbers during the winter.	
MARBLED GODWIT (*LIMOSA FEDOA*)	Mudflat	Diversity	Breeds on the prairies where they nest in grassy marshes.	

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
Federal Status: FSC **California Status: None**			Migrate to the coast in winter, where they are found in large numbers on mudflats.	
LONG-BILLED CURLEW (*NUMENIUS AMERICANUS*) **Federal Status: FSC** **California Status: CSC**	Mudflat	Diversity	Breeds in the plains and prairies in the western U.S. and winter in abundance at the few remaining large coastal marshes, including the Seal Beach Refuge	
DOWITCHER SP. (*LIMNODROMUS SP.*) **Federal Status: Short-billed - FSC; Long-billed - None** **California Status: None**	Mudflat	Structure and Function	Both short-billed and long-billed dowitchers breed in the tundra areas of northern North America and then migrate to the coasts in winter. Found in flocks on mudflats and marshes in winter in California	
OSPREY (*PANDION HALIAETUS*) **Federal Status: None** **California Status: None**	Intertidal Channels; Shallow Vegetated	Diversity	Common near the coast and large bodies of water throughout the U.S. Common visitor to the Refuge, where one or two individuals are regularly observed.	
BLACK SKIMMER (*RYNCHOPS NIGER NIGER*) **Federal Status: FSC** **California Status: CSC**	High Marsh/Salt Pan	Diversity	Uncommon breeder in southern California. More common in winter as it disperses from breeding grounds.	
ELEGANT TERN (*THALASSEUS ELEGANS*) **Federal Status: None** **California Status: None**	High Marsh/Salt Pan	Diversity	Elegant terns nest in only two locations in the United States, South San Diego Bay and Bolsa Chica, just south of the Seal Beach Refuge. Consequently, foraging individuals and small flocks up to about 20 individuals now regularly visit the Refuge around and during the breeding season.	
SURF SCOTER (*MELANITTA PERSPICILLATA*) **Federal Status: None** **California Status: None**	Hard Substrate Shoreline; Deep Water	Diversity	Breeds in the north of the continent. Found in large numbers off-shore and in tidal bays.	
CALIFORNIA BROWN PELICAN (*PELECANUS OCCIDENTALIS CALIFORNICUS*) **Federal Status: FD** **California Status: SD**	Hard Substrate Shoreline; Shallow Unvegetated	Diversity	See section 3.6.4.1	See section 3.6.4.1
BLACK OYSTERCATCHER (*HAEMATOPUS BACHMANI*) **Federal Status: FSC** **California Status: None**	Hard Substrate Shoreline	Diversity	Resident breeder along the Pacific coast of North America. Found along rip-rap shorelines and other rocky areas.	
BRANT (*BRANTA BERNICLA*) **Federal Status: None** **California Status: CSC**	Shallow Vegetated	Structure and Function	Breeds in Alaska and northern Canada. Regular winter visitor where it feeds in shallow water, primarily in areas containing eelgrass.	
COMMON LOON (*GAVIA IMMER*)	Shallow Unvegetated	Diversity	Breeds on lakes in the northern U.S. and Canada. Common	

Species and Status	Focal Habitat	Reason	Overall Range and Status at NAVWPNSTA Seal Beach	More Information
Federal Status: FSC **California Status: CSC**			winter visitor to the coastal areas of California.	
AMERICAN WHITE PELICAN (*PELECANUS ERYTHRORHYNCHOS*) **Federal Status: None** **California Status: CSC**	Shallow Unvegetated	Diversity	Breeds on scattered lakes and lagoons in the northern and western U.S. Uncommon visitor during breeding and winter.	
BLACK TERN (*CHLIDONIAS NIGER SURINAMENSIS*) **Federal Status: FSC** **California Status: CSC**	Shallow Unvegetated	Diversity	Breeds in freshwater marshes across the northern U.S. Rare in winter and migration in California.	
WHITE-FACED IBIS (*PLEGADIS CHIHI*) **Federal Status: None** **California Status: None**	Shallow Unvegetated	Diversity	Breeding range extends from the western US south through Mexico. The white-faced ibis was formerly more common throughout its range in the coastal wetlands of southern California, inland along the coastal slope, along the Colorado River, and at the Salton Sea. Locally it is found in the National Wildlife Refuge (NWR) but there are few recent records of its occurrence on, or in the vicinity of, the Refuge.	
LESSER SCAUP (*AYTHYA AFFINIS*) **Federal Status: None** **California Status: None**	Deep Water	Diversity	Regular winter visitor from northern breeding grounds to areas off-shore and tidal bays.	
CALIFORNIA GROUND SQUIRREL (*SPERMOPHILUS BEECHEYI NUDIPES*) **Federal Status: None** **California Status: None**	Grassland	Structure and Function	Found from California to Washington. Ground squirrels provide a valuable prey base for raptors, snakes, coyotes and bobcats at NAVWPNSTA Seal Beach. The ground squirrel also has an important specific role in the grassland habitat at NAVWPNSTA Seal Beach. It suppresses grass height and cycles soil nutrients back into the soil by eating grass and defecating directly back into the soil.	http://www.sdnhm.org/fieldguide/mammals/sper-bee.html
COYOTE (*CANIS LATRANS*) **Federal Status: None** **California Status: None**	Grassland	Diversity	The native coyote is found at NAVWPNSTA Seal Beach as an opportunistic forager. This species is not a sensitive species and is expanding its range throughout North America in unison with landscape changes caused by human expansion, urban sprawl and land development.	http://www.sdnhm.org/fieldguide/mammals/cani-lat.html
SAN DIEGO BLACK-TAILED JACKRABBIT (*LEPUS CALIFORNICUS BENNETTII*) **Federal Status: None** **California Status: CSC**	Grassland	Diversity	This species is found throughout the central and western US, with this particular subspecies being restricted to southern California.	http://www.sdnhm.org/fieldguide/mammals/lepu-cal.html

Status Codes: FE - Federally Endangered; FT - Federally Threatened; FC - Federal Candidate for listing; FD - Federally Delisted; FP - Federally Protected; FSC - Federal Species of Concern; SE - State endangered; ST - State Threatened; SD - State Delisted; CFP - California Fully Protected Species; CSC - California Species of Concern;
* - Exotic Species

Appendix J: Landscaping Plant List

All plantings of non-natives should be approved in advance by the Navy Region Southwest Botanist.

Table J-1: Trees and plants recommended for landscape planting at Naval Weapons Station Seal Beach

Botanical Name	Common Name
TREES	
Large Trees (40'+)	
Acer macrophyllum	big-leaf maple
Acer negundo californicum	California box elder
Acer negundo interius	box elder maple
Alnus rhombifolia	white alder
Calocedrus decurrens	incense cedar
Cupressus stephensonii	Cuyamaca cypress
Fraxinus latifolia	Oregon ash
Pinus coulteri	Coulter pine
**Pinus eldarica*	afghan pine
Pinus torreyana	Torrey pine
Platanus racemosa	California sycamore
Populus fremontii	Fremont's cottonwood
Quercus agrifolia	coast live oak
Quercus engelmannii	Engelmann oak
Quercus kelloggii	California black oak
Quercus lobata	California white oak
**Syagrus romanzoffianum*	queen palm
Umbellularia californica	California bay laurel
Medium Trees (25'-40')	
**Brahea armata*	blue hesper palm
Celtis reticulata	netleaf hackberry
**Jacaranda mimosifolia*	jacaranda
Myrica californica	Pacific wax myrtle
Small Trees (15'-25')	
**Agonis flexuosa*	peppermint tree
Aesculus californica	California buckeye
Arbutus menziesii	madrone
Arctostaphylos glauca	big-berry manzanita
**Callistemon citrinus*	lemon bottlebrush
Cercidium floridum	blue palo verde
Cercis occidentalis	western redbud
**Chamaerops humilis*	Mediterranean fan palm
Chilopsis linearis	desert willow
Lavatera assurgentiflora	California tree mallow

Table J-1: Trees and plants recommended for landscape planting at Naval Weapons Station Seal Beach

Botanical Name	Common Name
Lyonothamnus floribundus ssp. *asplenifolius*	Catalina/Santa Cruz ironwood
**Metrosideros excelsus*	New Zealand Christmas tree
Quercus dumosa	coastal scrub oak
Salix gooddingii	black willow
Salix lasiolepis	arroyo willow
Sambucus mexicana	Mexican elderberry
SUCCULENTS	
Large Succulent (10'-18')	
**Aloe* spp.	aloe
Medium Succulent (5'-10')	
**Aloe* spp.	aloe
Small Succulent (3'-5')	
**Aloe* spp.	aloe
Yucca baccata	banana yucca
Yucca shidigera	Mojave yucca
Yucca whipplei	Our Lord's candle
Ground Cover Succulent (less than 3')	
**Aloe* spp.	aloe
Agave shawii	Shaw's century plant
Dudleya spp.	dudleya
Echeveria sp.	hens and chickens
Ferocactus viridescens	San Diego barrel cactus
Opuntia littoralis	coast prickly pear
SHRUBS	
Large Shrubs (10'-18')	
Adenostoma sparsifolium	redshanks
Ceanothus spp.	California lilac
Cercocarpus betuloides	Western mountain mahogany
Comarostaphylos diversifolia	summer holly
Fremontodendron spp.	flannel bush
Heteromeles arbutifolia	toyon
**Juniperus* spp.	juniper
Lavatera assurgentiflora	island mallow
Malosma (Rhus) laurina	laurel sumac
Myrica californica	Pacific wax myrtle
**Phormium tenax*	New Zealand flax
Prunus ilicifolia	hollyleaf cherry
Rhamnus californica	California coffeeberry
Rhamnus ilicifolia	hollyleaf redberry
Rhus integrifolia	lemonade berry
Rhus ovata	sugarbush

Table J-1: Trees and plants recommended for landscape planting at Naval Weapons Station Seal Beach

Botanical Name	Common Name
Medium Shrubs (5'-10')	
Arctostaphylos spp.	manzanita
Adenostoma fasciculatum	chamise
Atriplex canescens	fourwing saltbush
Atriplex lentiformis spp. *Breweri*	quail bush
Baccharis pilularis	coyote brush
Calycanthus occidentalis	spicebush
Dendromecon rigida	bush poppy
Galvezia speciosa	island bush snapdragon
Garrya elliptica	coast silktassel
Isomeris arborea	bladderpod
**Juniperus* spp.	juniper
Philadelphus lewisii	mock orange
Rhamnus crocea	redberry
Salix laevigata	red willow
Simmondsia chinensis	Jojoba
Viguiera laciniata	San Diego sun flower
Small Shrubs (3'-5')	
Arctostaphylos spp.	manzanita
Artemisia spp.	sage species
**Bougainvillea* spp.	bougainvillea
Calliandra eriophylla	fairy duster
Carpenteria californica	bush anemone
Ceanothus spp.	California lilac
**Cistus purpureus*	orchid rockrose
Cornus glabrata	brown dogwood
**Dietes bicolor*	fortnight lily
Ephedra californica	Mormon tea
Ephedra nevadensis	Mormon tea
Encelia californica	coast sunflower
Encelia farinosa	brittlebush
Eriogonum fasciculatum	California buckwheat
Eriogonum parvifolium	coastal buckwheat
Eriogonum umbellatum	sulphur buckwheat
**Juniperus* spp.	juniper
**Lantana montevidensis*	trailing lantana
**Lavandula dentata*	lavender
Lonicera hispidula	California honeysuckle
Penstemon spp.	penstemon
**Phormium tenax*	New Zealand flax
Pteridium aquilinum pubescens	western bracken fern

Table J-1: Trees and plants recommended for landscape planting at Naval Weapons Station Seal Beach

Botanical Name	Common Name
Ribes speciosum	fuchsia-flowered gooseberry
Ribes viburnifolium	Catalina currant
Rosa minutifolia	small-leaved rose
**Rosmarinus officinalis prostratus*	prostrate rosemary
Salix exigua	sandbar willow
Salvia spp.	sage species
Symphoricarpos albus	canyon snowberry
Trichostema lanatum	woolly blue-curls
Ground Cover Shrubs (less than 3')	
Arctotaphylos spp.	dwarf manzanita
Armeria maritima	common thrift
Baccharis pilularis 'Pigeon Point'	prostrate coyote brush
Ceanothus spp.	California lilac
**Drosanthemum hispidum*	rosea ice plant
Helianthemum scoparium	peak rush-rose
Iva hayesiana	San Diego marsh elder
**Lampranthus spectabilis*	trailing ice plant
**Phormium tenax*	New Zealand flax
Rosa californica	California wild rose
**Rosmarinus officinalis prostratus*	prostrate rosemary
Symphoricarpos mollis	creeping snowberry
PERENNIALS	
Medium Perennials (5'-10')	
Lilium humboldtii	Humboldt lily
Lilium pardalinum	leopard lily
Lupinus albifrons	silverbush lupine
Lupinus arboreus	evergreen lupine
Romneya coulteri	Coulter's Matilija Poppy
Romneya trichocalyx	bristly Matilija poppy
Small Perennials (3'-5')	
Delphinium cardinale	scarlet larkspur
Isomeris arborea	bladderpod
Iva hayesiana	San Diego marsh elder
Keckiella antirrhinoides	chaparral beard-tongue
Limonium californicum	coastal statice
Mimulus aurantiacus	sticky monkeyflower
Penstemon spp.	penstemon
Thalictrum fendleri var. *polycarpon*	meadow-rue
Ground Cover Perennials (less than 3')	
Achillea millefolium	common yarrow
Aquilegia formosa	western columbine

Table J-1: Trees and plants recommended for landscape planting at Naval Weapons Station Seal Beach

Botanical Name	Common Name
Camissonia cheiranthifolia	beach evening primrose
Coreopsis maritima	sea dahlia
Dichondra occidentalis	western dichondra
Dodecatheon clevelandii	padre's shooting star
Epilobium canum (californica)	California fuschia
Erigeron glaucus	seaside daisy
Eriophyllum confertiflorum	golden yarrow
Heuchera spp.	coral bells
Iris douglasiana	Douglas's iris
Iris longipetala	coast iris
Lessingia filaginifolia	California aster
Penstemon spp.	penstemon
Potentilla gracilis	slender cinquefoil
Salvia sonomensis 'Dara's Choice	creeping sage
Solanum xanti	purple nightshade
Solidago californica	California goldenrod
**Thymus praecox (Thymus serphyllum)*	mother-of-thyme
Trichostema lanatum	woolly bluecurls
ORNAMENTAL GRASSES	
Medium Ornamental Grasses (5'-8')	
Leymus (Elymus) condensatus	giant rye grass
Small Ornamental Grasses (3'-5')	
Elymus glaucus	blue wild rye
Leymus triticoides	alkali rye
Melica imperfecta	oniongrass
Ground Cover Ornamental Grasses (> 3')	
Achnatherum coronatum	stipa coronata
Agrostis diegoensis	bentgrass
**Festuca ovina glauca*	blue fescue
Muhlenbergia rigens	deergrass
Nassella cernua	nodding needlegrass
Nassella lepida	foothill needlegrass
Nassella pulchra	purple needlegrass
Sisyrinchium bellum	blue-eyed grass
ANNUALS (LESS THAN 3')	
Clarkia amoena	farewell to spring
Clarkia unguiculata	elegant clarkia
Eschscholzia californica	California poppy
Nemophila menziesii	baby blue-eyes
VINES	
**Anempaegma chamberlaynii*	yellow trumpet vine

Table J-1: Trees and plants recommended for landscape planting at Naval Weapons Station Seal Beach

Botanical Name	Common Name
**Bougainvillea* spp.	bougainvillea
Calystegia spp.	morning glory
Clematis spp.	clematis, ropevine
**Clytospoma callistegiodes*	violet trumpet vine
Maurandya antirrhiniflora	snapdragon
**Phaedranthus buccinatorius*	blood-red trumpet vine
Vitis girdiana	wild grape
TURF	
Family Housing, Bachelor Quarters or Small Approved Areas	
Tall fescue or perennial rye	
Parks and Playfields	
Mix of perennial rye, dwarf tall fescue and hybrid bermuda	

*Non-native non-invasive

Table J-2. Plants NOT PERMITTED for use on Naval Weapons Station Seal Beach

Scientific Name	Common Name
Acacia baileyana	Bailey acacia
Acacia longifolia (latifolia)	Sydney golden wattle
Acacia melanoxylon	black acacia
Acacia verticillata	acacia
Acacia redolens	acacia
Ailanthus altissima	tree of heaven
Anthemis cotula	mayweed, stinking chamomile
Aptenia cordifolia	red apple ice plant
Arundo donax	giant reed grass
Bamboo spp.	bamboo
Carpobrotus edulis	hottentot fig, ice plant
Chrysanthemum coronarium	garland chrysanthemum
Cortederia jubata, Cortaderia selloana	pampas grass
Cynara cardunculus	artichoke thistle
Cynodon dactylon	Bermuda grass (except in approved parks and playfields)
Cyperus alternifolia	umbrella plant
Cyperus rotundus	nutgrass
Cytisus scoparius, Cytisus striatus	Scotch broom
Dracaena australis (Cordyline australis)	giant dracaena
Echium candicans, Echium pininana	pride of Madeira
Ehrharta calycina	veld grass
Eucalyptus sp.	eucalyptus
Foeniculum vulgare	fennel
Gazania sp.	gazania
Hedera canariensis	Algerian ivy

Table J-2. Plants NOT PERMITTED for use on Naval Weapons Station Seal Beach

Scientific Name	Common Name
Limonium perezii	sea lavender
Myoporum laetum	myoporum
Nicotania glauca	tree tobacco
Oenothera berlandieri (O. speciosa childsii)	Mexican evening primrose
Osteospermum fruticosum	trailing African daisy
Oxalis pes-caprae	Bermuda buttercup
Pennisetum cladestinum	Kikuyu grass
Pennisetum setaceum	fountain grass
Phalaris aquatica	harding grass
Lippia nodiflora	mat grass
Retama monosperma	bridal broom
Ricinus communis	castor bean
Rubus discolor	Himalaya berry
Senecio mikanioides	cape ivy
Schinus molle	California pepper tree
Schinus terebinthifolius	Brazilian pepper tree
Senecio mikanioides	German ivy
Sorghum halepense	Johnson grass
Spartium junceum	Spanish broom
Tamarix spp.	salt cedar
Ulmus paryifolia	Chinese elm
Vinca major	periwinkle

In addition, any plant listed by the California Invasive Plant Council or the California Department of Agriculture as a threat to ecosystems or agriculture will not be planted on Naval Weapons Station Seal Beach.

This Page Intentionally Blank

Appendix K: Reporting on Migratory Bird Management

This Page Intentionally Blank

Appendix K: Reporting on Migratory Bird Management

Migratory Bird Treaty Act

The MBTA of 1918 is the primary legislation in the United States established to conserve migratory birds. It implements the United States' commitment to four bilateral treaties, or conventions, for the protection of a shared migratory bird resource. The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. The species of birds protected by the MBTA appears in 50 CFR 10.13.

In addition, the Act was further amended in 2004 to exclude non-native migratory bird species that have been introduced by humans (intentionally or unintentionally) into the U.S. or its territories. The USFWS has published the final list of non-native bird species that are not protected under the MBTA (70 FR 49 [15 March 2005], pp. 28907-28908).

Migratory Bird Rule As Applied to Military Readiness Activities

On 02 December 2003, the President signed the 2003 NDAA. The Act provides that the Secretary of the Interior shall exercise his/her authority under the MBTA to prescribe regulations to exempt the Armed Forces from the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense.

Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Congress further provided that military readiness activities do not include:

1. The routine operation of installation operating support functions, such as administrative offices, military exchanges, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, laundries, morale, welfare, recreation activities, shops, and mess halls;
2. The operation of industrial activities; or
3. The construction or demolition of facilities used for a purpose described in 1. or 2., above.

The final rule authorizing the DoD to take migratory birds during military readiness activities was published in the Federal Register on 28 February 2007. The regulation can be found at 50 CFR Part 21. The regulation provides that the Armed Forces must confer and cooperate with the USFWS on the development and implementation of conservation measures to minimize or mitigate adverse effects of a military readiness activity if it determines that such activity may have a significant adverse effect on a population of a migratory bird species.

The requirement to confer with the USFWS is triggered by a determination that the military readiness activity in question will have a significant adverse effect on a population of migratory bird species. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem. A population is defined as "a group of distinct, coexisting, same species, whose breeding site fidelity, migration routes, and wintering areas are temporally and spatially stable, sufficiently distinct geographically (at some point of the year), and ade-

quately described so that the population can be effectively monitored to discern changes in its status." Assessment of impacts should take into account yearly variations and migratory movements of the impacted species.

Migratory Birds Memorandum of Understanding, DoD-USFWS

Migratory bird conservation relative to non-military readiness activities is addressed separately in a MOU developed in accordance with EO 13186, signed 10 January 2001, "Responsibilities of Federal Agencies to Protect Migratory Birds." The Memorandum of Understanding between DoD and the USFWS was signed on 31 July 2006. DoD responsibilities discussed in the Memorandum of Understanding include, but are not limited to:

1. Obtaining permits for import and export, banding, scientific collection, taxidermy, special purposes, falconry, raptor propagation, and depredation activities.
2. Encouraging incorporation of comprehensive migratory bird management objectives in the planning of DoD planning documents.
3. Incorporating conservation measures addressed in Regional or State Bird Conservation Plans in INRMP.
4. Managing military lands and activities other than military readiness in a manner that supports migratory bird conservation.
5. Avoiding or minimizing impacts to migratory birds, including incidental take and the pollution or detrimental alteration of the environments used by migratory birds.
6. Developing, striving to implement, and periodically evaluating conservation measures for management actions to avoid or minimize incidental take of migratory birds, and, if necessary, conferring with the USFWS on revisions to these conservation measures.

In April 2007, guidance was issued by the OUSD for Acquisition, Technology and Logistics on implementing the MOU to Promote the Conservation of Migratory Birds between the USFWS and DoD in accordance with EO 13186 (17 January 2001). This guidance covers all activities on Navy property, including natural resources management, routine maintenance and construction, industrial activity, and hazardous waste cleanup.

The guidance emphasizes interdisciplinary collaboration in framework of NABCI conservation regions, collaborative inventory, and long-term monitoring.

Migratory Bird Management at NWSSB

The SBNWR is recognized as an Important Bird Area by the Audubon Society (Orange Coast Wetlands complex; California Audubon Society webpage 2002). On NWSSB, 253 bird species have been recorded, the majority of which have been observed in SBNWR. Peak diversity can be found during spring and fall migrations though several species are year-round residents. The highly productive wetlands are the habitat most frequently used by birds, but the surrounding uplands are also utilized.

Conservation measures undertaken under the Migratory Bird Rule require monitoring and record-keeping for five years from the date the Armed Forces commence their conservation action. During Integrated Natural Resources Management Plan reviews, the

Armed Forces must report to the USFWS migratory bird conservation measures implemented and the effectiveness of the conservation measures in avoiding, minimizing, or mitigating take of migratory birds.

For NWSSB, these are:

1. Conservation measures implemented for migratory birds.
   - Habitat protection through a Congressionally-designated overlay for management by the USFWS.
   - Habitat management by limiting human access into wetlands and other habitat areas.
   - Several riparian, marsh, mudflat, eelgrass, and other restoration and enhancement that would benefit migratory birds are proposed in the INRMP.
   - Erosion control and water quality measures in uplands that prevents sedimentation and pollution of wetlands and shore areas.
   - Scheduling mowing, construction, and other activities to avoid the breeding season of migratory birds.
   - Inventory and monitoring of birds.
   - Invasive weed control.
   - Restoration of wetlands areas through Friends of Seal Beach, Arbor Day plantings, etc.
   - Promoting regular clean-up days.
   - Burrowing owl protection and management per State of California regional biodiversity objectives. Burrowing Owl Management Plan Development, Burrowing Owl Active Relocation, Burrowing Owl Passive Relocation.
   - Monitoring of avian populations.
     - Focused surveys for plants, birds, and wetlands are conducted periodically
     - Monthly High Tide Avian Survey
     - Monthly Low Tide Avian Survey

     Periodic Anaheim Bay Avian Survey
     - Annual Christmas Bird Counts
     - Avian Predator Survey, Avian Predator Trapping and Banding
     - Light-footed Clapper Rail Call Counts, Light-footed Clapper Rail High Tide Counts
     - California Least Tern Breeding Monitoring, California Least Tern Predator Management, NASA Island Weed Management Pilot Study
     - Western Snowy Plover Breeding Season Window Survey
     - Western Snowy Plover Winter Window Survey

     Five-year Belding's Savannah Sparrow Surveys as part of State-wide census
     - Wetland Study
     - Eelgrass Survey
     - Wetland Delineation

At NWSSB, migratory birds are typically managed through measures to avoid the breeding season, and routine checking for nests before undertaking activities that may affect nesting birds. Trees are typically not removed unless it is unavoidable (related to the mission and or safety) if migratory birds are present.

Migratory birds also benefit incidentally from the threatened and endangered species conservation strategies associated with that specific management and monitoring. Surveys for listed species are conducted at potential construction sites if there is a possibility of their presence. Results of these surveys are reported within the planning documents (e.g. Biological Assessments, Environmental Assessments) for the proposed project.

The Navy's pet management policy as well as the requirement to keep dogs on leash in housing areas are means to protect birds. The U.S. Navy policy regarding control of feral animals can be found in the following regulations: SECNAVINST 6401-1A, Veterinary Health Services; AFPMB TIM #37, Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States; OPNAVINST 6250.4B, dated 27 August 1998, Pest Management Programs.

Consistent with the 1997 ROD on predator control, predators of federally listed birds are harassed to avoid take on the listed species. While there is no written predator management plan, all avian predator management occurs consistent with ESA Section 7 consultation with the USFWS, as well as with USFWS permitted actions by the Navy's contractor (USDA Wildlife Animal and Plant Health Inspection Service Services).

2. Effectiveness of conservation measures for avoiding, minimizing, or mitigating take of migratory birds.

Each year the Navy programs for new projects in order to implement its INRMP. In addition, The USFWS-Refuges contributes to inventory and monitoring, and collaborates with education, outreach, and restoration projects with the Navy.

Appendix L: Critical Habitat and INRMP Benefits for Endangered Species

This Page Intentionally Blank

Appendix L: Critical Habitat and INRMP Benefits for Endangered Species

The ESA was revised via the NDAA of 2004 (P.L. 108-136) to recognize INRMP conservation measures and species benefit that could obviate the need for critical habitat designation on Navy lands.

Section 4(a)(3) of the revised ESA states that: "The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the DoD, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation."

All Navy installations with federally listed threatened or endangered species, proposed federally listed threatened or endangered species, candidate species, or unoccupied habitat for a listed species where critical habitat may be designated, must structure the INRMP to avoid the designation of critical habitat. The INRMP may obviate the need for critical habitat if it specifically addresses both the benefit provided to the listed species and the provisions made for the long-term conservation of the species. The species benefit must be clearly identifiable in the document and should be referenced as a specific topic in the INRMP table of contents.

The USFWS uses a three-point criteria test, to determine if an INRMP provides a benefit to the species. An installation is strongly encouraged to use these USFWS criteria, listed below, when structuring its INRMP to avoid the need for critical habitat designation. NWSSB's efforts is presented after each criterion.

a) The plan provides a conservation benefit to the species. The cumulative benefits of the management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species' population, or the enhancement or restoration of its habitat within the area covered by the plan [i.e. those areas deemed essential to the conservation of the species]. A conservation benefit may result from reducing fragmentation of habitat, maintaining or increasing populations, insuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies.

Light-Footed Clapper Rail

- In 1982, the USFWS constructed five nesting hummocks for light-footed clapper rails. These were built by carrying five-gallon buckets of soil to hummock sites and building them to an elevation above extreme high tide level. Natural erosion later reduced the heights of the hummocks to lower than optimal elevation.
- In 1985, additional light-footed clapper rail nesting mounds were constructed. Eleven nesting mounds in three separate locations on SBNWR were created by cutting existing berms extending from upland habitat into the marsh. The mounds were isolated from the uplands with the intent of deterring or preventing mammalian predators, primarily red foxes. Light-footed clapper rails nested on the berms in past years, but when the disappearance of eggs from nests became common, rails stopped nesting on them.

- In 1987, another project was initiated to create safe nesting sites for light-footed clapper rails. Before the clapper rail breeding season that year, the USFWS installed 28 floating rafts in the salt marsh portion of SBNWR. Each raft consisted of a wooden platform anchored with two wooden dowels. The dowels keep the raft from drifting away, yet allow it to float up and down with the tide. This protects the nest from flooding during extreme high tides. Rafts also provide rail nesting sites in isolated locations away from mammalian predators. A dense tumbleweed secured on top of each raft helps provide nesting cover and concealment for the rails. Light-footed clapper rails began nesting on the rafts the first year they were in place.

The breeding population of the light-footed clapper rail in 2012 was 42 breeding pairs, a 24% increase from 2011. This was the third year for a relatively large increase in number of breeding pairs. In 2011, the number of breeding pairs increased 36% from 2010. Eighty-seven nesting rafts for the light-footed clapper rail were monitored at NAVWPNSTA Seal Beach/SBNWR during the 2012 breeding season. Twenty-seven incubation nests were found; eight of those incubation nests contained a second clutch for a total of 35 clutches. Another 32 brood nests were built on 32 rafts. Overall nesting success was 99%. Continued raft maintenance, continued efforts to modify raft design to maximize the security of the nesting site, the provision of winter cover on the rafts and study of winter activity in the marsh to attempt to identify causes of winter mortality are important components in the program to manage and recover the light-footed clapper rail.

- High tide counts have been performed at least once annually during daytime +6.7 feet or higher tides since 1975. High tides force the clapper rails to the pickleweed in the marsh where they are easily visible to observers. These surveys provide min- imum population estimates for the clapper rails.
- Call count surveys are performed annually to estimate the composition and breeding status of the clapper rail population. USFWS biologists conduct these surveys over several evenings during the breeding season and throughout the marsh to estimate the ratio of males to females and of paired to unpaired rails.
- Nests are located and monitored for breeding success, predations and predators.
- NWSSB maintains conceptual restoration proposals in its INRMP that would benefit the clapper rail for future funding.
- Pollutants are controlled through monitoring and preventive measures.
- Water quality is monitored for adaptive management.
- Debris is removed that often arrives through local watersheds or tidal action.
- Agricultural practices are enforced that avoid or minimize the use of pesticides that could affect clapper rail food resources.

California Least Tern

Currently, California least terns nest on NASA Island within SBNWR. The nesting site is about three acres in size and was prepared for the terns between 1977 and 1979 by the Fish and Wildlife Service. Terns began nesting on NASA Island in 1979. Since then, their population on the Refuge has fluctuated (Refer to Figure 3-13).

A total of 121 CLT nests were initiated in 2012. The first nest was observed May 9 and the last new nest was initiated July 4. Mean clutch size was 1.77 eggs per nest, and hatching success was 81% (11 eggs were lost to predators and 30 were abandoned or infertile). Documented predation by Common Raven (*Corvus corax*), with suspected predation by American Kestrel (*Falco sparverius*), combined with natural mortality, resulted in a documented loss of 24.6% of chicks and a minimum fledgling estimate of 40 birds, or 0.34 fledglings per pair.

- Breeding Monitoring

- Predator Management

- A pilot study was performed at the three acre NASA island nesting site during 2005 to test a variety of control methods for undesirable vegetation. Five treatment methods were tested at the tern nesting site (AC&S 2006):
  - Mechanical Removal (Control): Non-native plants were removed by scraping the surface using a tractor.
  - Herbicide Application: Glyphosate herbicide (5% Aquamaster® solution) was sprayed on non-native plants using a power sprayer.
  - Saltwater Irrigation: The saltwater test section was watered for six hour periods three days in a row, and then the sprinkler system was removed.
  - Plastic, Salt and Sand Layering: Approximately 10 inches of soil was removed, a 4-millimeter thick plastic sheeting was installed followed by a 3-inch layer of salt, and a 6- to 7-inch layer of beach sand.
  - Salt and Rototilling: A 6-inch layer of salt was spread on the plot and then roto-tilled approximately 12 inches into the soil.
  - The most successful treatments in controlling non-native plant growth were the plastic/salt/sand, salt/rototill and saltwater irrigation treatments. These three management strategies produced less than 10 percent plant cover. The herbicide and control treatments had fairly high plant cover with 50 percent and 60-75 percent cove within their respective control treatment districts. However, in terms of subsequent use by terns for nesting, the plastic/salt/sand and salt/rototill methods were the least attractive to birds (AC&S 2006). The highest percentage of nest occurrence was documented on the control plot, followed by the herbicide and saltwater irrigation treatment zones.

- The effects of heron predation on terns and rails is of concern and additional study is needed to determine to what extent, if any, herons are contributing to the existing predation problem within the Refuge.
- Pollutants are controlled through monitoring and preventive measures.
- Water quality is monitored for adaptive management.
- Debris is removed that often arrives through local watersheds or tidal action.
- Agricultural practices are enforced that avoid or minimize the use of pesticides that could affect clapper rail food resources.

Participated in regional program that utilizes geolocators to reveal migratory patterns of least terns.

Western Snowy Plover

- Breeding Season Window Survey
- Western Snowy Plover Winter Window Survey
- Beach clean-ups
- Access control on beaches
- Western snowy plover nesting sites often overlaps that of the California least tern, it has benefitted from intensive management for terns in some locations.

Green Sea Turtle

- Critical habitat has not been delineated by USFWS in California.
- Proposed monitoring would contribute to the body of knowledge needed for understanding migration and behavior patterns of the green sea turtle, as well as utilization of NWSSB by individual turtles.

Periodic culvert inspection to ensure that marine growth will not impede turtle movement or create an entrapment hazard

Participate in a tag and tracking research project in partnership with NOAA-NMFS and California State University Long Beach to assess utilization of Station resources by green sea turtles.

Appendix M: NEPA Proof of Publication

This Page Intentionally Blank

AFFIDAVIT OF PUBLICATION

STATE OF CALIFORNIA,)
) ss.
County of Orange)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of **The Orange County Register**, a newspaper of general circulation, published in the city of Santa Ana, County of Orange, and which newspaper has been adjudged to be a newspaper of general circulation by the Superior Court of the County of Orange, State of California, under the date of November 19, 1905, Case No. A-21046, that the notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

August 3, 4, 5, 2012

"I certify (or declare) under the penalty of perjury under the laws of the State of California that the foregoing is true and correct":

Executed at Santa Ana, Orange County, California, on
Date:

August 5, 2012

Signature

The Orange County Register
625 N. Grand Ave.
Santa Ana, CA 92701
(714) 796-7000 ext. 3002

PROOF OF PUBLICATION

Proof of Publication of

NOTICE OF AVAILABILITY OF AN ENVIRONMENTAL ASSESSMENT (EA) AND FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR THE REVISED INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP) AT NAVAL WEAPONS STATION SEAL BEACH, ORANGE COUNTY, CALIFORNIA

Pursuant to the National Environmental Policy Act, the U.S. Navy gives notice that an EA and FONSI have been prepared, and an Environmental Impact Statement is not required, for the Revised INRMP at Naval Weapons Station Seal Beach.

The Navy will adopt the Revised INRMP which will balance natural resource management with the military mission of the Station. The agricultural leases on the Station will continue, with the possibility of conversion to native habitats over the long-term.

Based on the analysis presented in the EA, the Navy finds that implementation of the Revised INRMP will not significantly impact the quality of the human or natural environment. The Draft Final Revised INRMP (awaiting signature), EA and FONSI may be viewed at the Mary Wilson Public Library, 707 Electric Avenue, Seal Beach, California 90740 or by contacting Sara Yamashita at sara.yamashita@navy.mil, (619) 532-3868.

Publish: Orange County Register
August 3, 4, 5, 2012 R-1278 9500803

Appendix N: Duties Designation Letter

This Page Intentionally Blank

DEPARTMENT OF THE NAVY
NAVAL WEAPONS STATION SEAL BEACH
800 SEAL BEACH BOULEVARD
SEAL BEACH, CA 90740-5000

CANC FRP: Sep 14
IN REPLY REFER TO:
NAVWPNSTASBNOTE 1301
N00
15 NOV 2013

NAVWPNSTA SEAL BEACH CA NOTICE 1301

Subj: ASSIGNMENT OF PERSONNEL TO PRIMARY COLLATERAL DUTIES

Ref: (a) OPNAVINST 3120.32D
(b) U. S. Navy Regulations, 1990

Encl: (1) List of Duty Assignments
(2) Collateral Duty Assignments

1. Purpose. To publish the assignment of Naval Weapons Station Seal Beach personnel primary and collateral duties.

2. Cancellation. NAVWPNSTASBNOTE 1301 of 18 Apr 13.

3. Background. Reference (a) is the basis for assignments of primary and collateral duties. Reference (b) vests in the Commanding Officer (CO) the authority to assign personnel under his or her command primary duties based on the individual's capabilities and command manpower requirements. For positions requiring designation in writing, this notice fulfills that requirement. Enclosures (1) and (2) constitutes official notification of primary duties, collateral duties, and assignments to boards, councils, and committees.

4. Responsibility. All initial assignments and subsequent changes must originate from the Executive Officer in consonance with the desires of the CO. Installation Program Directors (IPDs) submit recommended changes to enclosures (1) and (2) to the Command Admin IPD. IPDs will review turnover files in instances where officers in their departments are relieved. The Executive Officer will review the files for relief's involving IPDs or senior board members.

5. Action. The primary and collateral duties contained in enclosures (1) and (2) are effective this date. No additional directives will be issued unless specifically required for the duty assigned. It is the responsibility of each person assigned duties by this notice to review applicable references, maintain required records, files, and submit required reports to the Commanding Officer and Executive Officer. Periodic review (i.e., three monthly collateral duty programs) of collateral duties will

be conducted and an internal command self-assessment audit completed. A memorandum of internal audit completion will be routed to the Commanding Officer via the Executive Officer and Command Admin IPD for review.

6. Cancellation Contingency. This notice will remain in effect until superseded by another notice of the same subject matter.

M. H. HARDY

Distribution:
Electronic only, via NAVWPNSTA Seal Beach Web site

LIST OF DUTY ASSIGNMENTS

Billet Title	Org	Rank/Name	Telephone (DSN)
Commanding Officer	N00	CAPT Martin H. Hardy	873-7901
Executive Officer	N01	CDR Paul Werring	873-7902
Director Det Fallbrook & NORCO	N01	Mr. Anthony Winicki	873-3609
Officer In Charge Det Norco	N01	CDR Wayne Goveia	873-7392
Command Senior Chief	N00F	CMDCM Pedro Gines	873-7687
Command Admin IPD	N04C2	Ms. Linda Tagami	873-7519
Inspector General IPD	N00G	Ms. Karen Burrows	873-7194
Public Affairs IPD	N00P	Mr. Gregg Smith	873-7215
Security Det Norco	N3AT	Mr. Anthony Herrera	933-4335
Security Det Fallbrook	N3AT	Mr. Martin Sizemore	873-3748
Security IPD	N3AT	CW03 Roderick Harris	873-7625
Anti-Terrorism Officer	N3AT	MAC Jose Hernandez	873-7415
Port Operations IPD	N31	Mr. Albert Rosales	873-7206
NAVOSH IPD	N35C	Mr. James Olinger	873-7390
Fire Chief Seal Beach	N30	Mr. Danny Parks	873-7005
Emergency Management IPD	N37C	Patrick Harding (Acting)	873-7209
NMC CWD Executive Director	N42D	Mr. Merrill Bailey	873-7400
NMC CWD Executive Officer	N42DC	CDR Marc Goode	873-7405
NMC CWD Unit Seal Beach Director	N42W	Mr. Kevin Miller	873-7476
NMC CWD Unit Seal Beach Deputy Director	N42W	Vacant	873-7010
NMC CWD Explosives Safety Director	N43DE	Mr. Ernie Castillo	873-7396
Explosives Safety IPD	N43WS	Mr. Anthony Kennedy	873-7009
Environmental IPD	N45WS	Mr. David Baillie	873-6068
Facilities IPD	N46WS	LCDR Ray Oviedo	873-7291
Information Technology IPD	N6	Ms. Debby Montoya	873-7100
Training and Readiness IPD	N7	Mr. Patrick Harding	873-7209
Support Services IPD	N92	Mr. John Clingan	873-7615
BQ Housing IPD	N931A	Mr. Keith Perry	873-7227

COLLATERAL DUTY ASSIGNMENTS

Collateral Duty Governing Instruction	Name	PRD	Loc
Agricultural & Rancher Outlease Media Coordinator			
OPNAVINST 5090.1C	Mr. Robert Schallmann		SB
	Ms. Christy Wolf		FB
***Apprenticeship Program Coordinator**			
OPNAVINST 1560.10C	MA1 Purcell Tabron	Jun-16	SB
Asbestos Control Program			
OPNAVINST 5100.23G	Mr. Leon Williams		SB/FB/NOR
Auxiliary Security Force Coordinator			
NAVPERSCOMINST 5530.4A	MACS Kelly Hallmark	Jul-15	
	MA1 Jose Cenuse	Oct-16	
Base Clean-up/Material Condition			
COMNAVREGSWINST 3120.3A	CAPT Martin Hardy	Jun-15	SB
	CDR Paul Werring	Nov-14	
***Base/Region Indoctrination**			
COMNAVREGSWINST 3120.3A	CMDCM Pedro Gines	Dec-13	SB
Beneficial Suggestion Awards Program			
DOD 1400.25M	Ms. Tara Banks		SB
***BEQ Advisory Board**			
COMNAVREGSWINST 11103.1B	CDR Paul Werring	Nov-14	SB
Bachelor Housing Ref Guide Series	CMDCM Pedro Gines	Dec-13	SB
	Mr. Keith Perry BQ Residence Rep		
***Career Development Board**			
BUPERSINST 1040.5A	CMDCM Pedro Gines	Dec-13	SB
	NC1 Antonia Diaz	Oct-14	SB
	YNC Kiona Gilbert	Mar-15	SB

COLLATERAL DUTY ASSIGNMENTS

Collateral Duty Governing Instruction	Name	PRD	Loc
***Casualty Assistance Control Officer (CACO)**			
OPNAVINST 1770.1A	CDR Wayne Goveia	Jun-16	SB/NOR
BUPERS 1770.3	MAC Ronnie Ray	Apr-17	SB
COMNAVREGSWINST 1770.5			
COMNAVMEDCOMINST 5360.1			
***Ceremonies and Protocol Advisory Board**			
OPNAVINST 1710.7A	CDR Paul Werring	Nov-14	SB
DODD 1344.9	CMDCM Pedro Gines	Dec-13	SB
Civilian MWR Custodian			
BUPERSINST 12990.1A	Mr. John Schweitzer (Primary)		SB
	Mr. Eleno Cortez (Alternate)		SB
Clean Water Ashore			
OPNAVINST 5090.1C	Mr. Julian Ibarra		SB/FB/NOR
Combined Federal Campaign			
SECNAVINST 5340.2D	MC1 Eli Medellin	Oct-15	SB
***Command Assessment Team**			
OPNAVINST 5354.1F	CDR Paul Werring	Nov-14	SB
	CW03 Roderick Harris	Apr-16	SB
	CMDCM Pedro Gines	Dec-13	SB
	YNC Kiona Gilbert	Mar-15	SB
	Ms. Linda Tagami		SB
	Mr. Patrick Harding		SB
	NC1 Antonia Diaz	Oct-14	SB
	MAC Ronnie Ray	Apr-17	SB
Command Blood Drive Coordinator			
OPNAVINST 6530.2D	MC1 Eli Medellin	Oct-15	SB
Command Career Counselor			
SECNAVINST 1560.4A	NC1 Antonia Diaz	Oct-14	SB
OPNAVINST 1560.9A	YNC Kiona Gilbert (Alternate)	Mar-15	SB
NAVPERS 15878G	CAPT Martin Hardy	Jun-15	

Enclosure (2)

COLLATERAL DUTY ASSIGNMENTS

Collateral Duty Governing Instruction	Name	PRD	Loc
NAVPERS 15878H	CDR Paul Werring	Nov-14	SB
	All Chief Petty Officers		
***Command Citizenship Representative**			
NAVADMIN 113-08	NC1 Antonia Diaz	Oct-14	SB
***Command Duty Officers (Watches)**			
OPNAVINST 5102.1D	MNCS Shane Caver	Jan-15	SB
OPNAVINST 3120.32D			
***Command Education Service Officer**			
SECNAVINST 1560.4A	YNC Kiona Gilbert	Mar-15	SB
DODD 1322.8	NC1 Antonia Diaz (Alternate)	Oct-14	SB
DODD 1322.16			
***Command Financial Specialists**			
OPNAVINST 1740.5B	MNC Hoffman	Jul-14	SB
DODD 1344.9	MNC Gardner	Dec-15	SB
DODD 1340.17	MA1 Jonathan Prichard	Jul-16	SB
***Command Fitness Coordinator**			
OPNAVINST 6110.1J			
OPNAVINST 6100.2A	MAC Jose Hernandez	Aug-14	FB
MILPERSMAN	MA1 Christopher Daniel	Oct-14	SB
DODD 1308.1	MA1 Mark Schlom	Jan-15	SB
DODD 1010.10	YN1 Shauntey Wills	Apr 17	SB
BUPERSINST 1430.16E			
***Command IA Coordinator**			
OPNAVINST 5354.1F	NC1 Antonia Diaz	Oct-14	SB
***Command Management Equal Opportunity Officer (CMEO)**			
OPNAVINST 5354.1F	MACS Kelly Hallmark	Jul-15	SB/FB/NOR
	MAC Ronnie Ray	Apr-17	SB/FB/NOR

Enclosure (2)

COLLATERAL DUTY ASSIGNMENTS

Collateral Duty Governing Instruction	Name	PRD	Loc
***Command Navy Sponsor Program**			
OPNAVINST 1740.3C	CMDCM Pedro Gines	Dec-13	SB
NAVWPNSTASBINST 1750.2E	NC1 Antonia Diaz	Oct-14	SB
	Mr. Joseph Samson		SB
Command Senior Watch Officer			
OPNAVINST 5102.1D	MNCS Shane Caver	Jan-15	SB
OPNAVINST 3120.32D			
NAVWPNSTASBINST 1601.10F			
***Command Suicide Prevention Coordinator**			
OPNAVINST 1720.4A	MACS James Bolibrzuch	Apr-14	SB/FB/NOR
DODD 1005.6	MA2 Jessica Reed (Assistant)	Apr-14	SB/FB/NOR
NAVWPNSTASBINST 1601.10F			
***Command Training Team**			
OPNAVINST 5370.2C	Mr. Patrick Harding		SB/FB/NOR
OPNAVINST 1500.22F	Mr. James Olinger		
DODD 1322.18	Mr. Thomas Beck		
***Command Urinalysis Screening**			
OPNAVINST 5350.4D	MAC Jose Hernandez	Oct-14	SB
NAVWPNSTASBINST 5350.4F	BM1 Emerson Harris	Jul-15	SB
DODD 1010.1	MA1 Jose Cenuse	Oct-16	SB
***Communications Security (COMSEC) Local Element/Issuer (LE/I)**			
EKMS 1B	Ms. Steven Schmidt		SB
Credit Union Liaison Officer			
DoD Financial Mgmt Reg Col 5, CH 34	Ms. Linda Tagami		SB/NOR
Cultural Resources Media Manager			
OPNAVINST 5090.1C	Ms. Lisa Bosalet		SB/FB/NOR

COLLATERAL DUTY ASSIGNMENTS

Collateral Duty / Governing Instruction	Name	PRD	Loc
Dependent Death Reporting Requirements and Claim Processing			
Public Law 107-14			
Public Law 105-368			
NAVPERS 15560C			
NAVADMIN 281-01	MAC Ronnie Ray	Apr-17	SB
Disaster Preparedness			
OPNAVINST 3440.17	Patrick Harding (Acting)		SB/FB/NOR
COMNAVREGSWINST 3440.1B			
***Disciplinary Review**			
OPNAVINST 1620.2A	CMDCM Pedro Gines	Dec-13	SB
Diversity/Multicultural Committee			
	MC1 Eli Medellin	Oct-15	SB
	MA1 Louis Huanate	Feb-16	SB
	YN2 Travis China	May-14	SB
***Drug and Alcohol Program**			
SECNAVINST 5300.28E	MAC Jose Hernandez	Aug-14	SB
OPNAVINST 5350.4D	MA1 Purcell Tabron	Jun-16	SB
NAVWPNSTASBINST 5350.4F			
DODD 1010.7			
DODD 1010.4			
Environmental Management System Management Representative (EMS-MR)			
OPNAVINST 5090.1C	Mr. David Baillie		SB/FB/NOR
Examining Board and Proctors for Advancement in Rate or Rating of Enlisted			
BUPERSINST 1430.16E	E-7 and Above as Assigned		
Exceptional Family Member (EFM) Program Manager			
SECNAVINST 1754.1B	YNC Kiona Gilbert	Mar-15	SB
OPNAVINST 1754.2D			
Explosive Hazardous Waste Program Manager			
NAVWPNSTASBINST 5090.2C	Ms. Pei-Fen Tamashiro		SB/FB

COLLATERAL DUTY ASSIGNMENTS

Collateral Duty Governing Instruction	Name	PRD	Loc
***Family Advocacy Representative Program**			
OPNAVINST 1754.1B	CMDCM Pedro Gines	Dec-13	SB
OPNAVINST 1752.2B			
Freedom of Information Act (FOIA) Coordinator			
SECNAVINST 5720.42F	Ms. Linda Tagami		SB/FB/NOR
COMNAVREGSWINST 5720.1			
***General Military Training (GMT)**			
OPNAVINST 1500.22F	MA1 Mark Schlom	Jan-15	SB
Geographic Bachelor Review Board			
COMNAVREGSWINST 11103.1B	CDR Paul Werring	Nov-14	SB
	Mr. Keith Perry		SB
Geographic Bachelor/Resident Advisory Board			
	CDR Paul Werring	Nov-14	SB
COMNAVREGSWINST 11103.1B	Mr. Keith Perry		SB
Bachelor Housing Ref Guide Series	CMDCM Pedro Gines	Dec-13	SB
Hazardous Material Control and Management (HMC&M) Program			
	Mr. Jeff McGovern		SB/FB/NOR
	Mr. James Olinger		SB/FB/NOR
	Mr. Thomas Beck		SB/FB/NOR
Hazardous Substances and Oil Spill Response Qualified Individual			
OPNAVINST 5090.1C	Mr. David Baillie		SB/FB/NOR
	Mr. Robert Schallmann		SB/FB/NOR
Information Assurance Manager (IAM)			
DODI 8500.2	Mr. Steven Schmidt		SB
Information Assurance Officer (IAO)			
DODI 8500.2	Ms. Imelda Vargas		SB
Installation Restoration Program (IRP) Coordinator/Munitions Response Program Coordinator			
OPNAVINST 5090.1C	Ms. Pei-Fen Tamashiro		SB/FB

COLLATERAL DUTY ASSIGNMENTS

Collateral Duty Governing Instruction	Name	PRD	Loc
Lead Program			
OPNAVINST 5100.23G	Mr. Hector Romero		SB/FB/NOR
***Legal Program/Non Judicial Punishment**			
JAG 5800.7F	YNC Kiona Gilbert	Mar-15	SB
Military Whistleblower Reprisal Coordinator			
SECNAVINST 5370.7C	Ms. Karen Burrows		SB
Military Volunteer Coordinator			
SECNAVINST 5720.44C	MC1 Eli Medellin	Oct-15	SB
Mishap Investigations, Reporting and Records Keeping			
OPNAVINST 5100.23G	Mr. James Olinger		SB/FB/NOR
	Mr. Evan Risorto		SB/FB/NOR
Motor Accident Investigation Crime Prevention			
OPNAVINST 5102.1D	MA1 Christopher Daniel	Oct-14	SB
	MA2 Hernandez Cruz	Nov-14	
	MA2 Robert Craven	Aug-16	
	MA3 Deven Highland	Apr-16	
***Motorcycle Safety Representative**			
OPNAVINST 5100.12J	MA1 Christopher Daniel	Oct-14	SB/FB/NOR
	MA3 Deven Highland	Apr-16	
National Environmental Policy Act Program			
OPNAVINST 5090.1C	Ms. Lisa Bosalet		SB/FB/NOR/SP
Natural Resources Manager			
OPNAVINST 5090.1C	Ms. Christy Wolf		FB
	Mr. Robert Schallmann		SB/NOR/SP
NAVOSH Councils and Committees Programs			
OPNAVINST 5100.23G	Mr. James Olinger		SB/FB/NOR
***Navy Family Ombudsman Program**			
OPNAVINST 1750.1G OPNAVINST 1740.4D	Mrs. Erika Phillips		SB