Final

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Naval Base Coronado, California

July 2013

FINAL

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

NAVAL BASE CORONADO, CALIFORNIA

JULY 2013

INRMP CONCURRENCE PAGE

This Integrated Natural Resources Management Plan (INRMP), July 2013, has been prepared in accordance with regulations, standards, and procedures of the Department of Defense, the U.S. Navy, and the Sikes Act, as amended through 2012 (16 United States Code [U.S.C.] §670a) in cooperation with the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), and the National Marine Fisheries Service (NMFS). This INRMP provides for management and stewardship of all natural resources present on the installation.

To the extent that resources permit, the USFWS, CDFW, NMFS, and the U.S. Navy by signature of their agency representative do hereby agree to enter a cooperative program for the conservation, protection, and management of natural resources present on Naval Base Coronado (NBC). The intention of this agreement is to develop functioning, sustainable ecological communities on NBC that integrate the interests and missions of the agencies charged with conservation, protection, and management of natural heritage in the public interest. This agreement may be modified and amended by mutual agreement of the authorized representatives of the three agencies. This agreement will become effective upon the date of the last signatory and shall continue in full force for a period of five years or until terminated by written notice to the other parties, in whole or in part, by any of the parties signing this agreement.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence with and acceptance of the following document.

Approving Officials:

CAPT Christopher Sund
Commanding Officer
Naval Base Coronado
San Diego, California

21 May 2014
Date

Mr. Luis Perez
Installation Environmental Program Director
Naval Base Coronado
San Diego, California

5/15/14
Date

Mr. Douglas Powers
Regional Natural Resources Program Manager EV51
San Diego, California

5/15/14
Date

INRMP APPROVING OFFICIAL SIGNATURE PAGE

Concurring agency:

U.S. Fish and Wildlife Service

Mr. Jim Bartel
Field Supervisor,
Carlsbad Field Office
U.S. Fish and Wildlife Service, Region 8

September 26, 2013
Date

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
(858) 467-4201
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

November 4, 2013

Captain G. A. Mayes
Commanding Officer, United States Navy
Naval Base Coronado
Box 357033
San Diego, CA 92135-7033

Subject: Review and Endorsement of the Final Integrated Natural Resources Management Plan, Naval Base Coronado California

Dear Captain Mayes:

The California Department of Fish and Wildlife (Department) has reviewed the Final Integrated Natural Resources Management Plan (INRMP) for Naval Base Coronado (NBC), California, dated July 2013. This INRMP was prepared pursuant to the Sikes Act as amended through 2012 (16 United States Code §670a) in cooperation with the appropriate State Fish and Wildlife Agency (i.e., the Department). The Department is responsible for the conservation, protection, and management of the state's biological resources, including rare, threatened, and endangered plant and animal species, pursuant to the California Endangered Species Act. The Department also administers the Natural Community Conservation Planning program.

The purpose of this 2013 NBC INRMP is to provide responsible planning and management of the natural resources present on the installation's facilities that integrate the concerns and mission of the Department while efficiently supporting the NBC mission.

As part of our efforts to fulfill our role in the Sikes Act Improvement Act as amended and foster improved conservation, protection, and management of particular species and/or habitat types, present on NBC, the Department, by way of this letter and by signature on the attached page, grants concurrence with and acceptance of the 2013 NBC INRMP

If you have any questions or comments pertaining to this letter, please contact Jennifer Edwards at (858) 467-2717or via email to Jennifer.Edwards@wildlife.ca.gov.

Sincerely,

Edmund Pert
Regional Manager
South Coast Region

Attachment: Approving Official Signature Page for California Department of Fish and Wildlife

ec: Ms. Betty Courtney, CDFW, Santa Clarita
Ms. Gail Sevrens, CDFW, San Diego
Ms. Terri Stewart, CDFW, San Diego

INRMP APPROVING OFFICIAL SIGNATURE PAGE

Concurring agency:

California Department of Fish and Wildlife

Ed Pert

Mr. Ed Pert
Regional Manager
California Department of Fish and Wildlife

11-4-13

Date

INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN
NAVAL BASE CORONADO, CALIFORNIA

APPROVAL

The U.S. National Marine Fisheries Service has participated in the revision of this INRMP, in accordance with the Sikes Act (16 U.S.C. 670a *et seq.*) as amended.

Concurring Agency—U.S. National Marine Fisheries Service

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

Dec. 23, 2013
Date

Executive Summary

An Integrated Natural Resources Management Plan (INRMP) is a long term planning document to guide the installation commander in the management of natural resources to support the installation mission, while protecting and enhancing installation resources for multiple use, sustainable yield, and biological integrity. The Sikes Act, as amended (2012), requires preparation and implementation of INRMPs at all Department of Defense (DoD) installations in the United States that contain significant natural resources. An INRMP is the primary means by which natural resources compliance and stewardship priorities are set and funding requirements are determined for DoD installations. The main purpose of an INRMP is to help installation commanders more effectively manage natural resources to ensure installation lands remain available and in good condition to support the military mission; conserve and rehabilitate natural resources on military installations; sustain multipurpose use of the resources and public access to military installations to facilitate the use of those resources; participate, as appropriate, in regional ecosystem initiatives; and demonstrate conservation benefits for species listed under the Endangered Species Act (ESA). The Navy is required to ensure ecosystem management is the basis for all management of its lands (Sikes Act, as amended [16 USC 670a]; DoD Instruction 4715.03).

The Naval Base Coronado (NBC) INRMP includes all lands owned, leased, withdrawn, or otherwise used for military training by NBC (see **Table ES-1**) with the exception of Naval Auxiliary Landing Field, San Clemente Island and NBC in-water property within San Diego Bay which are managed under separate INRMPs (U.S. Navy 2011a, 2013)(see **Figure 2-1**). In addition to terrestrial resources, this INRMP addresses marine resources in the Pacific Ocean up to 274 meters (898 feet) seaward and within the anchorages and training lanes (beyond the mean lower low water line) of the NBC facilities. The natural resources management for the NBC in-water bayside areas, although still under the responsibility of the NBC commanding officer, is covered within the San Diego Bay INRMP (2011).

This document represents a revision of the 2002 INRMP, which was required because of updated DoD and Navy INRMP guidelines; because the NBC footprint has increased and changed; and because additional Special Status Species information was acquired, including new observations of Quino checkerspot butterfly (*Euphydryas editha quino*).

The goal of the 2013 NBC INRMP is to provide an adaptive ecosystem-based conservation program that efficiently supports the NBC mission and provides for the sustainability of natural resources.

The INRMP was prepared and organized in accordance with the Sikes Act as amended through 2012, Department of Defense (DoD) Instruction 4715.03 *Natural Resources Conservation Program*, Chief of Naval Operations Instruction (OPNAVINST) 5090.1C CH-1 *Environmental Readiness Program Manual*, and the most recent series of DoD (2006), U.S. Fish and Wildlife Service (USFWS) and U.S. Navy (2006a), guidance on the Sikes Act and INRMPs. Numerous Navy personnel, tenants, and related organizations, as well as, Federal, state, and city representatives and other external organizations were invited to participate in the development and review of this document (see **Chapter 13**). In addition, the public was invited to review the document through the National Environmental Protection Act process (U.S. Navy 2013a). The USFWS, the California Department of Fish and Wildlife (CDFW) formally California Department of Fish and Game (CDFG), and National Marine Fisheries Service (NMFS) have reviewed and signed this INRMP, indicating their mutual agreement with the Commanding Officer regarding natural resources management on Naval Base Coronado.

Table ES-1: Naval Base Coronado Facilities

Facility Name	Previous Name	Acreage[1]
San Clemente Island[2]		36,200
Remote Training Site Warner Springs (RTSWS)[3]	SERE School	12,544
Camp Michael Monsoor (CMM)[4]	La Posta Mountain Warfare Training Facility	5,554
Naval Air Station North Island (NASNI)[5]		2,803
Naval Outlying Landing Field Imperial Beach (NOLF IB)		1,295
Naval Amphibious Base (NAB) Coronado and Silver Strand Training Complex North (SSTC-N)[5&6]		1,000.8
Silver Strand Training Complex South (SSTC-S)	Naval Radio Receiving Facility (NRRF)	548
Camp Morena (CM)[7]		62.49
Lofgren Terrace Housing Area		34.7
Holly Square Housing Area		0.6
	Total Managed Acreage	**60,042.59**

Notes:

1. The most current list of real estate transactions is available on NFADS.
2. San Clemente Island is covered under a separate INRMP.
3. Includes expanded acreage for facility as of August 2010, 1,743 hectares (4,307 acres) was leased from VID for a total of 2,228 leased hectares (5,505 leased acres). Under the new SUP, the U.S. Navy replaced USFS Area of Activity land to the east of the SERE compound with 1,250 hectares (3,091 acres) of USFS Area of Activity land southwest of the SERE compound. RTSWS exclusive use of USFS land remains at 24 hectares (60 acres). In addition, a right-of-way agreement allows training to take place on 246 hectares (609 acres) of BLM land.
4. 1,370 hectares (3,385 acres) proposed for withdrawal from Bureau of Land Management for exclusive use by the Navy; an additional 878 hectares (2,169 acres) are available to the Navy for mountain warfare training activities under a right-of-way access authorization from the Bureau of Land Management.
5. Acreage for housing areas included in total acreage for facility.
6. Includes 42 hectares (257 acres) leased from the state of California.
7. Supports Camp Michael Monsoor.

The 2013 Revised NBC INRMP establishes planning and management strategies; identifies natural resources constraints and opportunities; supports the resolution of land use conflicts; provides baseline descriptions of natural resources necessary for the development of conservation strategies and environmental assessment; serves as the principal information source for the preparation of future environmental documents for proposed NBC actions; and provides guidance for annual natural resources management reviews, internal compliance audits, and annual budget submittals. The INRMP fully integrates and coordinates the natural resources program with other NBC plans and activities. Throughout the development of this INRMP, management concerns were identified in a number of natural resources subject areas. Some of these natural resources concerns could have an adverse impact on the NBC mission or future planning operations. One of the purposes of this INRMP is to identify the goal and objectives for the installation and to obtain workable and useful solutions for each concern. These recommendations are balanced with the requirements of NBC to accomplish its mission with the

highest efficiency and are discussed in detail in **Chapters 4** through **10**. **Appendix C** provides a list of projects to be implemented based on the discussions in **Chapters 4** through **10**.

The National Defense Authorization Act for Fiscal Year 2004 (Public Law 108-136) amended the ESA (7 USC § 136, 16 USC § 1531 et seq.) to limit areas eligible for designation as critical habitat. Specifically, section 4(a)(3)(B)(i) of the ESA (16 USC 1533(a)(3)(B)(i)) now provides: "The Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 USC 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." The benefits provided by this INRMP are addressed for each federally listed species in **Appendix D** (Benefits for Endangered Species). Federally listed species known to occur on NBC are listed in **Table ES-2**. For a complete list of Special Status Species that occur on NBC see **Tables 4-5** through **9-5**.

Natural resources constraints and opportunities on NBC are presented in **Figures 11-1** through **11-7**. Constraints, as defined in **Section 11.1.2**, include known locations of federally listed and other special status species, areas preferentially managed for special status species, and areas with a regulatory driver. Constraints figures were not created for those areas lacking natural resources or natural resources constraints. Conversely, opportunities include areas on an installation where there is little to no restriction on training. Opportunities may include potential buffer areas and corridors, and encroachment partnering areas.

The effects of implementing the INRMP are addressed under the National Environmental Policy Act (NEPA) by an Environmental Assessment and Finding of No Significant Impact, appended to this document (**Appendix B**). The Navy will 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.).

The installation is achieving a no net loss of training lands through the implementation of the NBC INRMP. Range capacity (in terms of training areas, uses, and tempo) has increased at the Silver Strand Training Complex North and South (SSTC-N and -S), Camp Michael Monsoor (CMM), and Remote Training Site Warner Springs (RTSWS) (U.S. Navy 2011b, USFWS 2010a, U.S. Navy 2012, U.S. Navy 2007). NEPA documentation and Consultation under Section 7 of the Endangered Species Act have been completed to allow for increased training to occur at SSTC-N and SSTC-S, as well as a variety of training ranges and facilities at CMM and RTSWS. Due to the number and distribution of protected species on NBC, natural resources management strategies will continue to be needed to support current and future training and facilities projects.

Table ES-2: Federally Listed Species Observed on Naval Base Coronado

Common Name	Scientific Name	Federal Status	State Status	Other Status	Known Location
Plants					
Salt marsh bird's-beak	*Chloropyron maritimum* ssp. *maritimum*	FE	SE	CNPS 1B.2	SSTC-S, NOLF IB
Brand's phacelia	*Phacelia stellaris*	FC	–	CNPS 1B.1	NASNI, NAB Coronado and SSTC-N
Invertebrates					
San Diego fairy shrimp	*Branchinecta sandiegonensis*	FE	–	–	SSTC-S, NOLF IB
Quino checkerspot butterfly	*Euphydryas editha quino*	FE	–	–	CMM, RTSWS
Amphibians and Reptiles					
Arroyo toad	*Anaxyrus californicus*	FE	SSC	–	RTSWS
Green sea turtle [1]	*Chelonia mydas*	FT	–	–	NASNI, NAB Coronado and SSTC-N, SSTC-S
Birds [2]					
Western Snowy Plover	*Charadrius nivosus nivosus*	FT, BCC	SSC	–	NASNI, NAB Coronado and SSTC-N, SSTC-S, NOLF IB
Light-footed Clapper Rail	*Rallus longirostris levipes*	FE	SE, CFP	–	NASNI, NAB Coronado and SSTC-N, SSTC-S, NOLF IB
California Least Tern	*Sternula antillarum browni*	FE	SE, CFP	–	NASNI, NAB Coronado and SSTC-N, SSTC-S, NOLF IB
Least Bell's Vireo	*Vireo belli pusillis*	FE	SE	–	NOLF IB
Mammals					
Stephens' kangaroo rat	*Dipodomys stephensi*	FE	ST	–	RTSWS

Source: U.S. Navy 2006c, CNPS 2010, U.S. Navy 2010c, U.S. Navy 2006d, USFWS 2010c, U.S. Navy 2008b, U.S. Navy 2009b, U.S. Navy 2009c

Note: [1] The green sea turtle is known to occur on the bayside NASNI, NAB Coronado and SSTC-N, SSTC-S. Additionally this species has the potential to occur on the ocean side of these same installations. [2] Birds are named using the American Ornithologists' Union nomenclature.

Key:

BCC = USFWS Bird of Conservation Concern
CFP = California Fully Protected Species
FT = Federally Threatened
FE = Federally Endangered
FC = Federal Candidate Species
ST = State Threatened
SE = State Endangered
SSC = California Species of Special Concern

FINAL INTEGRATED NATURAL RESOURCES MANAGEMENT
NAVAL BASE CORONADO, CALIFORNIA

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

APPENDICES

* Due to the size of these documents they have been made available as electronic appendices and can be requested from the Navy.

FIGURES

FIGURES (CONTINUED)

PHOTOGRAPHS

TABLES

TABLES (CONTINUED)

1. Overview

1.1 Purpose and Scope of Plan

An Integrated Natural Resources Management Plan (INRMP) is a long term planning document to guide the installation commander in the management of natural resources to support the installation mission, while protecting and enhancing installation resources for multiple use, sustainable yield, and biological integrity. The Sikes Act, as amended (2012), requires preparation and implementation of INRMPs at all Department of Defense (DoD) installations in the U.S. that contain significant natural resources. An INRMP is the primary means by which natural resources compliance and stewardship priorities are set and funding requirements are determined for DoD installations. The main purpose of an INRMP is to help installation commanders more effectively manage natural resources to ensure installation lands remain available and in good condition to support the military mission; conserve and rehabilitate natural resources on military installations; sustain multipurpose use of the resources and public access to military installations to facilitate the use of those resources; participate, as appropriate, in regional ecosystem initiatives; and demonstrate conservation benefits for species listed under the Endangered Species Act (ESA). The Navy is required to ensure ecosystem management is the basis for all management of its lands (Sikes Act, as amended [16 USC 670a]; DoD Instruction 4715.03).

The Naval Base Coronado (NBC) INRMP includes all lands owned, leased, withdrawn, or otherwise used for military training by the NBC (see **Table 1-1**) consortium, with the exception of Naval Auxiliary Landing Field, San Clemente Island and NBC in-water property within San Diego Bay which are managed under separate INRMPs (Navy 2011a, 2013) (see **Figure 2-1**). In addition to terrestrial resources, this INRMP addresses marine resources in the Pacific Ocean up to 274 meters (898 feet) seaward and within the anchorages and training lanes (beyond the mean lower low water line) of the NBC facilities. The natural resources management for the NBC in-water bayside areas, although still under the responsibility of the NBC commanding officer, is covered within the San Diego Bay INRMP (2011a).

This document represents a revision of the 2002 INRMP, which was required because of updated DoD and Navy INRMP guidelines; because the NBC footprint has increased and changed; and because additional Special Status Species information was acquired, including new observations of Quino checkerspot butterfly (*Euphydryas editha quino*).

The INRMP was prepared and organized in accordance with the Sikes Act as amended through 2012, Department of Defense (DoD) Instruction 4715.03 *Natural Resources Conservation Program*, Chief of Naval Operations Instruction (OPNAVINST) 5090.1C CH-1 *Environmental Readiness Program Manual*, and the most recent series of DoD (2006), U.S. Fish and Wildlife Service (USFWS) and U.S. Navy (2006a), guidance on the Sikes Act and INRMPs. Numerous Navy personnel, tenants, and related organizations, as well as, Federal, state, and city representatives and other external organizations were invited to participate in the development and review of this document (see **Chapter 13**). In addition, the public was invited to review the document through the National Environmental Protection Act process (U.S. Navy 2013a). The USFWS, the California Department of Fish and Wildlife (CDFW) formally California Department of Fish and Game (CDFG), and National Marine Fisheries Service (NMFS) have reviewed and signed this INRMP, indicating their mutual agreement with the Commanding Officer regarding natural resources management on NBC.

Table 1-1: Naval Base Coronado Facilities

Facility Name	Previous Name	Acreage[1]
San Clemente Island[2]		36,200
Remote Training Site Warner Springs (RTSWS)[3]	SERE School	12,544
Camp Michael Monsoor (CMM)[4]	La Posta Mountain Warfare Training Facility	5,554
Naval Air Station North Island (NASNI)[5]		2,803
Naval Outlying Landing Field Imperial Beach (NOLF IB)		1,295
Naval Amphibious Base (NAB) Coronado and Silver Strand Training Complex North (SSTC-N)[5&6]		1,000.8
Silver Strand Training Complex South (SSTC-S)	Naval Radio Receiving Facility (NRRF)	548
Camp Morena (CM)[7]		62.49
Lofgren Terrace Housing Area		34.7
Holly Square Housing Area		0.6
	Total Managed Acreage	**60,042.59**

Notes:

1. The most current list of real estate transactions is available on NFADS.
2. San Clemente Island is covered under a separate INRMP.
3. Includes expanded acreage for facility as of August 2010, 1,743 hectares (4,307 acres) was leased from VID for a total of 2,228 leased hectares (5,505 leased acres). Under the new SUP, the U.S. Navy replaced USFS Area of Activity land to the east of the SERE compound with 1,250 hectares (3,091 acres) of USFS Area of Activity land southwest of the SERE compound. RTSWS exclusive use of USFS land remains at 24 hectares (60 acres). In addition, a right-of-way agreement allows training to take place on 246 hectares (609 acres) of BLM land.
4. 1,370 hectares (3,385 acres) proposed for withdrawal from Bureau of Land Management for exclusive use by the Navy; an additional 878 hectares (2,169 acres) are available to the Navy for mountain warfare training activities under a right-of-way access authorization from the Bureau of Land Management.
5. Acreage for these housing areas included in total acreage for facility.
6. Includes 42 hectares (257 acres) leased from the state of California.
7. Supports Camp Michael Monsoor.

The 2013 Revised NBC INRMP establishes planning and management strategies; identifies natural resources constraints and opportunities; supports the resolution of land use conflicts; provides baseline descriptions of natural resources necessary for the development of conservation strategies and environmental assessment; serves as the principal information source for the preparation of future environmental documents for proposed NBC actions; and provides guidance for annual natural resources management reviews, internal compliance audits, and annual budget submittals. The INRMP fully integrates and coordinates the natural resources program with other NBC plans and activities. Throughout the development of this INRMP, management concerns were identified in a number of natural resources subject areas. Some of these natural resources concerns could have an adverse impact on the NBC mission or future planning operations. One of the purposes of this INRMP is to identify the goal and objectives for the installation and to obtain workable and useful solutions for each concern. These recommendations are balanced with the requirements of NBC to accomplish its mission with the highest efficiency and are discussed in detail in **Chapters 4** through **10**. **Appendix C** provides a list of projects to be implemented based on the discussions in **Chapters 4** through **10**.

The National Defense Authorization Act for Fiscal Year 2004 (Public Law 108-136) amended the ESA (7 USC § 136, 16 USC § 1531 et seq.) to limit areas eligible for designation as critical habitat. Specifically, section 4(a)(3)(B)(i) of the ESA (16 USC 1533(a)(3)(B)(i)) now provides: "The Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 USC 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." The benefits provided by this INRMP are addressed for each federally listed species in **Appendix D** (Benefits for Endangered Species). For a complete list of Special Status Species that occur on NBC see **Tables 4-5** through **9-5**.

Commander, Naval Installation Command (CNIC) states that the eight facilities that comprise NBC, including Naval Auxiliary Landing Field, San Clemente Island, make NBC "the largest command in the southwest region of the U.S." (2009). Major tenant commands at the installation include Naval Air Force, U.S. Pacific Fleet; Carrier Groups One and Seven; Cruiser Destroyer Group One; Naval Surface Force, U.S. Pacific Fleet; Commander Naval Special Warfare Command, U.S. Pacific Fleet; Naval Expeditionary units and the Navy Parachute Team, the Leap Frogs. For the most current list of tenant commands on NBC, please contact the Naval Base, NBC N5 at (619) 545-9031.

The installation is achieving a no net loss of training lands through the implementation of this INRMP. Range capacity (in terms of training areas, uses, and tempo) has increased since the 2002 INRMP was finalized at the Silver Strand Training Complex, Camp Michael Monsoor, and Remote Training Site Warner Springs (U.S. Navy 2011b, USFWS 2010a, U.S. Navy 2012a, U.S. Navy 2007). NEPA documentation and Consultation under Section 7 of the Endangered Species Act have been completed to allow for increased training to occur at SSTC-N & S, as well as a variety of training ranges and facilities at CMM and RTSWS. Due to the number and distribution of protected species on NBC, natural resources management strategies will continue to be needed to support current and future training and facilities projects.

1.2 Authority

This INRMP revision is consistent with guidance and regulations provided in the Sikes Act, DoD Instruction 4715.03 (*Natural Resources Conservation Program*, 2011), OPNAVINST 5090.1C CH-1 (*Navy Environmental and Natural Resources Program Manual*, 2011), and associated Navy (U.S. Navy 2006a) and DoD Sikes Act and INRMP guidance. These guidance documents collectively require a plan and management approach that integrates mission support, multipurpose use, ecosystem or landscape-level management, and environmental compliance and stewardship.

The Sikes Act is one of the primary drivers behind the NBC natural resources management program and INRMP. According to the Sikes Act, the purposes of a military conservation program are conservation and rehabilitation of natural resources, sustainable multipurpose use of those resources, and public access to military lands, subject to safety requirements and military security. Moreover, the conservation program must be consistent with the mission-essential use of the installation and its lands. The Sikes Act requires the preparation of an INRMP to facilitate the conservation program.

The Sikes Act states that "the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation in the United States under the jurisdiction of the Secretary, unless the Secretary determines that the absence of significant natural resources on a particular installation makes preparation of such a plan inappropriate." DoD Instruction 4715.03 prescribes procedures for integrated management of natural resources, including preparing an INRMP as required by the Sikes Act. DoD Instruction 4715.03 also states that "INRMPs shall be

prepared, maintained, and implemented for all lands and waters under DoD control that have suitable habitat for conserving and managing natural resources" and that "each installation shall establish and maintain communications with the appropriate USFWS, State fish and wildlife agency offices, and when applicable, with NOAA Fisheries Service [NMFS] to identify, address, and resolve INRMP issues."

The 2006 Chief of Naval Operations (CNO) guidance, (U.S. Navy 2006a) further establishes the that "INRMPs must address natural resources management on those lands and near-shore areas owned by the U.S. and administered by the Navy; used by the Navy via license, permit, or lease for which the Navy has been assigned management responsibility; or withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility" (U.S. Navy 2006a). OPNAVINST 5090.1C CH-1 requires the preparation of INRMPs and prescribes Navy policies, procedures, and standards to "restore, improve, conserve, and properly use natural resources on Navy-administered lands." The NBC INRMP revision is consistent with and was developed according to this guidance.

The 2006 Memorandum of Understanding between the DoD, USFWS, and the International Association of Fish and Wildlife Agencies for a *Cooperative Integrated Natural Resource Management Program on Military Installations* (DoD et al. 2006) requires that the INRMP be cooperatively developed with USFWS, NMFS, and the state fish and wildlife agency, which for NBC is the California Department of Fish and Wildlife (CDFW). The resulting plan reflects the mutual agreement of all three parties concerning conservation, protection, and management of natural resources on the installation.

1.3 INRMP Vision, Goals, and Objectives

According to the Sikes Act, the vision of an installation INRMP is to ensure the sustainability of all ecosystems within the installation, and to ensure a no net loss of the capability of the installations to support the military mission (U.S. Navy 2006a). To meet the intent of the Sikes Act, the DoD adopted ecosystem management as the basis for future management of DoD lands and, applying the principles of adaptive management and collaborating with parties both inside and outside the fence (DoD 2011). In addition, the Navy developed guidance for developing and implementing INRMPs at Navy installations in 1998 (U.S. Navy 2006a). This guidance was revised in 2006 based on lessons learned from the first round of INRMPs developed by the Navy, these lessons included the following (U.S. Navy 2006a):

1. Increasing the ties between natural resource management and military readiness;
2. Establishing a consistent funding policy and project review process;
3. Improving the efficiency of INRMP review and coordination;
4. Increasing the effective implementation of INRMPs; and
5. Expanding opportunities for involvement with all INRMP stakeholders.

The Sikes Act, along with the 2006 guidance stressed the need for clear INRMP goals and objectives to guide natural resources management on an installation while ensuring a no net loss to the mission. The guidance defines goals as "broad guiding principles for the [installation natural resources] program" and objectives as "measurable targets for achieving the goals" (U.S. Navy 2006a). In addition, the guidance states that the INRMP will provide parameters to determine "the effectiveness of the natural resources program outlined in the INRMP through ensuring that the plan includes quantifiable, scientifically valid parameters that will demonstrate achievement of objectives" or INRMP projects (U.S. Navy 2006a).

The NBC INRMP goal is to provide an adaptive ecosystem-based conservation program that efficiently supports the NBC mission and provides for the sustainability of natural resources. Objectives and management strategies are identified in **Chapter 4** for Naval Air Station North Island, **Chapter 5** for Naval Amphibious Base and Silver Strand Training Complex North, **Chapter 6** for Silver Strand Training Complex South, **Chapter 7** for Naval Outlying Landing Field Imperial Beach, **Chapter**

8 for Camp Michael Monsoor (CMM) and Camp Morena (CM), **Chapter 9** for RTSWS, and **Chapter 10** for the off-base housing areas.

1.4 Stewardship and Compliance

The terms compliance and stewardship are defined in the 2006 Navy guidance (U.S. Navy 2006a) and are used to prioritize projects and activities in budget programming. Compliance projects and activities are defined as "must fund" conservation requirements that are required to meet recurring natural and cultural resources conservation management requirements or current legal compliance needs, including EOs. Stewardship includes valid projects and programs that enhance an installation's natural resources, promote proactive conservation measures, and support investments that demonstrate Navy environmental leadership and proactive environmental stewardship (U.S. Navy 2006a).

The DoD programming and budgeting priorities for conservation programs are detailed in DoD Instruction 4715.03 (*Natural Resources Conservation Program*, 2011). The Instruction divides programming and budget requirements into two categories: Recurring and Non-recurring. Compliance activities are in the Recurring category and the Non-recurring Current and Maintenance Compliance categories. Stewardship activities are in the Enhancement Actions Beyond Compliance category.

The Navy programming hierarchy is based on DoD funding level classifications. The projects recommended in this INRMP have been prioritized based on the Navy programming hierarchy of Environmental Readiness Levels (ERLs) (U.S. Navy 2006a). ERL 3 and 4 projects are compliance driven and ERL 1 and 2 projects are under the stewardship category. **Section 12.2** Priority Setting and Funding Classification describes ERLs and DoD Categories in more detail. Funding is routinely programmed 3 years in advance of project implementation. All projects and activities in the Implementation Table in **Appendix C** are assigned an ERL, but many actions are completed using on-site personnel and are not part of the program budget. For example, natural resources personnel lead bird walks for the public each month.

1.5 Revisions and Annual Reviews

The Sikes Act requires that INRMPs be reviewed for operation and effect regularly by the installation, the USFWS, the National Marine Fisheries Service (NMFS), and the state fish and wildlife agency (in this case, the CDFW). The DoD and Navy have provided specific guidance on the joint review and coordination process and timeframe (DUSD [I&E] 2002, OPNAVINST 5090.1C CH-1, 2011. As part of the review, NBC should invite annual feedback from the USFWS, NMFS, and the CDFW on the effectiveness of the INRMP, and inform the agencies about those INRMP projects and activities that are required to meet current natural resources compliance needs (DoN 2007a). An annual report is prepared during the annual review and is provided to the regulatory agencies upon completion (see **Appendix J**).

The CNO developed guidance for preparing, implementing, and revising INRMPs in April 2006. The guidance establishes that installations will use the Navy Conservation Website to facilitate annual review of the INRMP by the Navy, the USFWS, NMFS, and the CDFW (U.S. Navy 2006a). The Metrics Builder evaluates the effectiveness of the INRMP and installation natural resources management as a whole through the following seven performance areas (U.S. Navy 2006a):

- INRMP Implementation;
- Partnerships/Cooperation and Effectiveness;
- Team Adequacy;
- Status of Federally Listed Species and Critical Habitat;

- Ecosystem Integrity;
- Fish and Wildlife Management and Public Use and
- INRMP Impact on the Installation Mission.

If INRMP review for operation and effect results in major revisions to the plan, NBC must solicit public review and comments (U.S. Navy 2006a). The National Environmental Policy Act (NEPA) process may be used to meet public review requirements if the public is provided a meaningful opportunity to comment on the Draft revised INRMP. After soliciting public comments, NBC must afford the USFWS, NMFS, and the CDFW the opportunity to review all public comments. If an existing INRMP requires only limited revisions that are not expected to result in significant environmental effects other than those anticipated for the existing INRMP, then neither NEPA analysis or public review are necessary (U.S. Navy 2006a).

According to CNO guidance, (U.S. Navy 2006a), INRMPs must also be reviewed by installations at least once per year to verify the following:

- Current information on INRMP conservation metrics, as described in the Navy Conservation Website;
- 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 and the number of positions is based on natural resource recommendations;
- Projects and activities for the upcoming year have been identified and included in the INRMP - an updated project list does not necessitate INRMP revision;
- All required coordination has occurred and
- All significant changes to the installation's mission requirements or its natural resources have been identified.

1.6 INRMP Implementation and Responsibilities

Successfully implementing an INRMP and DoD guidelines requires the support of natural resources personnel, other installation staff, command personnel, and installation tenants. The following section discusses the responsibilities for INRMP implementation within the Navy.

1.6.1 Navy Responsibilities

1.6.1.1 Chief of Naval Operations (CNO)

The CNO provides policy, guidance and resources for the development, revision, and implementation of the INRMP and associated NEPA documentation. The CNO evaluates and validates Navy Environmental Program Requirements project proposals (U.S. Navy 2006a).

1.6.1.2 Commander of Navy Installations Command (CNIC)

The CNIC reviews the INRMP. Their role is to ensure that installations comply with DoD, Navy, and CNO policy on INRMPs and their associated NEPA documentation. They also ensure the programming of resources necessary to maintain and implement INRMPs, participate in the development and revision of INRMPs, and provide overall program management oversight for all natural resources program

elements. The CNIC reviews and endorses projects recommended for INRMP implementation prior to submittal for signature, and evaluates and validates Navy Environmental Program Requirements Web (EPR-Web) project proposals (U.S. Navy 2006a).

1.6.1.3 Commander Navy Region Southwest

Regional Commanders ensure installations comply with DoD, Navy, and CNO policy on INRMPs and their associated NEPA documentation. They ensure that installations under their control undergo annual reviews and formal 5-year evaluations. They ensure the programming of resources necessary to maintain and implement INRMPs, which involves the evaluation and validation of EPR-web-based project proposals and the funding of installation natural resources management staff. The Commander Navy Region Southwest (NRSW) maintains close liaison with the INRMP signatory partners (USFWS, NMFS and CDFW) and other INRMP stakeholders.

1.6.1.4 Installation Commanding Officers

Installation Commanding Officers ensure the preparation, completion, and implementation of INRMPs and associated NEPA documentation. Their role is to: act as stewards of natural resources under their jurisdiction and integrate natural resources requirements into the day-to-day decisionmaking process; ensure natural resources management and INRMPs comply with all natural resources related Federal regulations, directives, instructions, and policies; involve appropriate tenant, operational, training, or testing commands in the INRMP review process to ensure no net loss of military mission; designate a Natural Resources Manager/Coordinator responsible for the management efforts related to the preparation, revision, implementation, and funding for INRMPs, as well as coordination with subordinate commands and installations; involve appropriate 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; and endorse INRMPs via Commanding Officer signature.

1.6.1.5 Public Affairs Office

The Public Affairs Office is involved in aspects of the environmental program at NBC. This includes being informed of and when applicable implementing the public notice process required in various NEPA analysis processes.

1.6.1.6 Office of Counsel

The Office of the General Counsel, NRSW and Judge Advocate General's (JAG) Region Environmental Counsel, provides legal services to NBC on a variety of environmental matters. Particularly pertinent to natural resources management, is their review of NEPA documentation and legal interpretations involving compliance with natural resources laws as they pertain to base operations.

1.6.1.7 Naval Facilities Engineering Command Southwest (NAVFAC SW)

Public Works Department (PWD)

The NBC Facilities Planning Office, Public Works Department (PWD), is responsible for the comprehensive oversight and planning of all land use issues relating to NBC. Their role for this INRMP is to provide document review to confirm that this INRMP describes compatible land uses.

Environmental Division

The NBC Environmental Division, as delegated by command directive, is responsible for the preparation and implementation of this INRMP. Acting through the Natural Resources Manager, NBC Environmental Division is responsible for the management of natural resources as part of the overall NBC environmental program. NBC natural resources staff provides technical support. This INRMP is the direct "vehicle" for accomplishment of many of the responsibilities of the Commanding Officer and the Natural Resource Program Manager. The Installation Environmental Program Director communicates directly with the NBC Commanding Officer.

Business Line Team (N45)

Natural resources business line team specialists (N45) provide technical support and contractual oversight in the development, revision and implementation of this INRMP. In addition, NAVFAC SW is responsible for providing support for natural resources management at NBC when requested. NAVFAC SW personnel such as the NEPA and INRMP coordinators, have natural resources programming and/or technical support roles in developing this INRMP.

1.6.1.8 Morale, Welfare & Recreation (MWR)

The mission of Morale, Welfare & Recreation (MWR) is to support a variety of recreation, social, and community support activities on Navy facilities. MWR manages installation morale, welfare, and recreation activities for the NBC community. The MWR has a primary role in managing the installation's recreational resources at NBC. MWR works with Environmental Division to ensure compliance with environmental laws.

1.6.1.9 Other Installation and Tenant Organizations, and Partners

In addition to the directorates and offices mentioned above, INRMP implementation requires assistance from, or in coordination with, a variety of other installation organizations, tenants, partners, and contract personnel. Other installation partners consulted for natural resources activities on NBC include Lincoln Clark, responsible for developing and managing family housing under the Public-Private Venture (PPV).

1.6.2 External Partner Responsibilities

1.6.2.1 Integrated Natural Resource Management Plan Signatories

The Sikes Act is one of the primary drivers behind the NBC natural resources management program and INRMP. According to the Sikes Act, the purposes of a military conservation program are conservation and rehabilitation of natural resources, sustainable multipurpose use of those resources, and public access to military lands, subject to safety requirements and military security. Moreover, the conservation program must be consistent with the mission essential use of the installation and its lands. The Sikes Act requires the preparation of an INRMP to facilitate the conservation program.

The 2006 Memorandum of Understanding between the DoD, USFWS, and the International Association of Fish and Wildlife Agencies for a *Cooperative Integrated Natural Resource Management Program on Military Installations* (DoD et al. 2006) requires that the INRMP be cooperatively developed with the USFWS and the state fish and wildlife agency, which for NBC is the CDFW. The resulting plan reflects the mutual agreement of all three parties concerning conservation, protection, and management of natural resources on the installation. In accordance with the Sikes Act, the USFWS, CDFW, and NMFS are a signatory agency of installation INRMPs.

The primary mission of the USFWS is working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. The USFWS provides the Navy technical assistance with botanical and wildlife issues. In addition, the DoD and Navy consult formally and informally with the USFWS on the impacts of Navy activities on federally listed species and designated critical habitat. The Navy manages the Tijuana Slough National Wildlife Refuge (TSNWR) with USFWS.

The mission of the department is to "manage California's diverse fish, wildlife, and plant resources and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public" (CDFG 2009a). The CDFW oversees the management and use of the state's forests and parks, fisheries, and wildlife. It has statewide responsibilities for assessing and restoring water quality and habitat; managing and regulating recreational boating, fishing, and hunting; and managing wetlands, wildlife, and rare, threatened, and endangered species.

NMFS is a partner for managing the 1,024 hectare (2,531-acre) TRNERR and TSNWR (CDPR 1999). NMFS is dedicated to protecting and preserving the nation's living marine resources through scientific research, fisheries management, enforcement and habitat conservation (NOAA 2009a). NMFS Fisheries is the lead Federal agency responsible for the stewardship of the nation's offshore living marine resources and their habitat. The mission of NMFS is to ensure healthy fisheries and habitat for the benefit of all Americans by managing, conserving, and protecting fish, whales, dolphins, sea turtles, and other living creatures in the ocean (NOAA 2010). NMFS works within the Magnuson-Stevens Act, the Marine Mammal Protection Act, and the ESA to fulfill its mission of promoting healthy ecosystems.

1.6.2.2 Other External Organizations and Partners

In addition to the external organizations mentioned above, INRMP implementation will also require the assistance from, or coordination with, the Department of Interior Bureau of Land Management (BLM), the U.S. Forest Service, Vista Irrigation District (VID), the city of San Diego, the city of Coronado, and the city of Imperial Beach, San Diego County, and California State Parks.

1.7 Integration of Other Installation Plans and Programs with INRMP

The recognition of internal and external factors demands that natural resources management on NBC be integrated with other disciplines, programs, and planning beyond the scope of traditional fish and wildlife management on Navy installations. Internal factors include meeting mission requirements, and other environmental requirements (e.g., CWA); external factors include increasing population growth and development in the San Diego Metro area, and increased pressure on Federal and state lands to maintain green spaces and wildlife habitat in the face of increased development.

The recognition of internal and external factors demands that natural resources management on NBC be integrated with other disciplines, programs, and planning beyond the scope of traditional fish and wildlife management on Navy installations.

1.7.1 Navy Plans and Programs

The following regional, local and installation plans and reports were reviewed to highlight key interrelationships, and recommendations contained within these plans were utilized in the development of this INRMP. Note that the INRMP is not intended to compile detailed information on each plan and its contents (see **Table 1-2**). The following is not an exhaustive list of plans and reports reviewed and/or integrated into this INRMP. Where applicable plans are discussed and cited in the appropriate section and are references are available in **Section 14**.

Table 1-2: Plans and Reports Incorporated into the NBC INRMP

Title	Year
Final Naval Base Point Loma Integrated Natural Resources Management Plan, November 2012	2012
Air Installation Compatible Use Zone Plan, signed March 2012.	2012
Integrated Cultural Resources Management Plan (ICRMP), the ICRMP was finalized in February 2012 (U.S. Navy 2012b).	2012
Draft Southern California (SOCAL) and Northern California (NOCAL) Range Complex Management Plan 2012 Range Complex Management Plan Draft.	2012
Hawaii-Southern California Training and Testing Activities Draft Environmental Impact Statement/Overseas Environmental Impact Statement	2012
San Diego Bay Integrated Natural Resources Management Plan, November 2011 (U.S. Navy 2011a)	2011
Helicopter Wings Realignment and MH-60R/S Helicopter Transition Environmental Assessment MH-60 Helicopter Alignment Environmental Assessment (U.S. Navy 2011c).	2011
Quino Checkerspot Butterfly Habitat Enhancement Plan Camp Michael Monsoor, Campo California.	2011
Naval Base Coronado Encroachment Action Plan, completed in September 2010 (U.S. Navy 2010a).	2010
Activity Overview Plan (AOP) (U.S. Navy 2010b)	2010
Silver Strand Training Complex Environmental Impact Statement (U.S. Navy 2010c)	2010
Environmental Assessment for Remote Training Site Warner Springs (RTSWS) (U.S. Navy 2010d).	2010
Integrated Pest Management plan (IPMP), was completed in September 2009 (U.S. Navy 2009a).	2009
Installation Appearance Plan (IAP), the IAP was revised in April 2008 (U.S. Navy 2008a).	2008
Final La Posta Mountain Warfare Training Facility Environmental Assessment (U.S. Navy 2008b) and Amended in 2011.	2008
Environmental Assessment Navy Lodge on NASNI (U.S. Navy 2006b).	2006
Environmental Assessment Fiddler's Cove (U.S. Navy 2004a).	2004
Emergency Response Plans: NBC developed the Emergency Response Action Plan Summary, Oil and Hazardous Substance Integrated Contingency Plan (The Red Plan).	2003
Final Naval Base San Diego Integrated Natural Resources Plan, August 2002	2002
Environmental Management Systems (EMS)	NA

1.7.2 Regional Plans and Initiatives

1.7.2.1 California Wildlife Action Plan

In order to receive Federal funds through the State Wildlife Grants Program, Congress charged each state with developing a statewide comprehensive wildlife conservation plan by 1 October 2005 through the Consolidated Appropriations Act of 2005 (Public Law 108-447). The State Wildlife Grants Program provides Federal money to every state and territory for cost-effective conservation aimed at preventing wildlife from becoming endangered (Public Law 108-447).

Congress also directed that the strategies must identify and be focused on the "species of greatest conservation need" yet address the full array of wildlife and wildlife-related issues (CDFG 2009b). The California Wildlife Action Plan was completed in 2007 and identified statewide and regional conservation issues based on regional landscape types, regional habitats, and ecosystem level species needs and requirements, rather than prescribing management actions using a species-by-species approach (CDFG 2007). NBC falls within the south coast region, and the plan identified five key stressors affecting wildlife and their habitats in this region including (CDFG 2007):

- Growth and development;
- Water management conflicts and degradation of aquatic ecosystems;
- Invasive species;
- Altered fire regimes and
- Recreational pressures.

Marine stressors identified in this region include:

- Overfishing;
- Degradation of marine habitats;
- Invasive species;
- Pollution and
- Human disturbance.

The conservation actions identified by the CDFW for the south coast region were taken into consideration when preparing this document. The plan identified conservation actions to be undertaken to restore and protect wildlife and their habitats in this region, including reducing habitat fragmentation, protecting and restoring coastal wetlands, and protecting sensitive and wildlife habitats (CDFG 2007). The management strategies presented within this INRMP were developed with these conservation actions in mind and complement conservation activities contained within the California Wildlife Action Plan as follows:

- The INRMP management strategies are consistent with a number of statewide and South Coast region-specific conservation actions;
- NBC works with a number of local, state, and Federal agencies and non-profits on a number of statewide and regional conservation management efforts;
- NBC has an active Integrated Pest Management Program and coordinates with other agencies to improve effectiveness through information sharing and landscape planning efforts;
- NBC seeks encroachment buffer opportunities and works with state, Federal, and conservation organizations;

- NBC considers natural resources conservation education a high priority in managing natural resources;
- NBC has started to consider the most current projections of the effects of global warming in their conservation planning and ecosystem restoration work;
- NBC seeks to adequately fund projects and staff to sufficiently manage sensitive species and important wildlife habitats on NBC and
- NBC collaborates with local agencies and organizations to develop and implement the Fire Management Plan for CMM and RTSWS to restore the ecological integrity of the region's ecosystems while minimizing loss of property and life.

In addition, the plan listed the Quino checkerspot butterfly as a species at risk in the south coast region. The butterfly has been observed on NBC at CMM and RTSWS.

1.7.2.2 Multiple Species Conservation Program

Section 10(a)(1)(B) of the ESA (16 U.S.C. Sections 1531–1544) and the California Natural Community Conservation Plan Act of 1991 (CF & G Code Sections 2800--2835) provide for the development of Habitat Conservation Plans (HCPs), and Natural Community Conservation Plans (NCCPs) under California law, to manage multiple species and their habitats in a given geographical area. Section 10(a)(1)(B) of the ESA defines HCPs as "planning documents required as part of an application for an incidental take permit... [that] describe the anticipated effects of the proposed taking; how those impacts will be minimized, or mitigated; and how the HCP is to be funded" (USFWS 2009a). In addition, HCPs provide management recommendations for listed and nonlisted species (i.e., covered species) and their habitats (USFWS 2009a). HCP "planning is a cooperative process that often involves local, state, and federal agencies and the public… [that] encourage[s] the active participation and support of landowners and others in the conservation and stewardship of natural resources in the plan area during plan development using appropriate measures, including incentives" (City of San Diego 1998).

The Multiple Species Conservation Program (MSCP) plan for a 2,331-square-kilometer (900-square-mile) area in southwestern San Diego County was substantially completed in August 1998. The goal of the 1998 plan is to contribute "to [the] preservation of regional biodiversity through coordination with other habitat conservation planning efforts throughout southern California" and to manage projects using an ecosystem-based approach as opposed to the traditional project-by-project approach (City of San Diego 1998). The MSCP for southwestern San Diego County, which includes portions of NBC (NASNI, NOLF, SSTC-N, SSTC-S, Off-base housing areas), recommends developing conservation reserves throughout the county that connect various regions of species habitat to encourage protection of regional biodiversity (City of San Diego 1998). Additionally, the undeveloped HCP is proposed in Eastern San Diego County in the areas where CMM and RTSWS are located. In addition, the plan states that federal and state governments will "contribute 14,775 hectares (36,510 acres) of existing federal and state lands, excluding military lands, to permanent habitat conservation and management; acquire 5,463 hectares (13,500 acres) of privately owned habitat lands in the MSCP preserve from willing sellers; and manage and monitor the federal and state share of the MSCP preserve" (City of San Diego 1998).

Portions of NBC and other military lands are within the MSCP study area but are being planned separately. NBC is not required to contribute, or acquire lands, to meet MSCP goals. However, NBC strives to ensure that its land use and regional planning efforts are complementary with surrounding biodiversity conservation efforts such that NBC lands help support the region's habitat conservation needs while also providing continued support of the military mission.

Habitat conservation efforts within the city of San Diego's MSCP sub area plan preserve area, referred to as the Multi-Habitat Planning Area (MHPA), focus on acquiring critical areas of sensitive habitat and securing wildlife corridors with the MHPA and initiating monitoring efforts. The MHPA delineates core biological resource areas and corridors targeted for conservation. The city's MSCP study area includes 83,415 hectares (206,124 acres) within the city's jurisdiction. The city's planned MHPA totals 22,998 hectares (56,831 acres), with 21,048 hectares (52,012 acres) (90 percent) targeted for preservation (approximately 30 percent of the planned regional preserve) (City of San Diego 2011).

A few small holdings (i.e., Lofgren Terrace and Holly Square housing areas) of military properties within the city of San Diego have been included in the MSCP plan areas. While these lands are shown pictorially in the MSCP, nothing in the MSCP Subarea Plan or implementing ordinances applies to Federal-owned military property (City of San Diego 1998). Many of the natural resource management goals and activities on NBC lands are compatible with those of the MSCP. MSCP protections may also benefit the installation by providing stable habitat for populations of covered at risk unlisted species and preclude them from being listed. Projects planned or implemented to meet sustainability objectives on military properties within and adjacent to MSCP lands include: (1) special status species education, survey and monitoring, and habitat improvement; (2) wetlands and watershed management, monitoring, maintenance, and rehabilitation as necessary; (3) wildlife and habitat management; (4) exotic and invasive species management; and (5) wildland fire management.

1.7.2.3 San Diego Bay INRMP

In November 2011, the Navy partnered with the San Diego Unified Port District (SDUPD) to release a Draft INRMP for the San Diego Bay (*Port of San Diego | Port of San Diego*). The purpose of the plan was to develop an ecosystem-based plan for the San Diego Bay that incorporates natural resources, natural and human uses of the San Diego Bay, and the missions of each stakeholder who manages, or operates, within the San Diego Bay (U.S. Navy et al. 2011). The overall goal of the plan is to "flesh out a progression towards… [a San Diego Bay] that is wilder, with softer shorelines, richer and more abundant in native life... that, while used for thriving urban, commercial, and military needs, has an increasing proportion of use… [that include] public access, recreation, education and enjoyment of the myriad benefits of a healthy, dynamic ecosystem" (U.S. Navy et al. 2011). Five core strategies, with over 1,000 individual strategies, for management of San Diego Bay resources were developed including (U.S. Navy et al. 2011):

- Managing and restoring habitats, populations, and ecosystem processes;
- Planning and coordinating projects and activities compatible with natural resources;
- Improving information sharing, coordination and dissemination;
- Conducting research and long-term monitoring that supports decisionmaking and
- Putting in place a Stakeholders' Committee and Focus Subcommittees for collaborative, ecosystem-based problem solving in pursuit of the goal and objectives.

The strategies and objectives outlined within the San Diego Bay INRMP that pertain to NBC activities outside of San Diego Bay have been incorporated in this INRMP, but specific implementation projects identified in the San Diego Bay INRMP are not included within this INRMP because they are covered in the Bay INRMP. Vista Irrigation District

In 2011 the Vista Irrigation District completed its first Strategic Plan. The Plan, with its goals, objectives and work plan, was written by their Executive Team without any outside consultants. The Board set the direction of the District through a series of workshops that developed a vision and goals, and staff fleshed

out those goals and documented specific objectives and work plan details. The Board adopted the Strategic Plan in January (VID 2011a, VID 2011b).

1.7.2.4 Bureau of Land Management South Coast Plan

In 1994 the BLM presented the South Coast Planning Area Resource Management Plan guidance for future management of approximately 119,787 hectares (296,000 acres) of BLM-administered public land. This includes 52,204 hectares (129,000 acres) of BLM-administered surface land (referred to as BLM public land) and 67,582 hectares (167,000 acres) of Federal mineral ownership where the surface is privately owned (referred to as BLM split estate land). The 52,204 hectares (129,000 acres) of BLM public land are scattered over five county areas in 296 separate parcels. Ninety-five percent of the BLM land base in the planning area is in San Diego and Western Riverside counties, with the remainder in southwestern San Bernardino, Los Angeles and Orange counties.

The general objective of resource management planning is to maximize resource values and multiple uses of BLM public lands through a rational, consistently applied set of procedures. Resource management plans are designed to guide and control future management actions as well as the development of subsequent and detailed plans. The major effort for this Resource Management Plan is twofold. One aspect is to address opportunities for managing sensitive resources with potential uses such as recreation and mineral development. The other is to address the potential for improving management effectiveness through adjustment of the scattered land ownership pattern (BLM 1994). This plan is currently being revised.

1.7.2.5 Cleveland National Forest Plan

In 2005 the Forest Service published the Land Management Plan Part 2 of the Cleveland National Forest Strategy. The Land Management Plan is the primary governing plan for National Forest System lands and is the principal document (along with the special use permit) directing natural resource management. The strategic direction and program emphasis objectives that are expected to result in the sustainability (social, economic and ecological) of the national forest and, over the long-term, the maintenance of a healthy forest are described in that document. The legislative mandate for the management of national forests requires that public lands be conservatively used and managed in order to ensure their sustainability and to guarantee that future generations will continue to benefit from their many values. Forest plans are founded on the concept of sustainable use of the national forests. In its simplest terms, sustainability means to maintain or prolong. In order to foster the concept of sustainability, this section describes the program emphasis and strategies that may be employed to enable multiple uses to occur in ways that promote long-term sustainability. The program emphasis and management strategies are continuously projected over a 3- to 5-year period (over the life of the plan) in order to describe the projects or activities that may be employed as we move along the pathways toward the realization of the desired conditions described in Part 1 of the revised forest plan (USFS 2005a).

Part 1 describes the national forest in the future, the niche it occupies in the community framework, the desired conditions the Forest Service is striving to realize, and the challenges the national forest will resolve in getting there. Part 2 supplements Part 1 of the forest plan. Part 2 also constitutes the 'tools' resource staff will use to accomplish the objectives that contribute to the realization of the desired conditions. Part 2 defines and describes each of the land use zones. The land use zones are an on-the-ground manifestation of the desired conditions and are the primary tools used to describe the strategic direction, including the management intent and suitable uses for areas of the national forest where the zone is used. Part 2 also includes a prospectus describing the past performance history of the national forest and the anticipated performance in 3- to 5-year increments over the life of the forest plan. Place-Based Program Emphasis is also described so that people will have a better understanding of what

types of management are expected in specific areas of the national forest. Finally, Part 2 addresses the monitoring to be done to assess the effective implementation of the strategies used (USFS 2005b).

1.7.2.6 Landscape Conservation Cooperative

The California Landscape Conservation Cooperative (CA LCC) was created to inform and promote integrated science, natural resource management and conservation in order to address impacts from climate change and ecosystem stressors through a management-science partnership. Goals and objectives have been identified by the CA LCC and include the following (CA LCC 2013):

- Foster collaboration and integration of science and management;
- Support development of technical products for natural resource management;
- Facilitate information acquisition, interpretation, translation, exchange and availability and
- Communicate information within and outside the CA LCC community.

For more information on the CA LCC visit the CA LCC webpage at *http://californialcc.org/*.

THIS PAGE INTENTIONALLY LEFT BLANK

2. Location, Military Use and Natural Resources Management

2.1 Naval Base Coronado Locations, History, and Mission

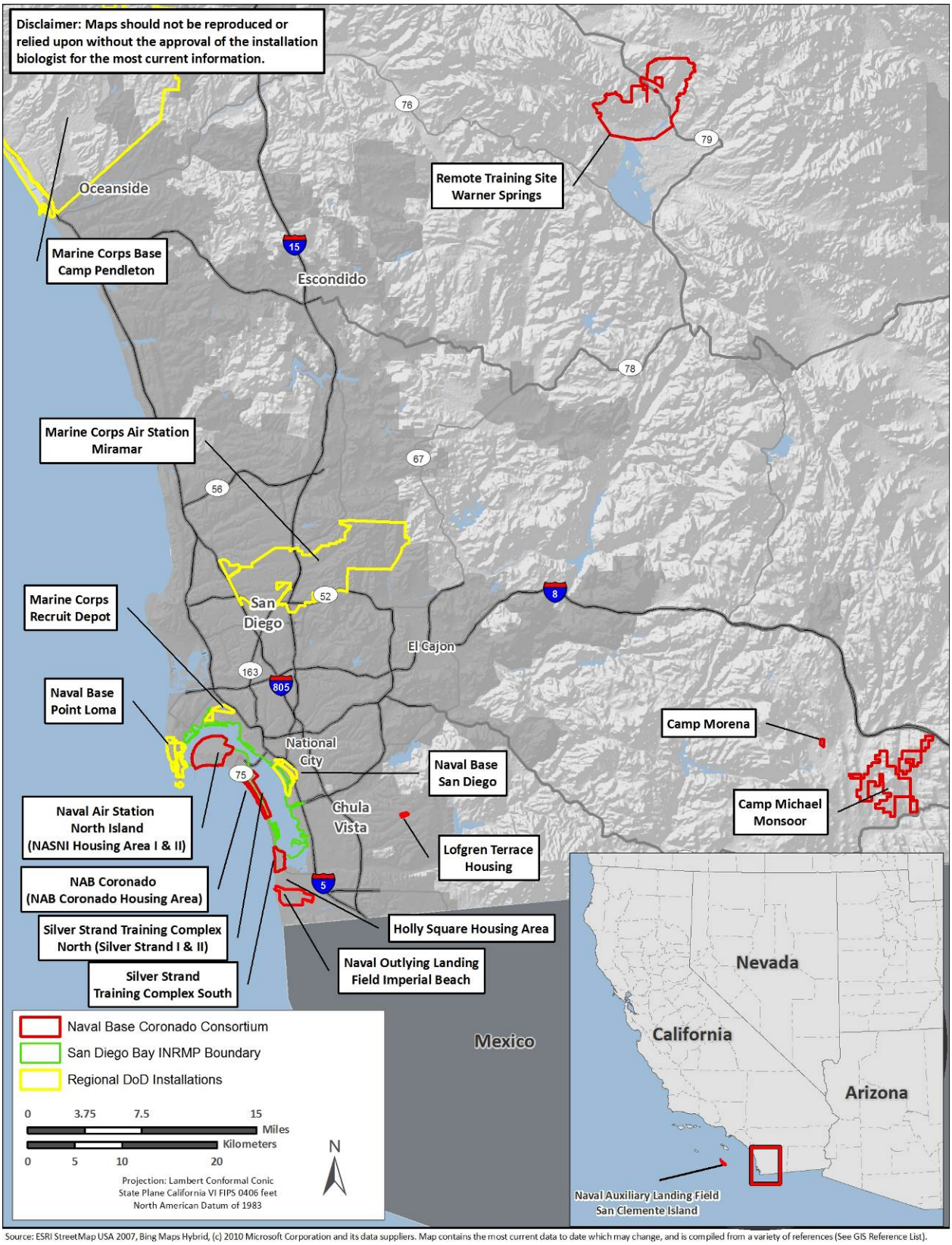
Naval Base Coronado (NBC) is located in San Diego County, California and is comprised of eight main properties. The NBC facilities covered under this Integrated Natural Resources Management Plan (INRMP) include Naval Air Station North Island (NASNI), Naval Amphibious Base (NAB) Coronado, Silver Strand Training Complex North (SSTC-N), Silver Strand Training Complex South (SSTC-S), Naval Outlying Landing Field Imperial Beach (NOLF IB), Camp Michael Monsoor (CMM), Camp Morena (CM), Remote Training Site Warner Springs (RTSWS), and six naval housing areas (see **Figure 2-1**). The first four of these properties border the Pacific Ocean. Portions of NASNI occur in both the city of San Diego and the city of Coronado. NAB Coronado, SSTC-N, and SSTC-S occur entirely in the city of Coronado. Portions of NOLF IB occur both in the city of San Diego and the city of Imperial Beach. The remaining properties: CMM, CM, and RTSWS are located in the unincorporated portion of San Diego County (Camp Michael Monsoor, approximately 80 kilometers [50 miles] east of San Diego, and RTSWS, approximately 72 kilometers [45 miles] northeast from San Diego). This INRMP excludes Naval Auxiliary Landing Field, San Clemente Island, and Naval Auxiliary Landing Field activities are covered under a separate INRMP.

Unequalled in operational scope and complexity, NBC provides a shore-based platform for helicopters, aircraft carriers, SEAL Teams (Sea, Air, Land Teams) and other ashore and afloat commands for access to a comprehensive quantity of ground, sea, air, and undersea operational and training space. NBC currently accommodates the requirements of 16 helicopter squadrons, 2 fixed wing squadrons, two aircraft carriers, four SEAL Teams, Navy Expeditionary Combat Command squadrons, and other air, surface and subsurface commands. NBC is home to over 18,000 active duty military and over 5,500 civilian employees (U.S. Navy 2013b).

Naval Base Coronado is a consortium of eight installations representing over 24,280 hectares (60,000 acres) of land and water and is distributed over an area of 8,754 square kilometers (3,380 square miles) in San Diego and Los Angeles counties in southern California. Of the total acreages, approximately 2,428 hectares (6,000 acres) are developed or improved, 53 hectares (130 acres) are used for agriculture, 303 hectares (748 acres) are wetlands or waters of the United States, and the remainder of terrestrial (21,448 hectares [53,000 acres]) is managed for wildlife and/or plant communities while supporting operational requirements. San Clemente Island Range Complex also supports more than a dozen range and operational areas that are clustered within a 97-kilometer (60-mile) radius of the island (U.S. Navy 2013b).

San Diego County is approximately 5,180 square kilometers (2,000 square miles), or roughly 1.1 million hectares (2.7 million acres) (U.S. Census Bureau 2009). The population of San Diego County grew by 5.7 percent from 2000 to 2007 to approximately 2.97 million people (U.S. Census Bureau 2009). Surrounding land uses include medium to high-density residential, commercial, and light industrial development, in part due to the presence of NBC.

The mission of NBC is to support the U.S. Pacific Fleet and other operating forces by providing "*the highest quality logistical support and quality of life services to U.S. Navy operating forces and for assigned activities and other commands as needed, and to provide the right support, at the right time, in the right amount, enabling operating forces to produce the right level of combat readiness; that is, support the Fleet, Fighter and Family*" (CNIC 2012). The installations of NBC serve a wide range of military users due to their proximity to the U.S. Navy's largest homeport, San Diego, and their coastal location.



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 2-1: Naval Base Coronado Regional Location

The following sections describe in detail the location, history and mission of each facility within NBC, excluding San Clemente Island. Biological Opinions, permits, leases and other Memorandums of Understanding (MOUs) or Conservation Agreements (CAs) between the U.S. Navy at NBC and other land managers are listed in **Table 2-1** and **Tables 2-3** through **2-7**.

2.1.1 Naval Air Station North Island

2.1.1.1 Location

NASNI is located just north of and adjacent to the city of Coronado. Bounded by San Diego Bay on the north and east, and the Pacific Ocean on the west, NASNI consists of 1,134 hectares (2,803 acres)—970 hectares (2,397 acres) of land and 164 hectares (406 acres) of water (see **Figure 2-2,** San Diego Bay INRMP covers waters within the bay east and north of NASNI). The installation occurs on the northernmost end of a tombolo sand-spit that connects the island of Coronado to the city of Imperial Beach. The elevation of NASNI ranges between 0 and 9 meters (0 and 30 feet) above mean sea level (AMSL) and the terrain is flat.

2.1.1.2 History

Pre- Military Land Use

On September 28, 1542, Juan Cabrillo found the natural, narrow channel opening to an embayment where seven river systems and tidal influence created a shore lined with deltas, mudflats, and salt marshes. Remaining for 6 days, the Spaniard reported a few native tribes who hunted and fished the sea with nets. He named the Bay San Miguel. Sixty years later, a Spanish-Mexican merchant, Sebastian Vizcaino, followed Cabrillo's route, found the embayment and renamed it San Diego Bay. To obtain fresh water, wells were dug on North Island. Native Americans in settlements around San Diego established campsites along San Diego Bay, attracted by shellfish and fish resources. "Fish constitutes the principal food of the Indians who inhabit the shore of this port, and they consume much shellfish because of the greater ease they have in procuring them. They use rafts made of reeds, which they manage dexterously by means of a paddle or double-bladed oar. Their harpoons are several yards long, and the point is a very sharp bone inserted in the wood; they are so adroit in throwing this weapon that they very seldom miss their mark" (Captain Vicente Vila 1769, cited in Pourade 1960).

The first government land was obtained on North Island in 1893. Seven hectares (18 acres) located at the southwestern tip of the island were condemned for construction of a jetty to keep the channel open into San Diego Harbor. Upon completion in 1905, an additional 15-hectare (38.5-acre) parcel adjacent to the jetty was condemned to establish Fort Pio Pico, a coast defense fort and the first military reservation on North Island. After World War I the fort was no longer needed and guns were removed (USDoN SWDIV 1991).

In the nineteenth century North Island was referred to as North Coronado Island. Both North and South Coronado Island were purchased by a developer for a residential resort in 1886. When South Coronado became the city of Coronado, North Coronado remained undeveloped. In 1910, a lease to the property of North Coronado was held by Glen Curtiss, an aviation pioneer and subsequent aircraft manufacturer, who opened a flight school on the premises. 1n 1911, Glen Curtiss trained the first group of Japanese aviators at the flying school.

Table 2-1: Active Land Use and Natural Resource Agreements Regarding Naval Air Station North Island

Facility	Agreement Summary	Date of Issue
Biological Opinions, Permits, and Correspondence with U.S. Fish and Wildlife Service		
Naval Air Station North Island	• Biological Opinion FWS - SDG - 1-1-80-F-18 for helicopter maintenance and training facility (MAT) repair project at NASNI.	March 1980
Naval Air Station North Island	• Biological Opinion 1-1-82-F-123 ("Mat BO") 1983 on the MAT Repair/Lamps MKIII Project at NASNI, a helicopter maintenance and training facility. • Develop designated Least Tern nesting sites to mitigate for loss of existing nesting area due to completing MAT repairs and construction of Light Airborne Multipurpose System facilities. Alternate nesting sites designated after 1980 BO were determined to be unsuccessful in benefitting the Least Tern.	March 1983
Naval Air Station North Island	• Letter from USFWS to CO of NBC regarding the Bird/Wildlife Aircraft Strike Hazard (BASH) program and Terns during Western Snowy Plover and California Least Tern nesting season. • USFWS determined that the use of pyrotechnics would likely not result in "take", provided pyrotechnics are banned form use around the perimeter of the MAT site, the western beach areas south of Zuniga Point, or the shoreline areas surrounding NASNI from April 1 to September 15.	18 October 2001
Naval Air Station North Island	• Biological Opinion (l-6-03-F-3452.1) • Endangered Species Consultation and Draft Biological Opinion on Military Training Operations during 2004 Breeding Season at Naval Amphibious Base, Coronado; Naval Receiving Facility, Imperial Beach; and Naval Air Station, North Island; San Diego County, California.	9 August 2004
Naval Air Station North Island	• Biological Opinion on Phase 1 of the Navy Lodge Expansion Project, NASNI • Amendments to Navy Lodge Expansion Project, Naval Air Station North Island, Naval Base Coronado, San Diego County, California (FWS-SDG-3908.6)	20 July 2005 1 August 2007
Naval Air Station North Island	• Programmatic biological opinion on the U.S. Navy's proposal to conduct training activities in the Southern California Complex from January 2009 to January 2014 and the Permits Division's proposal to issue regulations to the authorize the U.S. Navy to "take" marine mammals incidental to the conduct of training exercises in the Southern California Complex.	14 January 2009
Naval Air Station North Island	• Letter to USFWS notification of the removal of thirty ficus (*Ficus* spp.) nesting trees on NASNI.	9 September 2010

Facility	Agreement Summary	Date of Issue
Biological Opinions, Permits, and Correspondence with U.S. Fish and Wildlife Service (continued)		
Naval Air Station North Island	• USFWS Biological opinion FWS-SDG-3908.3 on the effects of ongoing airfield operations and management strategies on the Western Snowy Plover at NASNI. • USFWS Letter FWS-SDG-3908.4, Amendment to the 2005 Biological Opinion on the Navy's proposed and ongoing operations and 2005 management strategy for the Western Snowy Plover and California Least Tern at Naval Air Station North Island. • USFWS Letter FWS-SDG-11B0284-11F0424: Amendment to the 2005 Biological Opinion on Ongoing Operations and Management Strategies at NASNI regarding BASH strikes with Western Snowy Plover and California Least Tern.	1 April 2005 20 June 2005 3 June 2011
Silver Strand Training Complex	• Biological Opinion FWS-SDG-08B0503-09F0517 • Biological Opinion on the U.S. Navy SSTC Operations • This Biological Opinion was the result of a programmatic level consultation that addresses training activities on NASNI, NAB Coronado, SSTC-N and SSTC-S. Species considered during this consultation include Western Snowy Plover, California Least Tern, California Clapper Rail, salt marsh bird's-beak, green sea turtle, and San Diego fairy shrimp. Of these the effects on the Western Snowy Plover, the Least Tern and the San Diego fairy shrimp were evaluated within this Biological Opinion.	7 July 2010
Naval Air Station North Island	• Informal Consultation Letter (FWS-SDG-11B0282-11I0303) for Helicopter Wings Realignment and MH-60R/S Helicopter Transition at Naval Base Coronado, California. • USFWS concurred with the Navy's determination that potential impacts from the project on Western Snowy Plover, California Least Tern, and Light-footed Clapper Rail, would be insignificant.	3 June 2011
Permits issued by U.S. Army Corps of Engineers		
Naval Air Station North Island	• Permit Number 94-20861-DZ Amendment. • Amendment to permit regarding dredging for berthing of Carrier Vessel Nuclear (CVN) I. Modification discusses requirements for monitoring discharge on local recreational beaches.	1 May 1997
Naval Air Station North Island	• Permit Number 982004900-KMM (CVN II). • Permit issued by U.S. Army Corps of Engineers (USACE) to the Navy allowing dredging of 7-hectare (18-acre) site to construct one berth for new CVN (nuclear aircraft carrier) and creation of habitat enhancement plan offshore on the south bay side of NAB Coronado.	21 June 2000 to 1 July 2004

Facility	Agreement Summary	Date of Issue
Permits issued by U.S. Army Corps of Engineers (continued)		
Naval Air Station North Island	• Record of Decision and U.S. Army Corps of Engineers Permit Number 94- 20861-DZ (CVN I). • Creation of 6 hectares (14 acres) of subtidal and intertidal habitat by excavation of uplands. Heron mitigation requirements for nesting tree removal. Three hectares (8 acres) eelgrass planting at Navy Eelgrass Mitigation Site (NEMS) 5. Addition of clean sand to the MATS site. Habitat enhancement for Western Snowy Plover near Zuniga Point.	12 December 1995 to 4 April 1996
Memoranda of Understanding and Cooperative Agreements		
Naval Base Coronado	• Memoranda of Understanding regarding in-water construction projects most recently signed in 2001.	18 December 2007
Naval Air Station North Island	• Cooperative Agreement between CDFW and NBC. • Allows access for CDFW officers for enforcement of CDFW regulations on U.S. Navy land.	1978
Lease or Permit with State, City or Other Group		
Naval Air Station North Island	• City of Coronado N6871193RP03Q18 expires 31 October 2014. • Coronado beachfront property (Dog Beach).	31 October 2003
Naval Air Station North Island	• Lincoln Housing Lease ROW expires 31 July 2051 • Ground lease with respect to Naval Base Coronado, whereby Government-owned land is leased out to a Limited Liability Company (Lessee) for military family housing purposes. The Lessee for all Naval Base Coronado PPV projects is San Diego Family Housing, LLC (SDFH).	1 October 2007

In 1911, the first Naval Aviation Unit used the Curtiss Aviation Camp on North Island as winter quarters. In 1912, the U.S. Army established the Signal Corps Aviation School (renamed Rockwell Field) on North Island, and the U.S. Marine Corps established a temporary outpost there along the Spanish Bight. Disputes between the U.S. Army and the U.S. Navy over control of North Island began. In 1917, the U.S. Navy gained possession of the north end of the island by a signed boundary agreement with the U.S. Army. However, disputes continued, and in 1935 President Franklin Roosevelt issued an Executive Order (EO) for resolution. NASNI was designated on October 26, 1935.

Naval Air Station North Island Facilities Historic Era

Prior to the establishment of NASNI as one of the earliest Naval air stations in the U.S., and the first on the West Coast, the northern portion of Coronado Island (North Island) was undeveloped sand flat, used for agriculture and recreation (see **Photograph 1-1**). Climatic conditions, and the characteristics of flat terrain, good beaches and protected stretches of water, attracted aviation pioneer and Wright Brothers' competitor, Glenn H. Curtiss, to North Island in 1910. Through the intervention of a local flying club, the landowner, the Coronado Beach Company, was persuaded to permit Curtiss to use North Island for his Aviation School. In January 1911, the Navy assigned its first pilot, Lt. T. G. Ellyson, to be trained by Curtiss at his school on North Island. Later that year, the Navy established its first naval aviation unit at Annapolis, Maryland, in September 1911 (U.S. Navy 2012b).

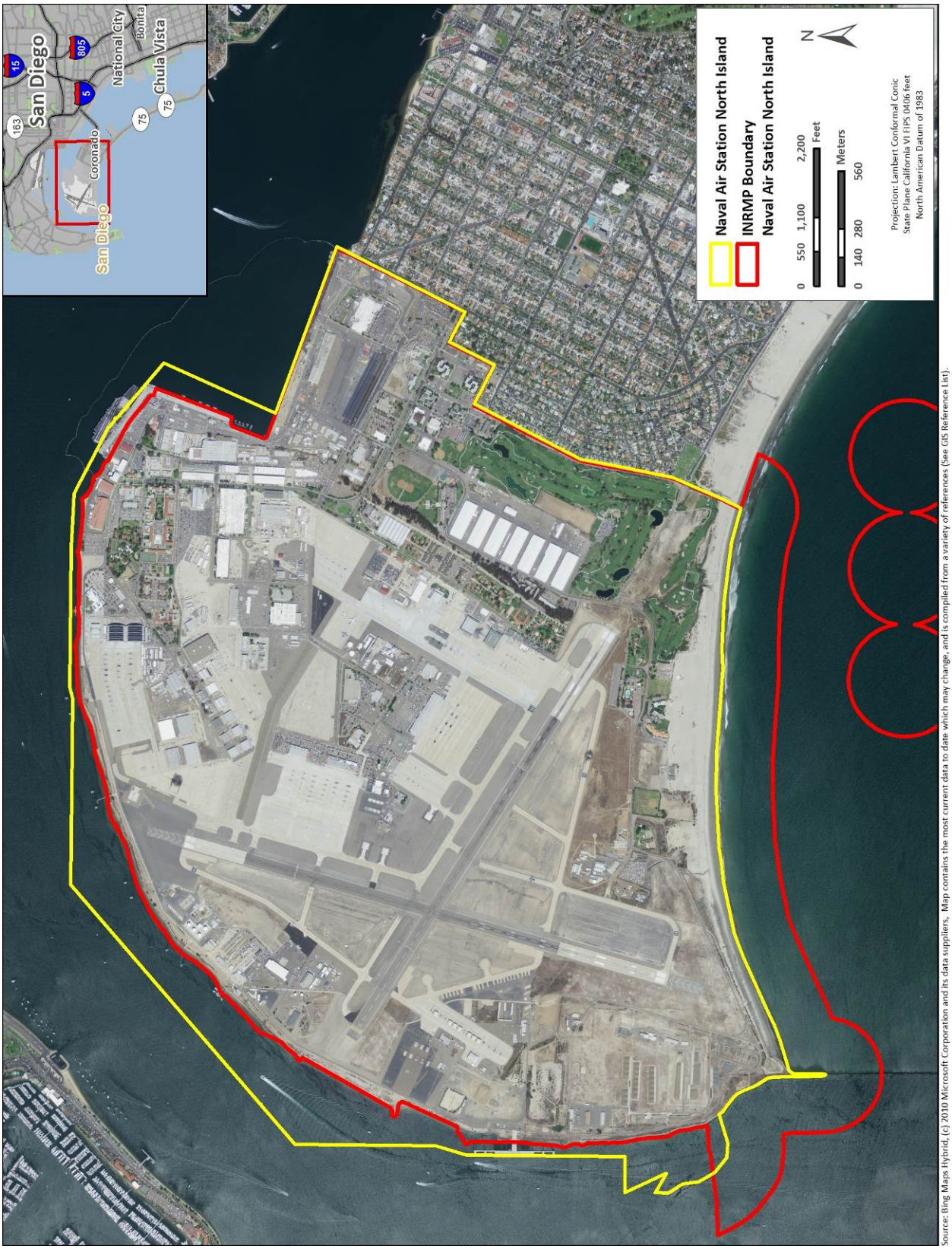


Figure 2-2: Naval Air Station North Island Location

Photograph 2-1: Naval Air Station North Island Location 1923

In 1912 the Army's Signal Corps Aviation School relocated from its original location at College Park, Maryland, to North Island. This was the first Army school to provide flying training for military pilots, and North Island was the school's first permanent location. There was a desperate need for trained military pilots after the U.S. entered WWI. In July 1917, Congress authorized the President to proceed with the taking of North Island (still in private ownership) for Army and Navy aviation schools (U.S. Navy 2012b).

The Army and Navy shared tenancy at North Island until 1935, when the Navy was awarded sole tenancy. The Army moved most of their aircraft to March Field in Riverside, California, but it took another three years to completely phase-out Army activities at North Island. In the early 1930's, the property increased in size by 250 hectares (620 acres) with a deposit of 16 million cubic yards of material from a dredging operation in San Diego Bay. Construction was initiated at that time because all four U.S. Navy aircraft carriers were located there. During World War II, the Spanish Bight was filled, providing space for medical facilities, quarters, administration, recreation, and storage. Facility airfields were renovated and concrete runways were built to accommodate increased activity. After World War II, NASNI was the largest Naval air station on the west coast, supporting the Pacific fleet with facilities for overhaul and repair, logistics, air operations, and as a homeport, it was sustained by continued interest in aviation technology and the introduction of jet aircraft (U.S. Navy 2012b).

Among major improvements at NASNI during the Korean War was the 457-meter (1,500-foot) extension of Runway 11/29 and construction of a new control tower. In 1958, a Nuclear Weapons Training Center was established, and in 1961 the new super carriers were accommodated by dredging to a depth of 13 meters (42 feet). In 1964, NASNI began to overhaul launching and arresting equipment and other aviation material from aircraft carriers, which continued during the Vietnam Conflict. Since November 2001, NASNI has the capacity for three carriers, two nuclear and one conventional. In 2010, a project was completed, converting the third berth to a nuclear capable berth. Currently, two carriers are homeported at NASNI, the Reagan and the Vinson.

2.1.1.3 Mission

Mission: To arm, repair, provision, service and support the U.S. Pacific Fleet and other operating forces (CNIC 2012).

NASNI is the largest naval aviation industrial complex on the West Coast and the only naval air station in California with an airfield supporting 24-hour capabilities. In addition, NASNI is the only military installation in Southern California capable of berthing and maintaining a Nimitz Class aircraft carrier. It is the largest aerospace employer in San Diego and is distinguished as headquarters for six major military Flag staffs.

Located at the mouth of San Diego Bay, NASNI affords Naval aircraft with direct, over-water access to ships anchored offshore. NASNI hosts the Commander, Naval Air Force, U.S. Pacific Fleet, the Commander Carrier Group One, and the Commander Carrier Group Seven. The U.S. Navy's largest Naval Aviation Depot and the Defense Distribution Center are stationed at NASNI, in addition to other commands.

The majority of current land use at NASNI is in the form of developed areas and structures. Military land use on NASNI includes air operations, air facilities, water facilities and other facilities for supply, weapons, administration, and command and control. Significant areas are dedicated to residential housing and community support services, and a variety of services and facilities are provided for outdoor recreation. Aviation safety zones and ordinance safety areas have been designated which typically restrict certain types of land use that are incompatible with the mission of the facility.

2.1.1.4 Administrative Facilities

There are many buildings representing supply, medical clinics, administrative, command and control, and military housing and community support.

2.1.1.5 Recreation

Outdoor recreation facilities include athletic/recreational field areas, tennis courts, volleyball courts, basketball courts, picnic areas, swimming pools, a golf course, oceanfront beaches, beach cabanas, a fishing pier, as well as jogging, cycling, walking and wildlife viewing trails. The golf course, in addition to providing recreation to military and civilian employees and wildlife habitat, functions as a passive buffer between the community of Coronado and activities at NASNI. Dog Beach is a U.S. Navy property on the ocean side of NASNI just outside of Gate 1, which is leased by the city of Coronado as a recreational beach (U.S. Navy 2010c).

2.1.1.6 Land Use and Resource Agreements

Biological Opinions, permits, leases and other MOUs or CAs between the U.S. Navy at NASNI and other land managers are listed in **Table 2-1**.

2.1.2 Naval Amphibious Base Coronado and Silver Strand Training Complex

2.1.2.1 Location

NAB Coronado is located on the Silver Strand Highway (SR-75), within the city of Coronado, approximately 4.3 kilometers (2.7 miles) south (and across the bay) from the city of San Diego and 2 miles southwest of NASNI. The administrative and pier areas of NAB Coronado are approximately 125 hectares (310 acres) in size. The NAB Coronado beach training areas overlap with SSTC-N beach training areas. NAB tenants use the adjacent Silver Strand Training Complex (SSTC), Marine Corps Base (MCB) Camp Pendleton, San Clemente Island, and other NBC installations for operations and training (U.S. Navy 2010a).

SSTC is situated on a 9.1 kilometers-long (6-mile-long) sand-spit that connects the city of Coronado to the city of Imperial Beach and separates the Pacific Ocean to the west from San Diego Bay to the east. At its northernmost point, this narrow strip of land begins approximately 3.2 kilometers (2 miles) southwest of NASNI, where it overlaps NAB Coronado beachfront, and ends approximately 2 kilometers (1.3 miles) north of NOLF IB. The SSTC site, adjacent to and just south of NAB Coronado, includes a total of 620 hectares (1,534 acres), with an elevation of 0 to 3 meters (0 to 10 feet) mean sea level (MSL). The Silver Strand Highway (SR-75) runs along the entire length of the strand (U.S. Navy 2010a).

The terrain surrounding SSTC is flat in all directions. San Diego Bay's calm waters to the east, harbor-water beachfront in Glorietta Bay to the northeast, and relatively rough waters of the Pacific Ocean to the west provide SSTC with optimum conditions for its mission to support training. Close proximity to other naval installations aids in the efficiency of coordinating joint operations and logistics support (U.S. Navy 2010a).

The training areas of SSTC-N total 405 hectares (1,002 acres); 301 hectares (745 acres) of land owned by the Federal government, and approximately 104 hectares (257 acres) leased from the state of California. In addition a portion of the water off-shore of SSTC-N is owned and utilized for training by the Navy. SSTC-S (formerly Naval Radio Receiving Facility [NRRF]) consists of approximately 221 hectares (548 acres) of mostly undeveloped Federal owned land down to the high tide line with additional offshore training areas leased from the state of California (U.S. Navy 2010a).

2.1.2.2 History

Pre-Military Land Use

NAB Coronado: In the mid-1800s, the Silver Strand peninsula was considerably narrower than it is now, and flats, marshes and tidelands were present along its bayside margins. In the 1840s, there was a wagon route along the Silver Strand, and later a railroad was built on trestles. The land was also used for grazing under the name Rancho Isla o Peninsula de San Diego in 1851.

By the early 1900s, roads were constructed, and the seaside resort community Coronado Tent City was established at the northern edge of where NAB Coronado is now. However, residential planning for the Silver Strand was never fully developed. Instead, from 1940 to 1946 an estimated 26 million cubic yards

of sediment was removed from the San Diego Bay and added to the Silver Strand to make it ready for the military amphibious training base.

Established in 1943, NAB is the only Naval Amphibious Base on the West Coast. It is located on land that was created from the dredging of San Diego Bay. Construction of NAB was completed within a short period of time and was designed by two architectural and engineering firms rather than the Navy's Bureau of Yards and Docks (U.S. Navy 2012b).

Originally known as the Amphibious Training Base, NAB was renamed in 1946 and its primary mission was changed to providing major administrative and logistical support to the amphibious units which are located on the base. In January 1953, NAB began providing logistical support to the Navy facilities at San Clemente Island. In 1963, Special Warfare Group One was established at NAB, and in 1968, the River Assault Group was stationed here, the first of its kind since the Civil War (U.S. Navy 2012b).

SSTC-S: In 1885 the Coronado Beach Company land development and community was established on present-day NRRF land. A water system and railroad was constructed to service this community, and soon another started up at the base of the Silver Strand. In the early 1900s, the developers did not have the means to continue their investments in the Silver Strand peninsula communities, and the Navy began to show interest in the property.

Naval Amphibious Base Coronado and Silver Strand Training Complex Facilities Historic Era

NAB Coronado: Although the U.S. Navy established a Destroyer Base on San Diego Bay during World War I, and a Landing Craft Detachment there in 1942, military presence on NAB Coronado actually began in 1943 with the authorization of an Amphibious Training Base at Coronado. Dredged material from San Diego Bay was used to create a landfill; this one was located 5 kilometers (3 miles) south of the fill created perpendicular to the Silver Strand. The conditions of this property were considered ideal for every type of amphibious training. The Landing Craft School was consolidated to a department of the Naval Amphibious Training Base in 1945, and in 1946 the installation was redesignated as NAB Coronado. The role was changed from actual training to that of providing a shore base for the support and training of amphibious units and for research and test of amphibious equipment.

Post World War II development of NAB Coronado was delayed due to uncertain title status of the occupied lands. By 1952, land acquisition proceedings progressed to enable initiation of permanent military construction. In 1955, the United States obtained clear title to the land. NAB Coronado's mission was modified in 1977 to more effectively support the training and operations of tenant commands and operational forces of the Pacific Fleet (DoN WESTDIV 1989). Today NAB Coronado is the only amphibious training base on the West Coast.

SSTC-S: The Coronado peninsula, or Silver Strand, was virtually undeveloped except as a transportation corridor until the early twentieth century. Concurrent with the development of Coronado north of the Silver Stand was the establishment of Coronado Heights in the 1880s just south of the peninsula at Imperial Beach—the current location of SSTC-S. As a result of the local real estate crash in 1888, however, the development never came to fruition. The property was finally taken over by the Navy at the start of WWII under a series of condemnation suits. The Navy acquired 59 hectares (145 acres) of land and the Army obtained 167 hectares (412 acres) (U.S. Navy 2012b). Prior to the war, the Navy had established a small radio compass station on the edge of the beach in 1920, to aid ships in navigation. With the military acquisition of the property, the Army established Fort Emory in 1942 as a coastal battery and strengthened the military's defenses around San Diego harbor with the relocation of guns here from Fort Rosecrans. The army ceased use of the battery in 1944, after which the Navy expanded its

activities here by using the Fort Emory facility as a sub-base of NAB for amphibious training (U.S. Navy 2012b).

In years immediately following the war, the Navy constructed radio facilities at the base, provided primary communication links for the Navy's submarine community, and established a training school for communication technicians in 1948. In 1952, the Navy officially took over the Army lands and expanded the facility by rehabilitating older buildings and constructing family housing, classrooms, barracks, offices, a bowling alley and a theatre (U.S. Navy 2012b).

The present SSTC-S site started in 1920 with the Radio Compass Station located at the southwestern corner of the SSTC-S property (see **Photograph 2-2**). From 1941 to 1944 additional land was acquired in the Imperial Beach area by the U.S. Navy. In 1945, the naval communication sites were consolidated under one command, the Eleventh Naval District Communications Offices, and functions at the Point Loma facility were transferred to Imperial Beach. In 1952, Fort Emory was acquired from the U.S. Army, and a communications training school was built on this portion of Imperial Beach. The school was moved in 1961 to Pensacola, Florida, and the buildings removed to accommodate the Wullenweber antenna, which was constructed in 1965.

Photograph 2-2: Silver Strand Training Complex South

The Wullenweber antenna array was completed in 1965 and has since been decommissioned for the purpose of reducing the footprint of Navy facilities by removing unused and technologically obsolete structures. The demolition of this excess facility would be in support of the Office of the Secretary of Defense (OSD) and CNIC initiatives to consolidate functions and eliminate excess and obsolete facility inventory under Navy Demolition and Footprint Reduction Program (U.S. Navy 2011b).

2.1.2.3 Mission

NAB Coronado

Mission: to support U.S. Navy and Marine Corps amphibious, special warfare, and mine countermeasure training by providing local land, sea, and airspace support services; materiel; and training facilities that will help Naval and Marine Corps forces achieve and maintain the highest level of operational readiness (U.S. Navy 2010c).

NAB Coronado is the primary Navy amphibious training facility on the West Coast. As such, it is a major hub for Naval Expeditionary and Special Warfare Commands. Tenants of NAB Coronado are subordinates to Commander Naval Surface Force Pacific Fleet (COMNAVSURFPAC), Commander Naval Special Warfare Command, and Commander Navy Expeditionary Combat Command. NAB Coronado provides support for basic, special, and expeditionary warfare training and operations on the West Coast (U.S. Navy 2010a).

Silver Strand Training Complex

Mission: To provide on-base facilities and services for the support of U.S. and allied forces engaged in amphibious, inshore, clandestine, unconventional, and special warfare training and operations (U.S. Navy 2010a).

Tenant commands based at NAB Coronado can use the SSTC as a "backyard" training area. These facilities provide a shore base for the operations, training, and support of west coast naval amphibious and clandestine units and are the core of basic, special and expeditionary warfare training and operations on the west coast. NAB Coronado and SSTC-N is comprised of 10 ocean side beach and boat training lanes (numbered as Boat Lanes 1 through 10), ocean anchorage areas (numbered 101 through 178), bayside water training areas (Alpha through Hotel), and bayside beaches (Alpha through Charlie, Delta North and Delta South) (see **Table 2-2** and **Figure 2-3**, the San Diego Bay INRMP covers waters within the bay east of NAB Coronado and SSTC-N) (U.S. Navy 2010c). The anchorages lie offshore of SSTC-N in the Pacific Ocean and overlap a portion of Boat Lanes 1 to 10. The SSTC-N consists of 301 hectares (745 acres) of land owned by the Federal government and approximately 104 hectares (257 acres) of beach property are leased from the state of California.

SSTC-S consists of four ocean side beach and boat training lanes (numbered as Boat Lanes 11 through 14), and inland training areas and facilities inside a fenced area (see **Table 2-2** and **Figure 2-4**, the San Diego Bay INRMP covers waters within the bay east of NAB Coronado and SSTC-S). SSTC-S consists of approximately 222 hectares (548 acres) of land owned by the Federal government down to the high tide line with offshore training areas leased from the state of California. In all, SSTC includes nearly 3.9 nautical miles (NM) of coastline (2.6 NM at SSTC-N and 1.3 NM at SSTC-S) (U.S. Navy 2010c).

2.1.2.4 Administrative Facilities

NAB Coronado consists of primarily developed areas and contains over 170 buildings. Land use within the boundaries of NAB Coronado is divided into 10 categories: activities, training, maintenance, supply, medical, administration, housing, community support, recreation, and utilities. Turner Field is a helicopter landing pad on NAB Coronado and is used for training. This facility is located near the eastern edge of NAB Coronado; the pad is used as a staging area for helicopter casts, special patrol insertion/extraction, and other waterborne activities that require loading/unloading personnel or equipment. Operational facilities are primarily concentrated along the north bayside area of NAB Coronado. This area includes 21 permanent berthing piers for the watercraft used for amphibious training, such as landing craft, high-speed patrol boats (Mark Vs), training barges, causeways and

Table 2-2: Naval Air Station North Island and Silver Strand Training Complex Training Areas

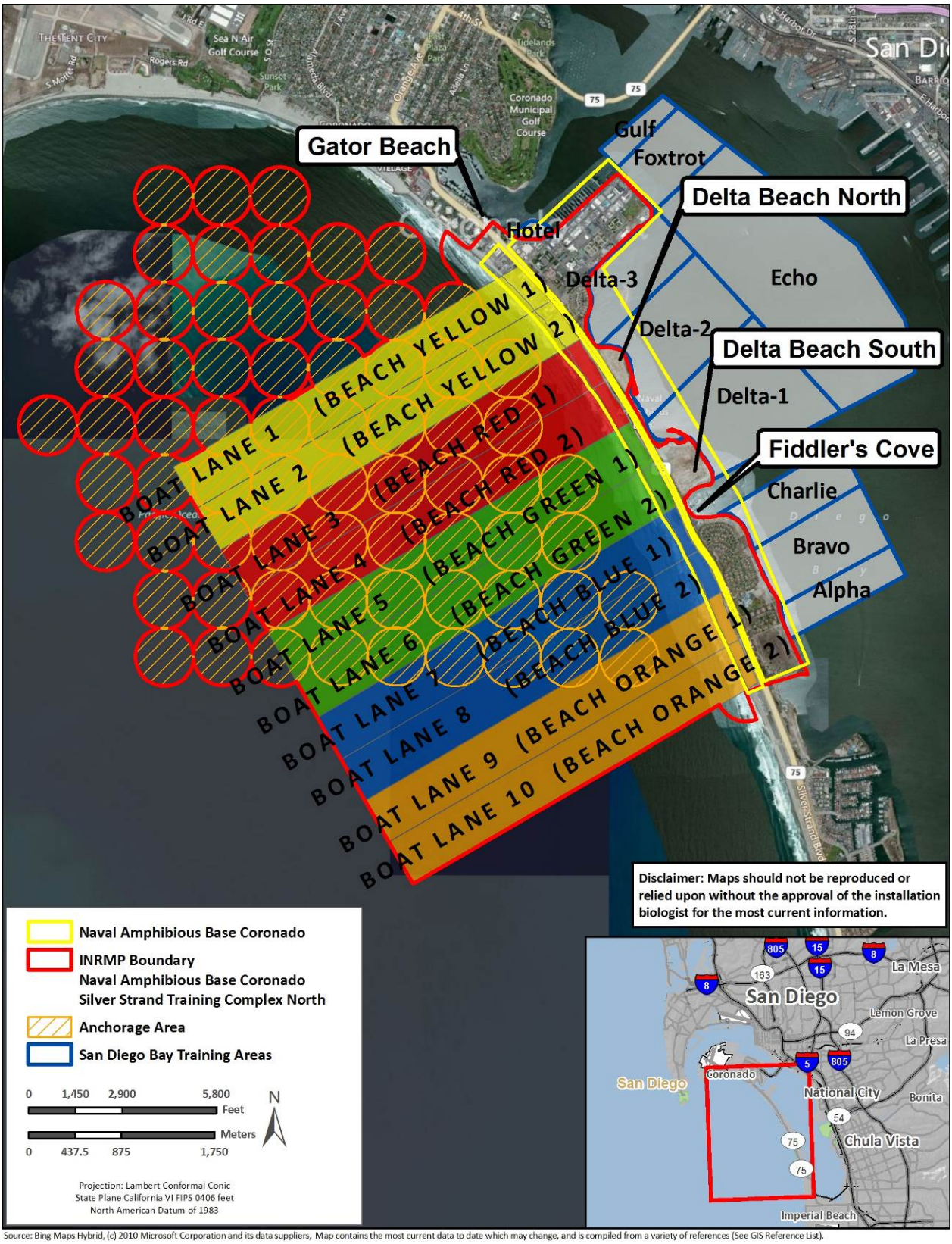
Training Area	Description
Boat Lanes (1-10) and Beach Training Areas (SSTC-N)	The 10 ocean training lanes are each 457 meters wide stretching 3,658 meters seaward and forming a 4,572 meter-long (15,000 feet-long) contiguous training area. The boat lanes, similar to the beach areas, are identified by color and number (Yellow 1 through Orange 2). Each boat lane is 457 meters (1,499 feet) wide (914 meters (2,998 feet) per color) and follows the boat lanes by stretching 4,572 meters (15,000 feet) north to south. A demolition pit and obstacle course are located within the beach training areas. A rappel tower is located adjacent to the beach training area just inside the fenced compound.
Bayside In-water and Beach Training Areas (SSTC-N)	Bayside training beaches consist of Delta North and South, and Alpha through Charlie, as well as bayside in-water training areas, Alpha through Hotel. This area also includes the piers and Lilly Ann Drop Zone (DZ). The Turner Field helipad is located on land within the NAB Coronado bayside areas.
Anchorages (SSTC-N)	Anchorages are numbered 101 through 178 and are 598 meters (1,962 feet) in diameter. They are grouped together in an area located primarily due west of SSTC-N, east of Zuniga Jetty and the restricted areas on approach to the San Diego Bay entrance.
Boat Lanes (11-14) and Beach Training Areas (SSTC-S)	There are four beach training areas as well as four contiguous boat lanes (11-14) at SSTC-S. The four ocean training lanes are each 457 meters (1,499 feet) wide stretching 3,658 meters seaward. Each boat lane (914 meters [2,998 feet] per color) follows the other boat lanes by stretching 1,828 meters (6,000 feet) north to south and is divided (for scheduling purposes) into White 1 and 2 and Purple 1 and 2. Each color section is 914 meters (2,998 feet) wide for a total of 1,828 meters (6,000 feet).
SSTC Inland Areas (SSTC-S)	A multi-use facility located on land containing training infrastructure for use primarily by Naval Special Warfare (NSW) and Explosive Ordnance Disposal forces, the Kaufman DZ is located at the southeastern corner of SSTC-S. A helipad is located adjacent to Building 902.
NASNI Training Areas	The NASNI training areas include the beaches and nearshore waters from Breaker's Beach to Zuniga Jetty and the nearshore waters surrounding NASNI.

warping tugs. In addition, the piers serve as an area for limited training activities, including practice dives, boat maneuvers, and docking (U.S. Navy 2010c). See **Figure 2-3** for an aerial map of NAB Coronado and Silver Strand Beaches.

Current land uses on SSTC-S include supply/storage functions (near Bunkers 99 and 100); military recreation facilities including an athletic field, playing courts, showers, a clubhouse, and picnic facilities (located near Bunkers 98 and 99); and four former military family housing units (located along the southern boundary) that are now used for administrative purposes (U.S. Navy 2010c).

2.1.2.5 Recreation

NAB Coronado and SSTC-N: Training for the Conseil International Du Sport Militaire (CISM) takes place on the southern shore of the Main Base. The CISM is an international military "Olympic" event which Special Forces personnel train. The waters and a park near Delta III Beach are often utilized for



Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers, Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 2-3: Naval Amphibious Base Coronado and Silver Strand Training Complex North Location

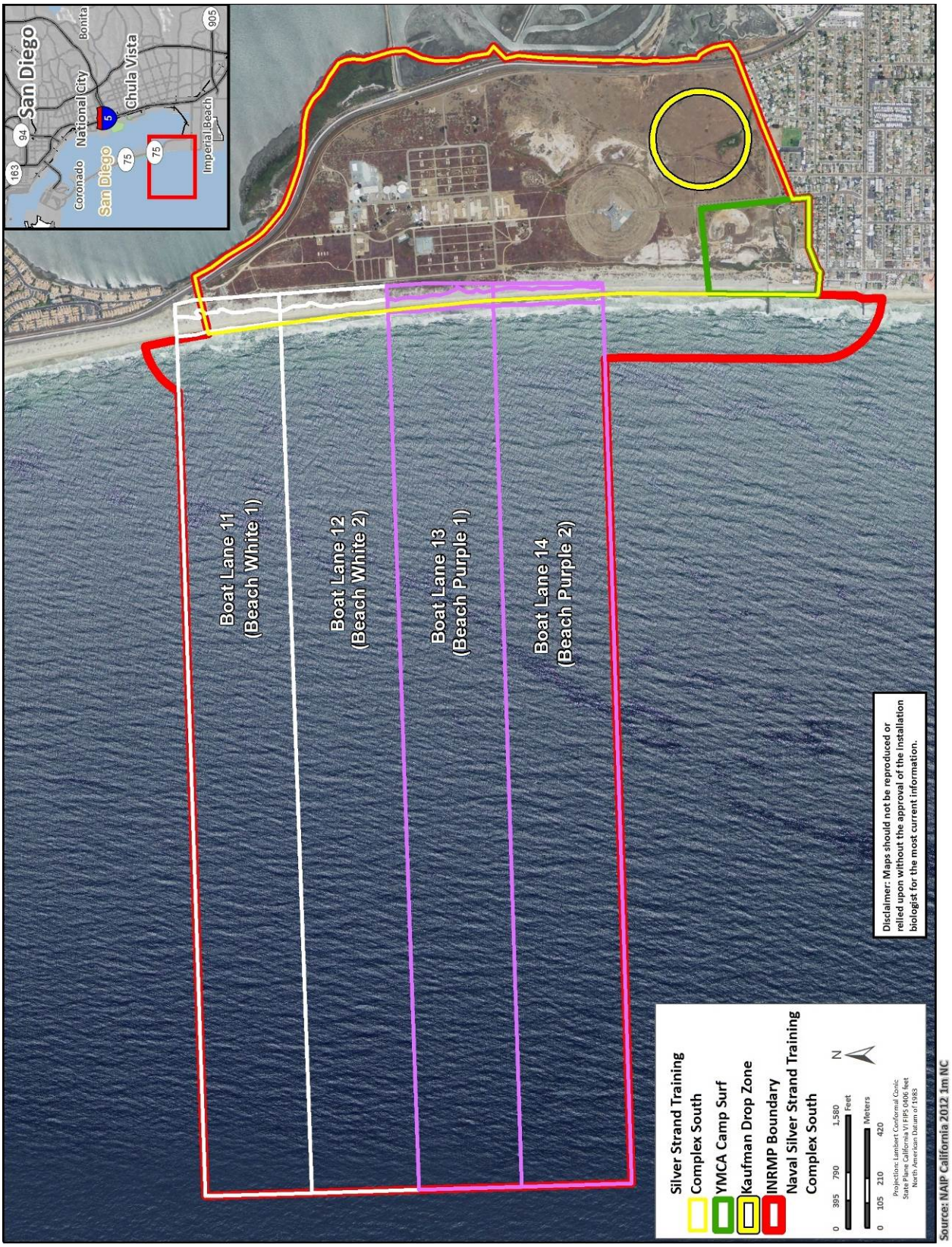


Figure 2-4: Silver Strand Training Complex South Location

this purpose (Barnhill 2001). The CISM field is used by many NAB Coronado commands for physical readiness training, a required component of military life for all service personnel (U.S. Navy 2010c).

Fiddler's Cove Marina and Recreational Vehicle Park is located to the south of SSTC-N on the bayside along Silver Strand State Highway/SR-75, just north of Loews Coronado Resort. The marina has approximately 150 moorings and approximately 130 dock slips, and the RV Park offers year-round camping. Both facilities are open to active duty, retirees, DoD civilians, and sponsored civilian guests (U.S. Navy 2010c).

Gator Beach is a recreational beach on the Silver Strand ocean-side of NAB Coronado (west side of State Highway 75). The beach is open to all military personnel and their dependents (U.S. Navy 2010c).

Just south of military enlisted housing is a parcel of about 16 hectares (40 acres) that is leased by the U.S. Navy (Navy) to the California Department of Parks and Recreation (CDPR), with a lease expiration date of 2022. This parcel was leased as part of a Coastal Consistency Determination with the California Coastal Commission (CCC) as compensation for fencing the Delta Beach property to create the Least Tern preserve. Together with a southern state owned parcel, the State Beach property includes 1,402 meters (4,600 feet) of Bay frontage (CDPR 1984). The parcel has been the focus of negotiation between the U.S. Navy and CDPR for exchange purposes in the past.

Management of the parcel by CDPR is based on the 1984 general plan for this State Beach. The leased parcel is a passive recreation area with a formalized trail system to control foot and bike traffic. After discovering a population of the sensitive plant Nuttall's lotus (*Acmispon prostratus*), plans for a campground were dropped. Interest in developing boat berthing and access was expressed in the plan, but the Navy has not clarified its approval of such use of the tidelands. The state owned parcel is developed with day use and maintenance facilities. If other sensitive species are found, the park will restrict public access to the specific site (Navarro 1998). A habitat restoration plan was implemented on the parcel (Wells 1998).

2.1.2.6 Land Use and Resource Agreements

Biological Opinions, permits, leases and other MOUs or CAs between the U.S. Navy at NAB Coronado, SSTC N and SSTC-S, and other land managers are listed in **Table 2-3**.

Table 2-3: Active Land Use and Natural Resource Agreements Regarding Naval Amphibious Base Coronado and Silver Strand Training Complex

Facility	Agreement Summary	Date of Issue
Biological Opinions, Permits, and Correspondence with U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration		
Naval Amphibious Base Coronado and Silver Strand Training Complex North	• Concurrence letter from USFWS regarding U.S. Navy proposal to remove Heron trees at Navy Exchange. • Navy proposed removing trees whose roots were buckling sidewalks in front of the Navy Exchange and blocking drainage structures. USFWS agrees to U.S. Navy proposal to relocate some and plant new nest trees at the NAB Coronado entrance and also recommends other measures, including development of long- term regional Heron Management Plan encompassing NAB Coronado, NASNI, and Point Loma.	4 June 2001

Facility	Agreement Summary	Date of Issue
Biological Opinions, Permits, and Correspondence with U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration (continued)		
Silver Strand Training Complex	• Programmatic biological opinion on the U.S. Navy's proposal to conduct training activities in the Southern California Complex from January 2009 to January 2014 and the Permits Division's proposal to issue regulations to the authorize the U.S. Navy to "take" marine mammals incidental to the conduct of training exercises in the Southern California Complex.	14 January 2009
Silver Strand Training Complex	• Biological Opinion FWS-SDG-08B0503-09F0517 on the Navy SSTC Operations, this BO subsumed preceding BOs for the SSTC. • This BO was the result of a programmatic level consultation that addresses training activities on NASNI, NAB Coronado and SSTC-N and SSTC-S. Species considered during this consultation include Western Snowy Plover, California Least Tern, California Clapper Rail, salt marsh bird's-beak, green sea turtle, and San Diego fairy shrimp. Potential impacts on the Western Snowy Plover, the California Least Tern and the San Diego fairy shrimp were evaluated within this BO.	7 July 2010
Silver Strand Training Complex	• Essential Fish Habitat Assessment consultation letter for Navy training activities on the Silver Strand Training Complex.	13 October 2010
Silver Strand Training Complex	• Incidental Harassment of Authorization for Navy training activities on the Silver Strand Training Complex.	18 July 2012
Permits issued by U.S. Army Corps of Engineers		
Naval Amphibious Base Coronado and Silver Strand Training Complex North	• To date, the following are active USACE permits. For a current list, contact NBC planning office. a. 200700243-JMB Fiddler's Cove Marina Repair and Improvement Project (expires 8/7/12 pending extension) b. NASNI: SPL-2011-00305-RRS Repair berths Juliet and Kilo	Expires 18 March 2012 or one year from start date)
National Environmental Policy Act		
Silver Strand Training Complex South	• Environmental Assessment on boundary designations for South San Diego Bay National Wildlife Refuge • Navy concurred with designation of all of SSTC-S as a "Special Planning Unit" of the Refuge under this EA.	

Facility	Agreement Summary	Date of Issue
Memoranda of Understanding and Cooperative Agreements		
Naval Amphibious Base Coronado and Silver Strand Training Complex North	• Memorandum of Understanding between USFWS and NAB Coronado regarding California Least Tern preserve establishment • Required the U.S. Navy to set aside, fence, and manage 31 hectares (78 acres) at NAB Coronado's Delta Beach as a California Least Tern preserve. This was a result of March 1983 BO regarding helicopter maintenance and training facility (LAMPS MKIII) on NASNI.	1984
Naval Amphibious Base Coronado and Silver Strand Training Complex North	• Memorandum of Understanding between USFWS and U.S. Navy regarding California Least Tern and In-water Construction, this MOU was renewed in 2004 and given an extension in 2007. • The MOU establishes standards and conditions for in-water construction activities in San Diego Bay to prevent adverse effects to endangered California Least Tern.	2007
Lease or Permit with State, City or Other Group		
Naval Amphibious Base Coronado and Silver Strand Training Complex North	• Lease Number N 6247482RP00Q39 • Leased approximately 16 hectares (40 acres) of land fronting on the easterly line of Highway 75 adjacent to the existing State Park from the U.S. Navy to the state of California.	1 May 1982 to 31 August 2021
Naval Amphibious Base Coronado and Silver Strand Training Complex North	• Lease Number N6247482RP00A93 Leased from the state of California to the U.S. Navy • In grant lease provides for U.S. Navy exclusive use of 104 hectares (257 acres) of land on "ocean side" Silver Strand Beaches for amphibious military training.	17 November 1985 to 31 August 2021
Naval Amphibious Base Coronado and Silver Strand Training Complex North	• Lincoln Housing Lease ROW expires 31 July 2051 • Ground lease with respect to Naval Base Coronado, whereby Government-owned land is leased out to a Limited Liability Company (Lessee) for military family housing purposes. The Lessee for all Naval Base Coronado PPV projects is San Diego Family Housing, LLC (SDFH).	1 October 2007
Silver Strand Training Complex South	• Lease to city of Coronado, Silver Strand Elementary School, approximately 4 hectares (11 acres).	1 April 2009
Silver Strand Training Complex South	• License N6247309RP00046 leased 10 hectares (27 acres) to the city of Coronado for the Educational Ecological Preserve, biological study area, and wildlife sanctuary.	1 April 2009 to 31 March 2014
Silver Strand Training Complex South	• Easements to the California Department of Transportation for State Highway 75 plus 3-meter (10-foot) right-of-way for a bikeway.	

Facility	Agreement Summary	Date of Issue
Lease or Permit with State, City or Other Group (continued)		
Silver Strand Training Complex South	• Easements to the California Water and Telephone Company • 9-meter (30-foot) water main easement, running north and south.	
Silver Strand Training Complex South	• Lease Number N6871198RP08Q23 from the U.S. Navy to the Young Men's Christian Association • YMCA leases 18 hectares (45 acres) of southwest corner of SSTC-S along the Pacific Ocean for Camp Surf, a summer camp for youth.	Expires 16 September 2048

2.1.3 Navy Outlying Landing Field Imperial Beach

2.1.3.1 Location

NOLF IB is located in the Tijuana River Valley approximately 2.4 kilometers (1.5 miles) north of the U.S.-Mexico border, 16 kilometers (10 miles) south of downtown San Diego, and within the city of Imperial Beach. It is approximately 16 kilometers (10 miles) south of NASNI, and 12 kilometers (7.5 miles) south of NAB Coronado. The operational portion of the 524-hectares (1,295-acre) NOLF IB is the fence-lined Ream Field, which includes 115 hectares (283 acres) of over flight easements generally south and west of the airfield. NOLF IB includes fenced-in hectares (242 fenced-in acres) of mowed grasslands in and around the landing field and 112 hectares (276 acres) of roads and developed areas (see **Figure 2-5**). Additionally, 52 hectares (128 acres) are leased for agriculture and grazing, 10 hectares (25 acres) are leased to the Department of Labor Job Corps Center, and the U.S. Border Patrol maintains offices and detention facilities onsite. The remaining portion of the site is managed by the USFWS as a part of the TRNERR/TSNWR.

The Pacific Ocean is less than 0.8 kilometer (0.5 mile) to the west of Ream Field, and riverine inlets of the Tijuana Estuary tidal flats extend inland from the coast and adjacent to the airfield. As a result, much of the NOLF IB property is at or just above sea level. The elevation of Ream Field ranges from approximately 3 meters (10 feet) AMSL near the southwest fenceline to approximately 12 meters (40 feet) AMSL near the U.S. Border Patrol facilities (northeast fenceline). Runway elevation at the airfield is approximately 8 meters (26 feet) AMSL. The terrain surrounding NOLF IB is flat to the north and west of the station, with low coastal foothills and mesas approximately 2.4 kilometers (1.5 miles) south and 6.4 kilometers (4 miles) east of the airfield.

NOLF IB is bounded to the north, east, and northeast by the highly developed and mostly residential city of Imperial Beach. I-5 is a 10-lane major freeway that passes 2.3 kilometers (1.4 miles) northwest of NOLF IB in a general north/south direction. Access to NOLF IB is primarily from 13th Street, by way of Palm Avenue, via I-5. The primary entry control point for NOLF IB is located on Iris Avenue (U.S. Navy 2010a).

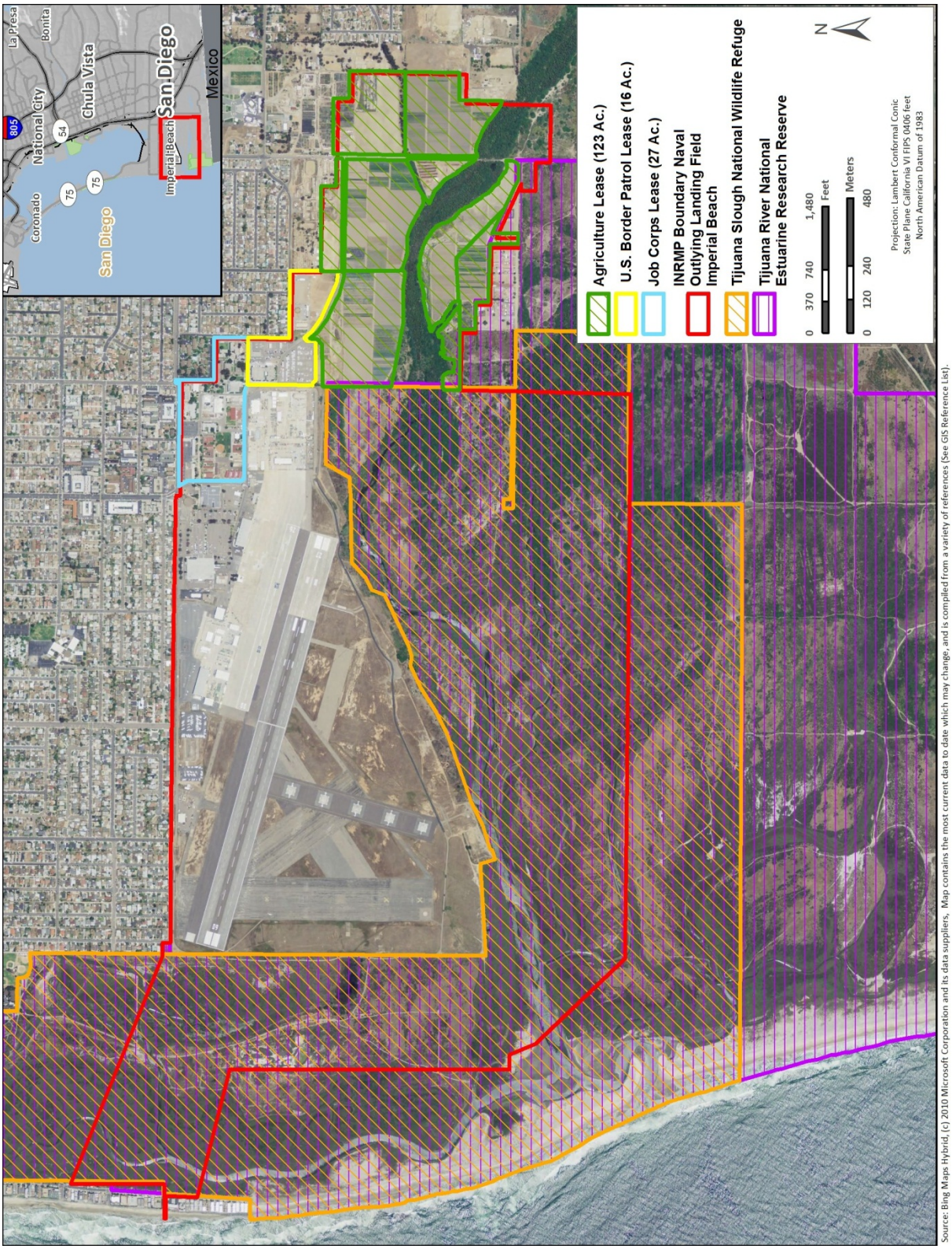


Figure 2-5: Naval Outlying Landing Field Imperial Beach Location

2.1.3.2 History

Pre-Military Land Use

Former land use on this property included 13 hectares (31 acres) of irrigated and dryland pasture of tall fescue and narrow leaf trefoil, which are salt-tolerant plants. Water quality of the wells used to irrigate the pasture probably required the use of salt-tolerant crops. These crops were located on the eastern portion of what was then known as Ream Field, near Sunset Street (USDA 1969).

Naval Outlying Landing Field Imperial Beach Historic Era

In 1917, an aviation field called Ream Field was established by the U.S. Army on the property now known as NOLF IB. It had been named after U.S. Army Medical Corps Major William R. Ream, from its original name of Oneneta Flying Field at Camp Hearn. In the early 1920s, the U.S. Navy began to use Ream Field as an outlying practice field. During World War II, the government purchased additional land, totaling 257 hectares (634 acres), and present-day runways and facilities were built, but after World War II the facility was deactivated and reverted to the practice landing field.

In 1951, the property was designated an Auxiliary Landing Field and in 1955 redesignated as a Naval Auxiliary Air Station. In 1968, Ream Field was commissioned as Naval Air Station, Imperial Beach and more land was purchased. This brought the facility to its present size of 482 hectares (1,190 acres) fee ownership and 42 hectares (105 acres) in aviation easements. In November 1975, as a result of Shore Establishment Realignment action, the facility once again became an Outlying Landing Field under the jurisdiction of NASNI.

2.1.3.3 Mission

Mission: To operate as an extension of NASNI, to provide a practice field for helicopter operations and siting miscellaneous personnel support facilities that serve the military population in the Imperial Beach area.

As an extension of NASNI, NOLF IB is comprised of an airfield and an overflight easement and used for helicopter landing practice and lift training air operations. The facility is used almost exclusively by helicopters and is the only naval helicopter training center for the West Coast. U.S. Navy helicopters based out of NASNI conduct landing practice and lift training operations on a daily basis, but there are no helicopters stationed at NOLF IB. The landing field also provides siting facilities for government tenants including the Department of Labor, Job Corps Training Center, Space and Naval Warfare Systems Center Pacific, and the Defense Reutilization Management Office (DRMO) (CNIC 2012).

A portion of the TRNERR/TSNWR is located on NOLF IB and provides recreational and interpretive opportunities (U.S. Navy 2010c). These portions of the TRNERR/TSNWR are administered under an MOU between NASNI and USFWS relating to the protection of natural resources (U.S. Navy 1992a). The U.S. Border Patrol, Department of Labor, and DRMO maintain leases on the installation, and there are agricultural and grazing leases as well.

2.1.3.4 Administrative Facilities

NOLF IB is composed primarily of two areas. The first area is enclosed within a fenced area and includes two runways and five helicopter pads. Although one of the runways is 1,524 meters (5,000 feet) long and capable of supporting numerous aircraft, NOLF IB is used almost exclusively by helicopters. There are no aircraft permanently assigned to NOLF IB. U.S. Navy helicopters based out of NASNI conduct landing practice and lift training operations on a daily basis. The second area is the overflight easement

portions, which are designated Accident Potential Zones (APZs) and are used primarily for agricultural purposes. The actual property boundaries for the U.S. Navy portion of the TSNWR are currently being reviewed.

2.1.3.5 Recreation

There are no outdoor recreation facilities on NOLF IB aside from the lands administered as part of the TRNERR/TSNWR. The TRNERR/TSNWR is open to hiking, horseback riding, and bird watching. The TRNERR/TSNWR are open to the public, however, recreation activity is limited on U.S. Navy lands even inside the TRNERR/TSNWR because a portion of NOLF IB are zoned as an Accident Potential Zone and TRNERR/TSNWR land use designations do not permit the placement of structures. The U.S. Navy zoning also prohibits use of large groups such as school tours, picnicking, or camping.

2.1.3.6 Land Use and Resource Agreements

Biological Opinions, permits, leases and other MOUs or CAs between the U.S. Navy, NOLF IB, and other land managers are listed in **Table 2-4**.

Table 2-4: Active Land Use and Natural Resource Agreements Regarding Naval Outlying Landing Field Imperial Beach

Facility	Agreement Summary	Date of Issue
Biological Opinions, Permits, and Correspondence with U.S. Fish and Wildlife Service		
Naval Air Station North Island, and Naval Outlying Landing Field Imperial Beach	• USFWS Letter FWS-SDG-11B0282-11I0303. Informal consultation regarding the possible effects of the proposed Helicopter Wings realignment and MH-60R/S Helicopter Transition on the federally endangered California Least Tern, Light-footed Clapper Rail, and threatened Western Snowy Plover.	3 June 2011
Memoranda of Understanding and Cooperative Agreements		
Naval Outlying Landing Field Imperial Beach	• MOU between the Navy and USFWS relating to the protection of natural resources within the TRNERR/TSNWR. • The MOU stresses the importance of protecting the Tijuana Marsh and that USFWS will assume lead responsibility in managing the natural resources. The area is approximately 245 hectares (606 acres).	13 April 1992 Valid until terminated by mutual agreement. Review every 5 years.
Naval Outlying Landing Field Imperial Beach	• MOU between U.S. Border Patrol, the U.S. Fish and Wildlife Service, California State Department of Parks and Recreation, San Diego County Parks and Recreation Department, city of San Diego, State Park Mounted Assistance Unit (MAU), the Tijuana River Valley Equestrian Association (TRVEA), Citizens Against Recreational Eviction (CARE), and the U.S. Navy • The MOU establishes a framework for coordinating trail planning activities and recreational use.	17 September 1997

Facility	Agreement Summary	Date of Issue
Memoranda of Understanding and Cooperative Agreements (continued)		
Naval Outlying Landing Field Imperial Beach	• Department of Labor, Employment and Training Administration Use Agreement N6871197RP07P47 • 11 hectares (27 acres) with buildings and facilities for the establishment, operation and maintenance of a Job Corps Center.	Expires 30 November 2017
Naval Outlying Landing Field Imperial Beach	• Tijuana River Estuary National Natural Landmark designation. • A National Natural Landmark is a nationally significant natural area designated by the Secretary of the Interior. The National Park Service monitors the condition of the landmarks and prepares a report for Congress on their status.	Perpetuity
Lease or Permit with State, City or Other Group		
Naval Outlying Landing Field Imperial Beach	• Lease Number from the U.S. Navy to Mr. David Egger • 48 hectares (123 acres) used solely for agricultural or grazing purposes.	1 August 2004 to 31 July 2014
Naval Outlying Landing Field Imperial Beach	• County of San Diego N6871195RP05P68 • Trails and park area. Use of land at Saturn/Sunset Ave for recreational purposes which includes removal/treatment of all plants (except annual grasses).	2009
Naval Outlying Landing Field Imperial Beach	• U.S. Border Patrol N6871190RPP61 • 6 hectares (16 acres) for INS Border Patrol Station and Training Facilities.	Indefinite

2.1.4 Camp Michael Monsoor

2.1.4.1 Location

CMM (formerly Mountain Warfare Training Facility, La Posta; the name was changed on October 27, 2008) consists of 2,248 hectares (5,554 acres) of land in San Diego County, approximately 92 kilometers (57 miles) east of the city of San Diego and 8 kilometers (5 miles) northeast of the community of Campo (see **Figure 2-6**). Four parcels (totaling 1,370 hectares [3,385 acres]) are currently being considered for transfer of administrative jurisdiction from the BLM to the Navy. These four parcels, including the Existing Withdrawal, are being proposed for exclusive use. Five additional parcels of BLM land (totaling 878 hectares [2,169 acres]) are being proposed to change to nonexclusive use by the Navy through a right-of-way authorization from the BLM for the purposes of conducting training (U.S. Navy 2008b).

A purchase of 124.4 hectares (220 acres) of land contiguous to the existing withdrawal was made (2006) by the Nature Conservancy (TNC) from a private landowner using a combination of funding from DoD, the state of California, and TNC in accordance with the "Buffer Lands Initiative Memorandum of Understanding." These parcels were purchased to act as a buffer from incompatible land use around the CMM. The intent of these parcels is that they not be used by the public or the military. The Buffer Lands Initiative MOU precludes the use of this acquisition land as compensation for military impacts within the boundaries of the installation.

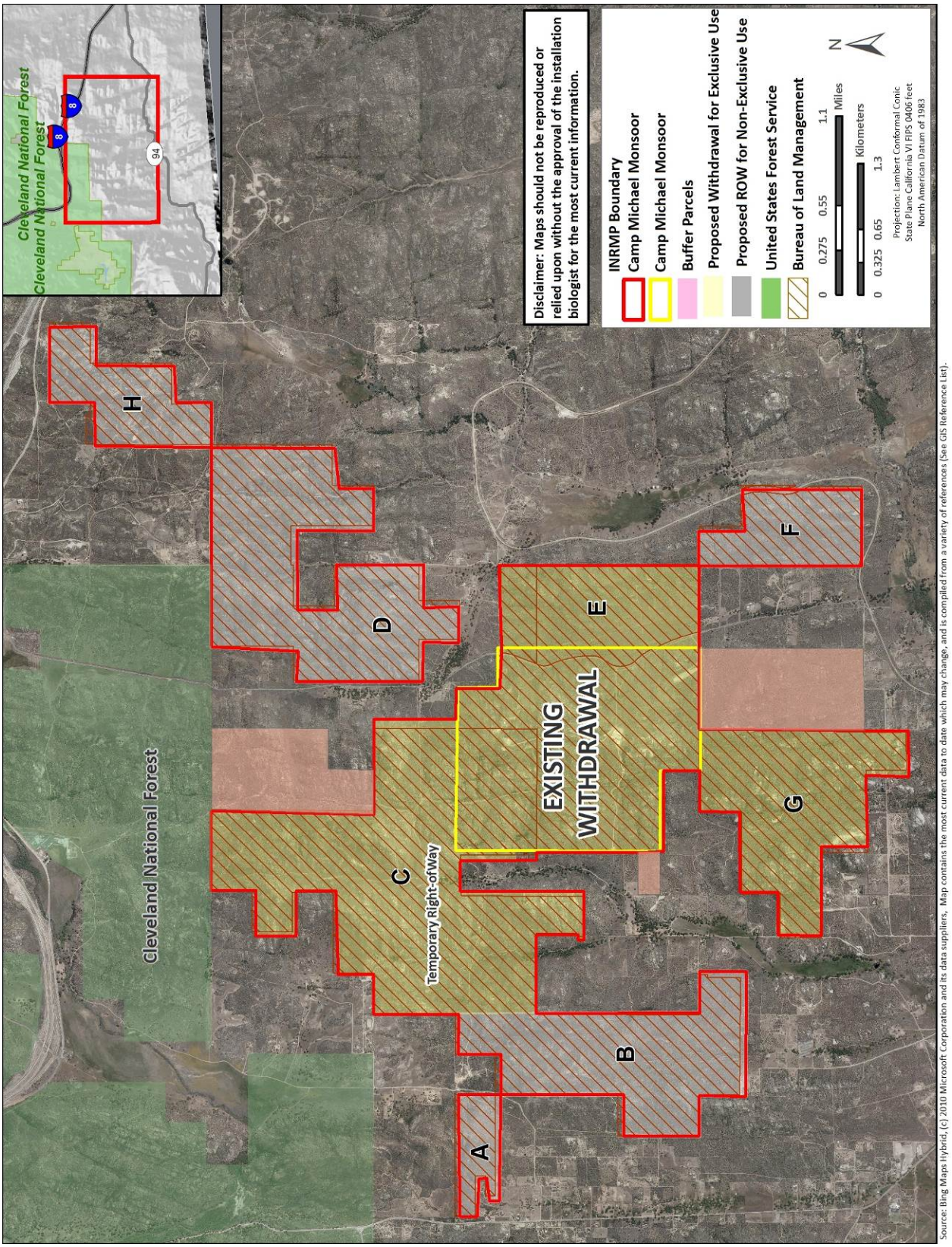


Figure 2-6: Camp Michael Monsoor Location

The terrain at CMM is characterized by steeply sloping mountains reaching elevations of 1,189 meters (3,900 feet). Adjacent properties include undeveloped Cleveland National Forest land to the north and BLM land to the south, east, and west. Multiple privately-owned parcels of land abut CMM to the southwest, southeast, and northeast. Discontiguous portions of the Campo Indian Reservation are located less than 5 kilometers (3 miles) to the southwest and east of the site, while the La Posta Indian Reservation is located about 5 kilometers (3 miles) northeast of the site. Predominant land uses in the general area include rural residential, agriculture, and recreation (e.g., horseback riding, hiking, and camping) (U.S. Navy 208b).

2.1.4.2 History

Pre-Military Land Use

Kumeyaay people inhabited the La Posta area. The Kumeyaay spoke a Yuman language of the Hokan linguistic stock. For the Kumeyaay in the vicinity of CMM, grass seeds and acorns were probably the primary foods, supplemented by various other seeds such as sage (*Salvia* spp.), sagebrush (*Artemisia californica*), and lamb's quarters (*Chenopodium album*). Small game was the primary source of protein, but deer were hunted as well (U.S. Navy 2008b).

During the Mission period, the Kumeyaay strongly resisted the Spanish (Luomala 1978:594-595). Native use of the landscape was radically curtailed as the most productive land and water resources along the coastal strip were seized for the ranching and agricultural pursuits of the presidios, missions, and rancheros. Numerous coastal Indian rancherias in the San Diego region were soon abandoned, and survivors retreated to more remote areas, such as CMM (U.S. Navy 2008b).

Camp Michael Monsoor Facilities Historic Era

Public Land Order 3457 withdrew the CMM (formerly La Posta Mountain Warfare Training Facility) for U.S. Navy use on September 30, 1964. Construction for the La Posta Astro-Geophysical Observatory began in May 1964, initiated by Naval Command, Control, and Ocean Surveillance Center (NOSC), Research, Development, Test and Evaluation (RDT&E) Division as an astrophysical observatory and microwave space relay station. The 1,189-meter (3,901-foot) elevation site played a major role in solar radio mapping, studies of environmental disturbances, and development of a solar optical videometer for microwave research. The 18-meter (60-foot) dish, able to transmit and receive signals, was used for important research programs in propagation and ionospheric forecasting. In the late 1980s, the microwave facility was decommissioned and is no longer functional. The facility is now used for U.S. Navy Sea, Air, Land (SEAL) training in mountain warfare sustainment and urban tactics training. Administration of CMM was transferred to NBC on September 17, 1996.

Several of the parcels proposed for withdrawal from public use would be used for a variety of training activities, including training in strategic reconnaissance, land navigation, PIC, and patrolling. One of the parcels would be used for live fire. First are those lands for which the Navy has filed an application to withdraw from public use, including settlement, sale, location, or entry under the general land laws, including mining laws, subject to valid existing rights, for exclusive use for military purposes. These are Parcels C, E, and G immediately adjacent to the existing withdrawal. Second are those lands where the Navy is seeking an ROW authorization for ongoing training purposes but where it is not seeking exclusive use. These are Parcels A, B, D, F, and H, which are nearby but not immediately adjacent to the existing withdrawal.

2.1.4.3 Mission

Mission: To provide operations and training in preparation for missions in both peacetime and in crises.

CMM is a Naval Special Warfare Command facility used to conduct mountain warfare and other Special Warfare training (U.S. Navy 2008b). The training area and facilities are managed by Naval Special Warfare Group One (NSWG-1). NSWG-1 conducts special warfare operations and provides operational and administrative control. NSWG-1 operates CMM for the purpose of providing a location to test and train Special Operations Forces to provide and maintain a level of absolute readiness. NSWG-1's mission is to prepare and deploy Naval Special Warfare forces worldwide at an optimum state of readiness, discipline, and morale in accordance with the contingency and wartime requirements of theater commanders. NSWG-1-deployed forces currently support the U.S. Pacific and Central Commands and are also available to support missions in its designated role as a supported combatant commander in the Global War on Terrorism (U.S. Navy 2008b).

2.1.4.4 Administrative Facilities

Facilities at CMM include a microwave dish, a telescope dome, seven buildings used for administration and storage, a range complex, and a helipad, along with other support facilities (U.S. Navy 2008b). There are eight permanent buildings on CMM that include a nonoperational microwave dish. These buildings are located on the hill around the microwave dish and are used as offices, classrooms, and berthing spaces. In addition, buildings on site include a couple of range buildings, close quarters combat (CQC), and a maintenance shed located just up from the gate near the shooting range.

In 2011 the USFWS issued a Biological Opinion in regards to the construction of P-781. This project will result in 23.2 acres (9 hectares) of permanent impacts, 5 hectares (14.1 acres) temporary impacts, and a 1 hectare (4 acres) construction buffer. This project includes 1) road improvements (e.g., road widening); 2) above-ground power poles extending from the "Existing Withdrawal" to the proposed development in Parcel C; 3) structures that comprise the Multi Structure Training Complex; and 4) a fire suppression system consisting of an access road, two 50,000 gallon water tanks, and above-ground water pipes (USFWS 2011).

2.1.4.5 Recreation

Public recreational activities, such as horseback riding, camping, hiking, and hunting, are currently allowed on portions of CMM (Parcel C); however, it is not allowed on the 436 hectares (1,079 acres) of BLM withdrawn land. Although a BLM-maintained trail system does not exist, a social trail system has developed over the course of time that is reflective of the use of the area by the public (U.S. Navy 2008b).

2.1.4.6 Land Use and Resource Agreements

Biological Opinions, permits, leases and other MOUs or CAs between the U.S. Navy, Camp Michael Monsoor, and other land managers are listed in **Table 2-5**.

Table 2-5: Active Land Use and Natural Resource Agreements Regarding Camp Michael Monsoor

Facility	Agreement Summary	Date of Issue
Biological Opinions, Permits, and Correspondence with U.S. Fish and Wildlife Service		
Camp Michael Monsoor	• BO (FWS-SDG-4452) issued for the Land Withdrawal, Facilities Construction, and Operations at Naval Special Warfare, La Posta Mountain Training Facility (a.k.a. Camp Michael Monsoor), Campo, California. • Amendment to BO (FWS-SD-11B0338-11F0507).	20 April 2007 23 August 2011
National Environmental Policy Act		
Camp Michael Monsoor	• Environmental Assessment for Naval Special Warfare Group One MWTA Facility • EA on establishment of training facility and ranges.	November 1998
Camp Michael Monsoor	• Final La Posta Mountain Warfare Training Facility (a.k.a. Camp Michael Monsoor) Environmental Assessment, San Diego, California. • EA evaluates the potential environmental consequences of several land use changes between the BLM and the Navy and the construction and operation of new military training facilities at and surrounding the La Posta Mountain Warfare Training Facility (a.k.a. Camp Michael Monsoor) near Campo, California.	June 2007
Memoranda of Understanding and Cooperative Agreements		
Camp Michael Monsoor	• Inter-agency Agreement between the Cleveland National Forrest and the US Navy • Approximately 1416 hectares (3,500 acres) of land	December 1998 Valid until terminated by either party
Lease or Permit with State, City or Other Group		
Camp Michael Monsoor	• Public Land Order 3457 • Withdrew approximately 436 hectares (1,079 acres) of public land managed by the BLM for all forms of appropriation under public land laws, including the mining and mineral leasing laws, and reserved for use by the Navy for use as a Microwave Space Relay Station. Withdrawal "does not alter the applicability of the public land laws governing the use of the lands under lease, license, or permit, or governing the disposal of their mineral or vegetative resources other than under the mining and mineral leasing laws."	30 September 1964

Facility	Agreement Summary	Date of Issue
Lease or Permit with State, City or Other Group (continued)		
Camp Michael Monsoor	• Permit between the U.S. Forest Service and the U.S. Navy • Agreement allows U.S. Navy to use 32 hectares (80 acres) of BLM land known as Mount Laguna - Horse Haven for military map and compass training and as safety zones for live fire ranges.	Expires 30 September 2002
Camp Michael Monsoor	• Letter 11011 Ser 543EE/166 • This letter transfers all Class I and Class II property at the La Posta MWTC to the Commanding Officer, NBC.	24 April 1997
Camp Michael Monsoor	• Letter requesting withdrawal of 1,146 hectares (3,500 acres) of BLM lands currently used under MOU with BLM.	2001
Camp Michael Monsoor	• BLM right-of-way, expires 31 December 2040. • Biological Opinion of Land Withdrawal and Operations at Naval Special Warfare La Posta Mountain Warfare Training Facility Campo, CA • BLM Right-of-Way Grant/Temporary Use Permit • USFWS Letter FWS-SD-11B0338-11F0507. Amendment to the Biological Opinion (FWS-SDG-4452) for the Land Withdrawal, Facilities Construction, and Operations at Naval Special Warfare, La Posta Mountain Training Facility, Campo, CA.	21 July 2010 November 2005 30 September 2011 23 August 2011

2.1.5 Camp Morena

2.1.5.1 Location

CM is located in the county of San Diego approximately 8 kilometers (5 miles) northwest of CMM and approximately 84 kilometers (52 miles) east of the city of San Diego. The 25-hectare (62-acre) property comprises three land parcels on the north side of Morena Reservoir, two of which have been owned by the city of San Diego since 1912. The remainder of CM is owned by the state of California. The Lake Morena County Park borders CM on the southwest side. The park is open to the public for camping, picnicking, hiking, and fishing activities. The Cleveland National Forest surrounds CM on the north and east and is accessible to the public for recreational uses (U.S. Navy 2010a).

The California Army National Guard vacated the camp in October 2004 in conjunction with the expiration of the lease agreement between the state of California and the city of San Diego. In December 2004, the Navy retained a year-to-year license with the City to occupy and utilize the camp. The duration of the current lease covers a ten-year period from 1 January 2012 – 31 December 2022 (U.S. Navy 2012c).

2.1.5.2 History

Established during World War II, CM originally served as a small Army outpost to protect the Morena Reservoir and defend against potential foreign invaders attempting to gain entry to the U.S. from the Mexican border. Army use of CM ended by 1946. The California Division of Forestry (CDF) leased the two city of San Diego parcels from 1953 through 2004. CDF used CM as a conservation and fire protection work camp, perhaps including an "Honors Camp" component in conjunction with a local correctional department. In 1999, the California Department of Military sublet the property from the CDF, for use by the California Army National Guard (CAARNG) and the CAARNG Counter Drug Task Force (CDTF), which used the property as base camp for counter drug operations and international border fence construction. The CAARNG left CM in October 2004, when the state of California lease with the city expired. Beginning in December 2005, the U.S. Navy retained a year-to-year license agreement with the city to occupy and use the camp. The U.S. Navy intends to enter into a long-term lease with the city of San Diego so that CM can continue to serve as a support facility to CMM. The San Diego County Sheriff's Department Narcotics Task Force (NTF) maintains an office in one of the CM buildings, and uses the helipad to support their field operations in the area (U.S. Navy 2009b).

2.1.5.3 Mission

Mission: To provide operations and training in preparation for missions in both peacetime and in crises. They engage in: Unconventional Warfare, Direct Action, Special Reconnaissance, Foreign Internal Defense, Counter-terrorism, Psychological Operations and Civil Affairs to fulfill their responsibilities.

CM operates under the command of NSWG-1 for use by NSWG-1 and NSW Center. NSWG-1 is the primary tenant, user, and on site manager responsible for scheduling activity for Camp Morena. NBC is the Class I/II property manager with responsibility for facilities and resource management. The mission of NSW Center is to provide operations and training for missions involving unconventional warfare, direct action, special reconnaissance, foreign internal defense, counter-terrorism, psychological operations, and civil affairs.

2.1.5.4 Administrative Facilities

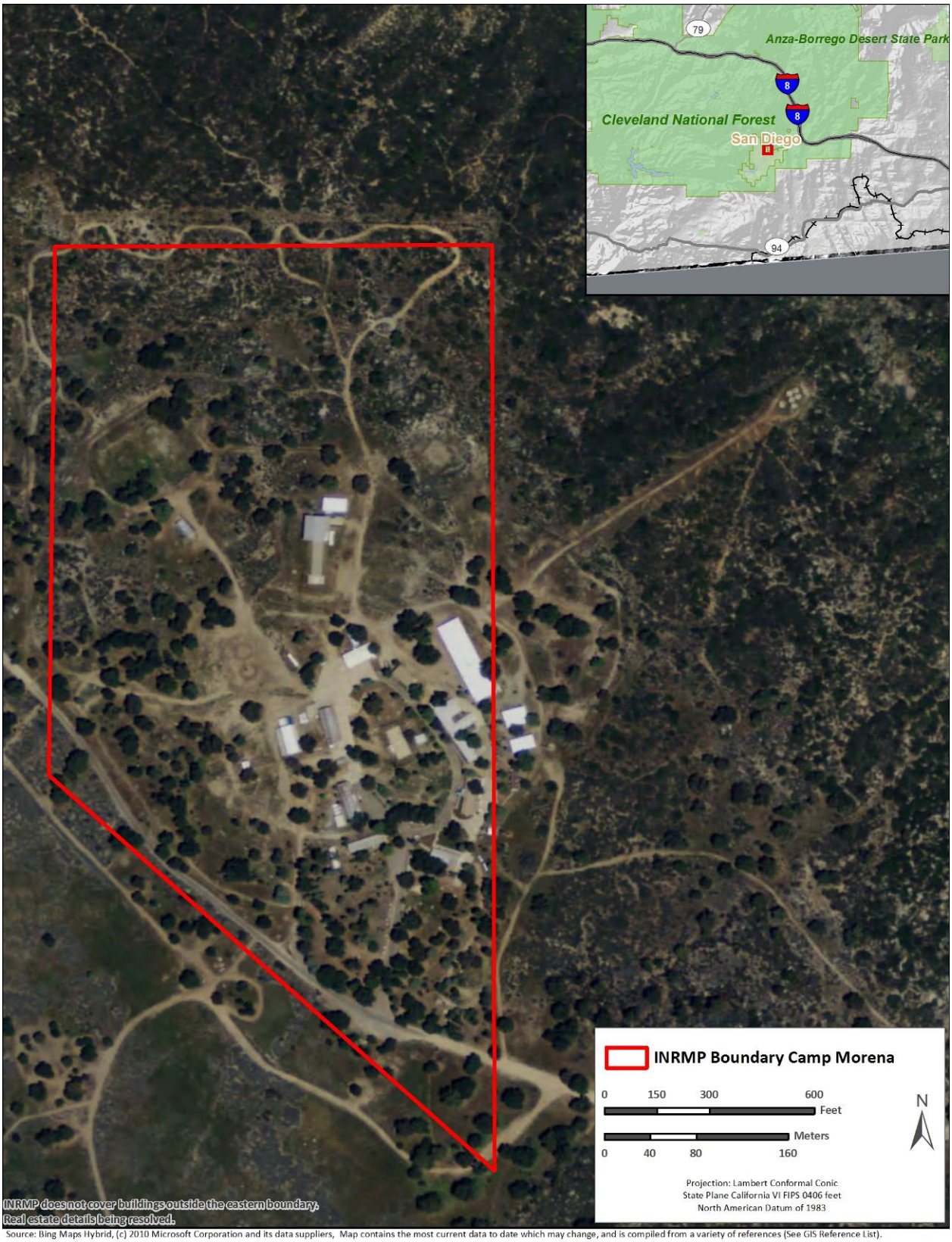
CM supports CMM through housing approximately 25 structures and their associated infrastructure that consists of classrooms, storage facilities, and administrative office space used for training troops (see **Figure 2-7**) (U.S. Navy 2009b).

2.1.5.5 Land Use and Resource Agreements

Biological Opinions, permits, leases and other MOUs or CAs between the U.S. Navy, Camp Morena, and other land managers are listed in **Table 2-6**.

Table 2-6: Active Land Use and Natural Resource Agreements Regarding Camp Morena

Facility	Agreement Summary	Date of Issue
Lease or Permit with State, City or Other Group		
Camp Morena	• U.S. Government In-License for Exclusive Use of Real Property. License Number: N6871104RP04A29. All that portion of Tract 70 (beginning and containing 25 hectares [62.49 acres]) of the Morena Reservoir Basin.	31 December 2004



Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers, Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 2-7: Camp Morena Location

2.1.6 Remote Training Site Warner Springs

2.1.6.1 Location

RTSWS is located on portions of the Cleveland National Forest, Vista Irrigation District (VID) lands, and BLM lands in northern, inland San Diego County, approximately 72 kilometers (45 miles) northeast from San Diego (U.S. Navy 2010d). The nearest community, Warner Springs, is 13 kilometers (8 miles) southeast on Highway 79. The U.S. Navy entered into a 1972 MOU with the USFS for exclusive use of 24 hectares (60 acres) where RTSWS structures are located, and 1,982 hectares (4,900 acres) for nonexclusive training as a "Bivouac and Problem Area". An additional 484 hectares (1,197 acres) have been leased for use by the U.S. Navy from VID (U.S. Navy 2010d). The lease with USFWS was updated and the former exclusive use area is now referred to as Area A (public access restricted at all times) and the non-exclusive areas are now referred to as Area B (public access allowed) (see **Figure 2-8**). VID is a local governmental agency formed as a State of California Special District to provide water to much of northern San Diego County in California (U.S. Navy 2010a).

A geographic expansion and increase of training activities has been approved by the U.S. Navy for RTSWS. A final Environmental Assessment dated May 2010 outlines the approved expansion. Specifically, the approved changes consist of:

- The expansion and realignment of RTSWS, which occurs on land owned by VID, BLM, and USFS;
- An increase in Survival, Evasion, Resistance and Escape (SERE) student annual throughput and
- Accommodation of future training requirements of the NSW, 1st Marine Special Operations Battalion (MSOB), and I Marine Expeditionary Force Experimentation Group Tactical Exercise Control Group, and other units that are occasional users of the RTSWS.

Prior to the expansion, RTSWS was approximately 2,492 hectares (6,158 acres). With the geographic expansion and realignment, an additional 1,743 hectares (4,307 acres) was leased from VID for a total of 2,228 leased hectares (5,505 leased acres). The land use agreement between the USFS and the U.S. Navy changed from an MOU to a Special Use Permit (SUP). Under the new SUP, the U.S. Navy replaced USFS Area of Activity land to the east of the SERE compound with 1,250 hectares (3,091 acres) of USFS Area of Activity land southwest of the SERE compound. RTSWS exclusive use of USFS land remains at 24 hectares (60 acres). In addition, a right-of-way agreement allows training to take place on 246 hectares (609 acres) of BLM land. This expansion increased the size of RTSWS by 2,584 hectares (6,386 acres), bringing the total size to 5,076 hectares (12,544 acres) (U.S. Navy 2010d).

2.1.6.2 History

Pre-Military Land Use

The Warner Springs valley near SERE Training School is considered one of the most active areas in the county for both prehistoric and historic Native tribes. It is the only area in San Diego County where the four historic Native American cultural groups are known to have occurred in geographic contact. The Cupeño occupied the Valle de San Jose and Warner Springs. Nearby were the Kumeyaay to the south, the Cahuilla to the northeast, and the Luiseño to the west. Little is known of prehistoric cultural groups (La Jolla and San Dieguito cultures).

Europeans first arrived in the area in August of 1795. Padre Fray Juan Mariner from the San Diego Mission recorded the names of 13 Native American rancherias in the area (Hill 1927, cited in US DoN

SWDIV 1990 [Environmental Assessment for TACON-90 Mataguay Scout Reservation, Warner Springs, CA]). Sheep and cattle from Mission San Diego grazed the area as early as the 1820s.

The Valle de San Jose and vicinity was deeded as a land grant to John Warner in 1844. In 1903, Native American peoples were forcibly removed from their lands and relocated to the Pala Indian Reservation (Shipek 1987, cited in USDoN SWDIV 1990).

Remote Training Site Warner Springs Historic Era

In 1953, a temporary base camp for Fleet Airborne Electronics Training Unit, Pacific Fleet (FAETUPAC) was set up at Warner Springs, California. This unit's mission was to train all Pacific Fleet Naval Aviators and other air crewmen in survival and evasion techniques. In June 1964, FAETUPAC SERE Detachment was officially established and the current mission was officially adopted. The next year, the detachment moved to its current location under an MOU with the USFS. In 1972, the detachment changed its name to Fleet Aviation Specialized Operational Training Group, Pacific Fleet (FASOTRAGRUPAC) SERE Training School, Warner Springs, California, but its mission did not change.

2.1.6.3 Mission

Mission: Train personnel at risk of capture and exploitation, survival skills, evading capture, resisting interrogation, and planning their escape from capture.

The Remote Training Site Warner Springs primarily supports SERE training, and support training activities for NSW personnel, including clandestine insertion, reconnaissance and surveillance, and extraction training. Other units, such as 1st MSOB and Amphibious Construction Battalion (ACB) ONE Seabees, also conduct training evolutions at RTSWS (U.S. Navy 2009c and U.S. Navy 2010d). This is a course that teaches military personnel the skills to survive and evade capture, or if captured, to resist interrogation and plan their escape. Personnel considered at high risk of capture are those whose position, rank, or seniority puts them at greater risk of exploitation efforts by a captor. Examples are aviators, aviation crewmembers, airborne personnel (jump from aircraft), Special Forces personnel, and Explosive Ordnance Disposal personnel. The SERE school follows Joint Rescue Personnel Agency guidance for training to ensure that its students train to common standards while also training to specific U.S. Navy and Marine Corps missions (U.S. Navy 2010a).

2.1.6.4 Administrative Facilities

The principal SERE compound at the RTSWS is located on Cleveland National Forest land and consists of a headquarters with an administrative building, several staff barracks buildings, a wastewater treatment plant, and a training compound (consisting of several small structures). There are no additional structural facilities at other locations on the RTSWS. There are 10 permanent party personnel stationed at the RTSWS but none live at the RTSWS full time (see **Figure 2-8**) (U.S. Navy 2009c).

The Navy has expanded and realigned activities undertaken at the RTSWS in order to sustain and enhance the level and type of training activity that occurs at the facility (U.S. Navy 2009c). The approved expansion includes leasing an additional 2,228 hectares (5,505 acres) from VID; obtaining access under a non-exclusive right-of-way for up to 247 hectares (609 acres) from the BLM; and realigning 1,326 hectares (3,276 acres) of existing non-exclusive use area, and obtaining access to an additional 1,252 hectares (3,094 acres) for non-exclusive from the USFS. The existing 24 hectares (60 acres) of exclusive use area remained unchanged, and no exclusive use areas were added (see **Figure 2-8**) (U.S. Navy 2009c).

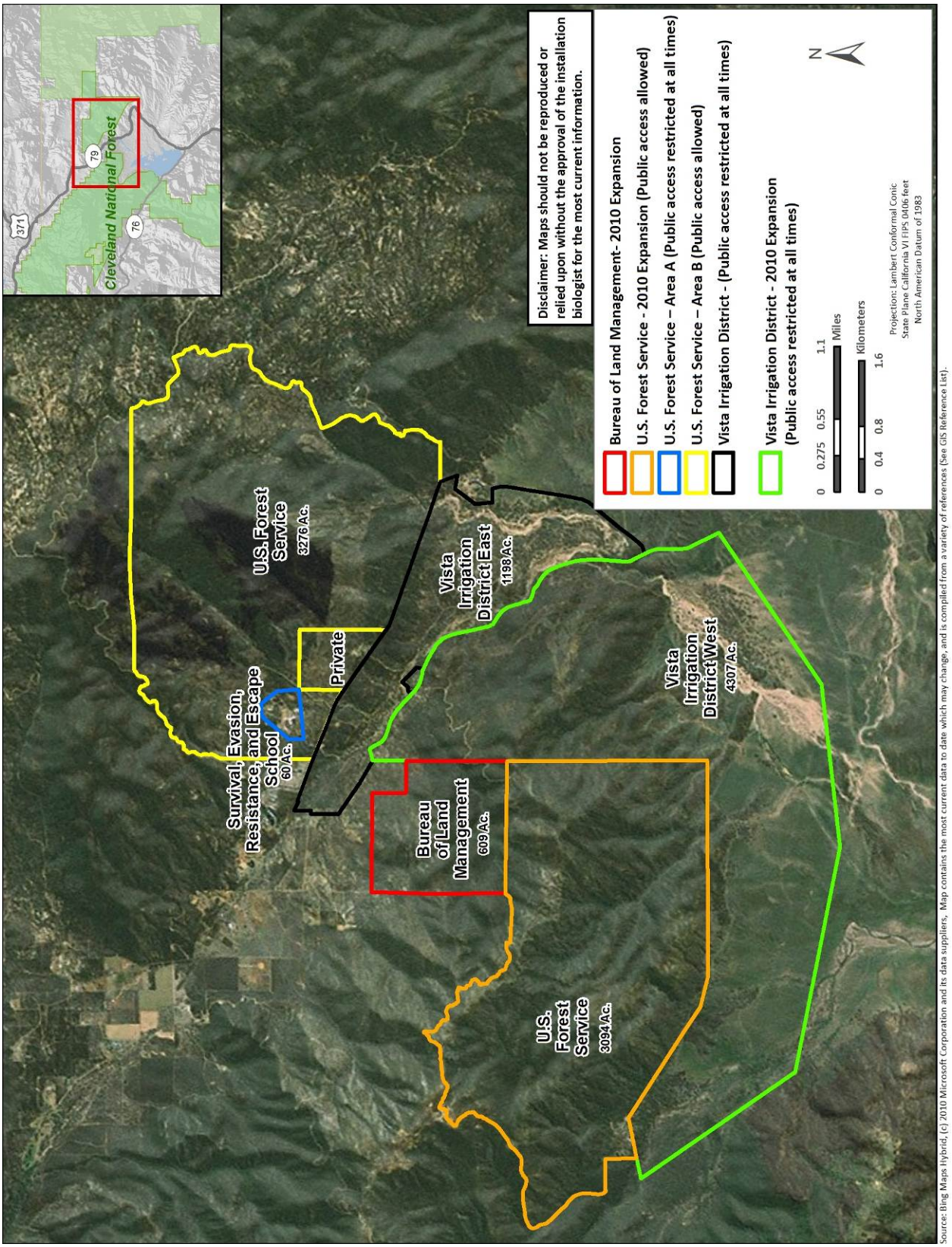


Figure 2-8: Remote Training Site Warner Springs Location

2.1.6.5 Recreation

The local area is popular for developed, dispersed, and wilderness recreation. Developed recreation sites include Warner Hot Springs, the San Luis Rey Picnic Area, and Cleveland National Forrest campground Indian Flats. Access points into these areas originate from SR-79. Camping, hiking, and hunting are popular activities. Trail use in the vicinity is moderate and most use is at Cutca Trail, California Riding and Hiking Trail, and the Pacific Crest National Scenic Trail, which are all outside of the INRMP area.

The Barker Valley Trail and Barker Valley Spur Trails are located just northwest of the project area. The Barker Valley Spur Trails descend along the old Barker Valley Road for about 2 miles before joining the old Barker Valley Trail. The trail then descends along the west side of the drainage and ends in a large meadow on the north side of the west fork of the San Luis Rey River. The trail offers views of Dyche, Will, and Mendenhall Valleys. Vegetation along the trail is mostly chaparral; sycamore, black oak, coastal live oak, and cottonwood are found lower in the valley. The area is frequented by backpackers that camp in the area and some day use for hikers. Other features of interest in the area are a set of falls in the San Luis Rey River canyon to the southeast of the meadow. The Forest Service manages this area as a primitive area.

There are six established campgrounds in the Palomar District of the Cleveland National Forest, which include Dripping Springs, Fry Creek, Indian Flats, Oak Grove, Observatory, and Crestline Group. Only Indian Flats is within close proximity to the proposed project area, approximately a quarter of a mile away. The Pacific Crest Trail is approximately 1.5 miles to the east of the proposed project area.

The Cleveland National Forest, Palomar District, and BLM land offers numerous recreational opportunities such as hunting, recreational target shooting, hiking, birding, picnicking, and camping. Hunting for deer, cottontail, and jackrabbit are permitted in the Palomar District. Wild turkeys have been introduced on private lands in the county, and the state has spring and fall wild turkey seasons in San Diego County. Mountain quail, California quail, band-tailed pigeon, waterfowl and dove are all permitted to be hunted in the Cleveland National Forest Palomar Ranger District and BLM lands.

Recreational target shooting involves the discharge of firearms, air or gas guns at inanimate objects for the exercise of skill or sighting in of weapons. The national forests have traditionally provided a unique, open, outdoor setting in which shooters can participate in shooting sports in a variety of locations. Within the Cleveland National Forest, recreational target shooting is allowed only in designated open areas, which include the Palomar Divide Area and Orosco Ridge Shooting Area. Pursuant to the Cleveland National Forest LMP, shooters must remove their targets and spent shells when departing shooting areas.

The Warner Springs Ranch Resort and Lake Henshaw are both south of the project area. Both offer a variety of recreational opportunities. Lake Henshaw is the largest body of water in the area and offers camping and fishing. Warner Springs Ranch is a full service resort that offers recreational facilities/services including; tennis, golf, horseback riding, and dining. The Palomar Observatory, a world-class center of astronomical research, is located northwest of the proposed project area approximately 59.0 kilometers (36 miles). Palomar Observatory is open to the public daily and receives numerous visitors (U.S. Navy 2010d).

2.1.6.6 Land Use and Resource Agreements

Biological Opinions, permits, leases and other MOUs or CAs between the U.S. Navy, RTSWS, and other land managers are listed in **Table 2-7**.

Table 2-7: Active Land Use and Natural Resource Agreements Regarding Remote Training Site Warner Springs

Facility	Agreement Summary	Date of Issue
Biological Opinions, Permits, and Correspondence with U.S. Fish and Wildlife Service		
Remote Training Site Warner Springs	• USFWS Letter FWS-SDG-09B0277 -09F0806 • Biological Opinion on the Formal Section 7 Consultation for the Navy's Remote Training Site Warner Springs, San Diego County, California. The Biological Opinion addressed impacts to Stephen's kangaroo rat and arroyo toad.	30 October 2009
Lease or Permit with State, City or Other Group		
Remote Training Site Warner Springs	• Lease Number N6247311RP0090 Leased from Vista Irrigation District to the U.S. Navy • The U.S. Navy leases 1,742 hectares (4,307 acres) of limited use land to train personnel in escape, evasion and survival techniques. Vista Irrigation reserves right to access and develop water wells.	03 November 2010
Remote Training Site Warner Springs	• BLM right-of way (N624731RP00059) 246 hectares (609 acres), expires on 31 December 2040.	28 September 2010
Remote Training Site Warner Springs	• Forest Service Special Use Permit. Area A 24 hectares (60 acres) intensive use area and Area B 2587 hectares (6,370 acres) limited use area, expires 30 October 2030.	02 November 2010
Remote Training Site Warner Springs	• Lease Agreement, Vista Irrigation District (N6247311RP00046), and 484 hectares (1,198 acres) exclusive use.	03 November 2010

2.1.7 Navy Housing Areas

The Department of the Navy (Navy) has entered into certain ground leases on Government-owned land, pursuant to the Military Housing Privatization Initiative (MHPI). The United States Congress enacted the MHPI authorities on February 10, 1996, as part of the National Defense Authorization Act for fiscal year 1996. MHPI is codified at Title 10 United States Code, Sections 2837 and 2871 *et seq*. Congress made the MHPI authorities permanent in 2004. Under the MHPI authorities, the Department of Defense can partner with the private sector to revitalize military family housing, including by conveyance or leasing of property or facilities. The Navy refers to projects undertaken under the MHPI authorities as Public/Private Venture (PPV) projects.

Pursuant to the MHPI authorities, the Navy has entered into a certain ground lease with respect to Naval Base Coronado, whereby Government-owned land is leased out to a Limited Liability Company (Lessee) for military family housing purposes. The Lessee for all Naval Base Coronado PPV projects is San Diego Family Housing, LLC (SDFH). The current, relevant ground lease for all Naval Base Coronado PPV neighborhoods is the Second Amended and Restated Real Estate Ground Lease, dated October 1, 2007, by and between the United States of America, acting through the Department of the Navy, as Lessor, and

San Diego Family Housing, LLC, as Lessee. This ground lease has an end date of July 31, 2051. This ground lease covers the Coronado PPV neighborhoods addressed in this INRMP, as well as numerous other leased PPV neighborhoods throughout California and Nevada. Certain provisions of the subject ground lease are relevant to this INRMP, as they either directly or indirectly address the issue of natural resources.

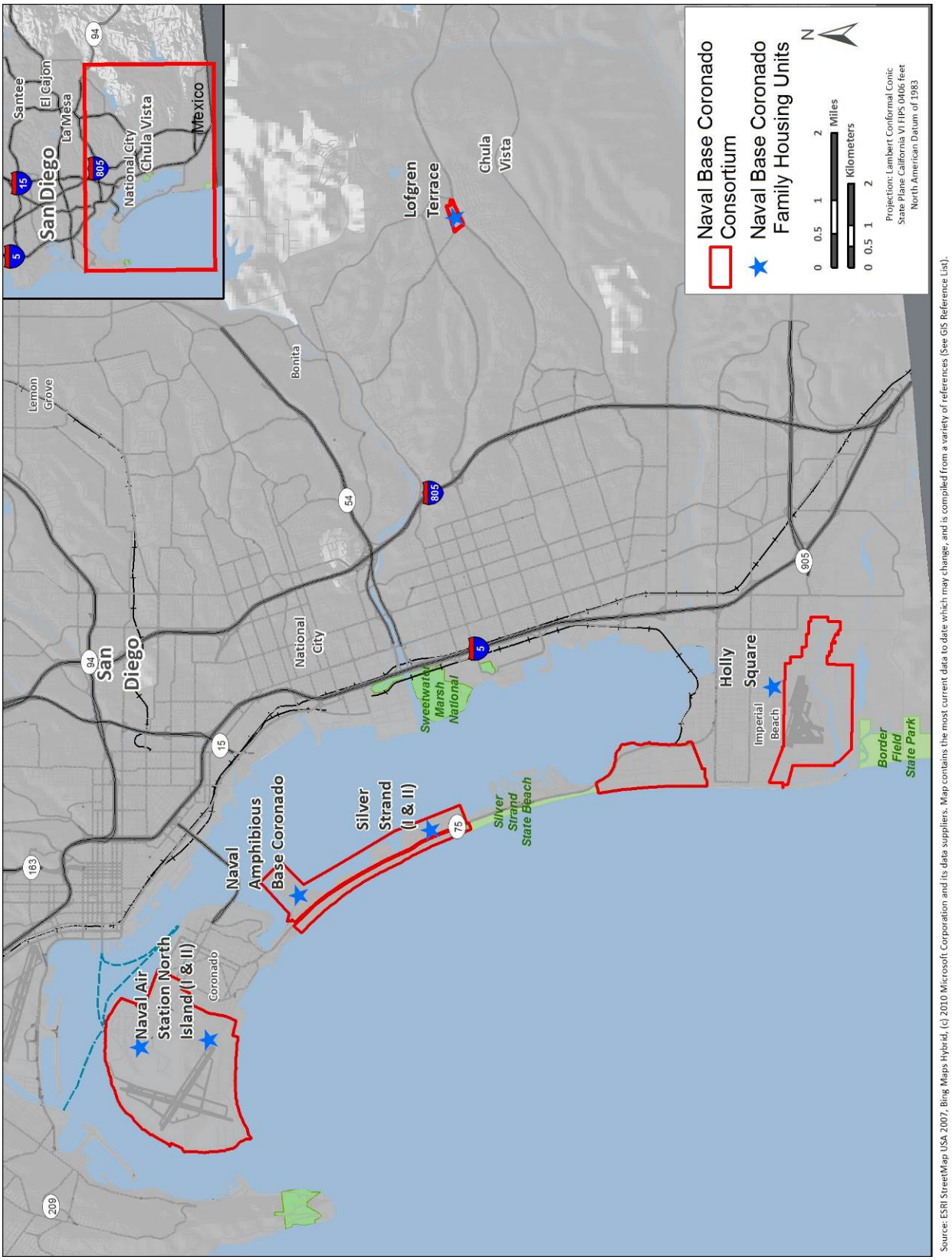
Based on key provisions in the ground lease, the Lessee has several important responsibilities with regard to the leased land, pertaining to natural resources. First, it is important to note that per Lease Section 1.1, the Lessee has "exclusive use and possession" of the leased land, which includes the Coronado PPV neighborhoods. The Lessee's key responsibilities with regard to this leased land include the following: Lessee shall comply with all applicable Environmental Laws (Lease Section 11.1); Lessee is to use all reasonable means available to protect the environment and natural resources in accordance with applicable Environmental Laws (Lease Section 11.18); Lessee shall be liable for a violation of applicable Environmental Laws, for damage caused by Lessee and arising from Lessee's activities (in accordance with the Lease terms) (Lease Section 11.18); with regard to natural resource protection, Lessee shall adhere to all applicable Federal and State Laws (including, but not limited to, the Endangered Species Act and the Migratory Bird Treaty Act) (Lease Section 11.31); Lessee is subject to certain specific restrictions with regard to ground disturbing activities at specified PPV neighborhoods, including Rendova Court at NAB Coronado (Lease Section 11.31(a)); Lessee shall, at all times during the lease term and at no expense to the Government, protect, preserve, maintain and repair the premises, and keep them in good order and condition (reasonable wear and tear and damage by casualty excepted) (Lease Section 12.1); and on or before expiration of the lease term, Lessee shall surrender possession of the premises to the Government in good, clean order and repair (ordinary wear and tear excepted) (Lease Section 10.2).

Accordingly, for the Coronado PPV neighborhoods, the Navy notes that the Lessee has exclusive use and possession of the leased land, and has these important responsibilities with regard to natural resources management issues. Lessee will retain these responsibilities until termination of the ground lease (lease termination date is July 31, 2051), at which time the Lessee is to surrender the leased premises to the Government (Navy) in good, clean order and repair. Thus, for natural resources issues that may arise for the Coronado PPV neighborhoods, questions should be directed to the Lessee, SDFH, in accord with the Lessee's exclusive use and possession of the leased land, and per the Lessee's responsibilities as set forth above. If appropriate, the Government will work with the Lessee, and any regulatory agency, for natural resources issues that may arise with respect to the leased land (Real Estate 2007).

There are six U.S. Navy-managed housing areas that came under NBC jurisdiction in 2006 under a PPV. The family housing areas are located throughout the San Diego Metro Region (see **Figure 2-9**). **Table 2-8** provides the number of units in each of the housing areas and the year(s) that they were built.

Table 2-8: Naval Base Coronado Military Housing Areas

Housing Area	Number of Units	Year Built
Holly Square	13	1993
Lofgren Terrace	200	1988
Silver Strand I and II	390	1969/1990
NASNI Housing Area I and II	54	1919/1933
NAB Coronado Housing Area	40	1965



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 2-9: Naval Base Coronado Housing Units

2.2 Other Operations, Activities, and Land Uses

2.2.1 Transportation and Utilities

Access to the city of Coronado is provided by two routes: the San Diego-Coronado Bay Bridge, which spans the Bay and serves as a travel link between the two cities, and Silver Strand Boulevard, which extends south from Coronado along the peninsula to Imperial Beach. Both of these routes are designated as State Route 75. In addition, State Routes 282 is a short, three lane couplet that operates along 3rd and 4th Streets in Coronado between San Diego-Coronado Bay Bridge and NASNI.

All traffic bound for NASNI enters the city of Coronado via the bridge or Silver Strand Boulevard. The street network within the city of Coronado provides local access to NASNI. The average daily traffic volumes (number of vehicles) for First Street, Third Street, Fourth Street, and Ocean Boulevard are 7,500, 17,200, 15,800, and 12,000, respectively. First Street follows the north side of Coronado parallel to the shoreline of the San Diego Bay. Third Street is one-way westbound, and Fourth Street is one-way eastbound. This couplet is the primary link for the San Diego-Coronado Bay Bridge (U.S. Navy 2010c). Access between the cities of Coronado and Imperial Beach is via SR-75, which travels along the entire length of the Silver Strand through NAB Coronado and SSTC-N and SSTC-S and connects the city of Coronado to the city of Imperial Beach. The roadway capacity for SR-75 is 40,000 average daily trips (U.S. Navy 2010c).

CMM and CM are accessed off of Interstate 8, and RTSWS is accessed off of State Route 79. The NBC housing facilities are located on NASNI, NAB Coronado and Silver Strand Training Complex North, in south Chula Vista near Interstate 5, in south Bonita east of Interstate 805, and between State Routes 54 and 905.

2.2.2 Waterfront Operations

Information for the waterfront operations occurring at NASNI, NAB Coronado and SSTC-N, SSTC-S, and NOLF IB were drawn from the 2010 Final EIS for the Silver Strand Training Complex, and the 2002 EA for the 2002 NBC INRMP (U.S. Navy 2010c, U.S. Navy 2002).

The Coastal Zone Management Act (CZMA) of 1972 (16 USC Section 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 NMFS 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 USC 1453). Accordingly, although NBC land is Federal Government property and, therefore, excluded from the coastal zone, the U.S. Navy nonetheless conducts tests 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 CCC 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 effects analysis, per NEPA, prior to being implemented. If and when such projects are to be carried forward, the U.S. Navy would engage in consultation with the CCC to the extent necessary and appropriate under the CZMA.

In California, the CCC and local governments have the responsibility of managing California's coastal resources. The California Coastal Act is the center of California's CMP, which was certified in 1978. Other legislation guiding the program can be found in Proposition 20 (Coastal Initiative, 1972), the California Coastal Plan (1975), the McAteer-Petris Act, the Suisun Marsh Preservation Act, and the Conservancy Act. The enforceable policies of the California CMP can be found in Chapter 3 of the California Coastal Act and include public access, recreation, marine environment, land resources, development, and industrial development.

A General Consistency Determination for repair and maintenance activities and other types of general activities on naval bases in the San Diego Bay area was developed and approved by the CCC in August 1998 (Consistency Determination No. CD-070-98). The periodic replacement and repair of piers and shoreline structures was found to be consistent with the marine resource, habitat, access, recreational, and shoreline structure policies of the California CMP.

The U.S. Navy recognizes that actions technically outside of the coastal zone, such as those that would occur at NBC facilities including maintenance to piers, docks, sea walls, small-craft berthing facilities, fueling facilities, armories, and waterfront operations buildings, could have potential impacts on coastal resources. NASNI is surrounded on the western, northern, and southern side of facility by the city of Coronado, the San Diego Bay and the Pacific Ocean, respectively. Waterfront facilities at NASNI include a sea wall along the northern waterfront that can berth aircraft carriers or deep draft ships; and three piers that berth aircraft carriers, deep draft ships, and smaller boats.

NAB Coronado and SSTC-N consist of several beaches that are used for swimming, self-contained underwater breathing apparatus (SCUBA) training, small boat and ferry barge navigation training, and approximately 117 hectares (289 acres) of undeveloped oceanfront property that are used for amphibious and clandestine training. There are 21 piers used for berthing amphibious landing craft, and patrol and other small craft. These piers also serve for training in practice dives, boat maneuvers, and docking. Marine mammal training and pens also are located here.

Lastly, SSTC-S contains four beach lanes for small unit beach and inland training activities. A General Consistency Determination for repair and maintenance activities in naval bases in the San Diego Bay area (Consistency Determination No. CD-070-98) was developed and approved by the CCC in August 1998. The periodic replacement and repair of piers and shoreline structures was found to be consistent with the marine resource, habitat, access, recreational, and shoreline structure policies of the California CMP.

2.2.3 Security and Perimeter Buffer Requirements

Force Protection's mission is to deter, detect, and defend the installation's personnel and assets against hostile actions. This is accomplished through the effective integration of anti-terrorism, physical security, law enforcement, and installation access.

Anti Terrorism/Force Protection (ATFP) design guidance requires specific setbacks to minimize impacts on personnel and facilities in the event of a terrorist attack. These specifications are laid out in the *Unified Facilities Criteria, DoD Minimum Antiterrorism Standards for Buildings* as amended and published February 9, 2012 (DoD 2012).

Permanent vehicle stickers are issued by the NBC Pass and Identification Office located in Building 174 at the Main Gate. Regular access to the NBC requires a DoD vehicle sticker. Temporary and visitor passes are also issued by the NBC Pass and Identification office. Visitors must be cleared through the NBC Access Control Coordinator before a visitor pass will be issued (CNIC 2012).

In January 2009, the Navy revised guidance for the *Navy Physical Security and Law Enforcement Program* (OPNAVINST 5530.14E, DoN 2009). The revised policy states the "objective of the Navy Security Program is to safeguard personnel, property, facilities and materiel, and to enforce laws, rules, and regulations at Navy installations, activities, and operational commands." To ensure physical security at U.S. Navy installation, the instruction requires installations to perform the following (DoN 2009):

- Conduct physical security surveys annually;
- Conduct daily security checks;
- Conduct regular security inspections for all critical areas;
- Conduct a vulnerability assessment of all housing areas, facilities, and activities annually;
- Conduct threat assessments through coordination with local, state, and other Federal agencies;
- Establish a risk management process;
- Develop an education program on security;
- Maintain an external entry and restricted area access control program to ensure security to and from the installation and
- Employ barriers and patrol craft to ensure water boundaries are protected.

2.2.4 Environmental Restoration Program

The Defense Environmental Restoration Program (ERP), created under the Superfund Amendments and Reauthorization Act, has two site cleanup programs: Installation Restoration Program for sites with past releases of hazardous substances and Munitions Response Program for sites with munitions and explosives of concern. Information on Navy's ERP is available at:

https://portal.navfac.navy.mil/portal/page/portal/NAVFAC/NAVFAC_WW_PP/NAVFAC_NFESC_PP/ENVIRONMENTAL/ERB/ERP

The installation recognizes that adverse impacts to natural resources addressed in this INRMP may result from the release of hazardous substances, pollutants, and contaminants into the environment. The Navy ERP is responsible for identifying releases; considering risks and assessing impacts to human health and the environment, including impacts to endangered species, migratory birds, and biotic communities; and developing and selecting response actions when a release may result in an unacceptable risk to human health and the environment (U.S. Navy 2006a).

When appropriate, the regional or installation's natural resources management staff will help the ERP Remedial Project Manager identify potential impacts to natural resources caused by the release of these contaminants (U.S. Navy 2006a).

Regional or installation natural resources staff will also participate, as appropriate, in the ERP decision-making process by communicating natural resource issues on the installation to the Remedial Project Manager, attending Restoration Advisory Board meetings, reviewing and commenting on ERP documents (e.g., Remedial Investigation, Ecological Risk Assessment), and ensuring that response actions, to the maximum extent practicable, are undertaken in a manner that minimizes impacts to natural resources on the installation (U.S. Navy 2006a).

When appropriate, the regional or installation natural resources staff will make recommendations to the ERP regarding cleanup strategies and site restoration. During initial monitoring protocols, the natural resources manager may suggest sampling and testing be accomplished so as not to impact sensitive or

critical areas. Also during site restoration, the natural resources manager has the opportunity to recommend site restoration practices that are outlined within the INRMP. Examples include landfill caps restored to grasslands, excavation areas restored to wetland/pond areas, and treated water located to enhance a pond area (U.S. Navy 2006a).

The Navy Environmental Restoration Program is required to comply with the substantive provisions of applicable or relevant and appropriate requirements (ARARs) identified prior to performing remedial or removal actions. CERCLA Section 121(d) requires compliance with state and Federal ARARs for wastes left on site at the conclusion of a remedial response. Overall, protection of human health and the environment and compliance with ARARs (unless a specific ARAR is waived) are threshold requirements that a remedial alternative must meet in order to be selected. In cases where removal actions will be performed, ARARs shall be attained to the extent practicable. ARARs are identified on a case-by-case site-specific basis, considering but not limited to factors such as the hazardous substance present, the site's physical features and the actions being considered as remedies. Coordination with agencies regarding listed species and critical habitats during the normal CERCLA process through document review and agency input is sufficient to satisfy the substantive requirements of the Endangered Species Act as well as the CERLCA/ National Oil and Hazardous Substances Pollution Contingency Plan requirements to coordinate with natural resource agencies.

As of October 2012, 146 active Environmental Restoration sites were identified for NASNI, eight active sites for NAB Coronado, five active sites for NOLF IB, and one active site (proposed for closure) at SSTC-S. There are no active sites at CM, CMM, and RTSWS. Active ER sites are shown in **Figures 2-10** through **2-12** (Brown and Caldwell 2009).

2.2.5 Public Access

Although provision of public access is addressed in the Sikes Act, security concerns in the aftermath of September 11, 2001, have greatly restricted public access on DoD facilities. However, public access is granted at several of the recreation facilities discussed above.

Access to NBC is granted by obtaining proper identification and documentation as accepted by NBC. Examples of proper identification include an Active-Duty Identification card, a DoD civilian Common Access Card (CAC), and a retired DoD Identification card.

Regular access to the NBC requires a DoD vehicle sticker. Temporary and visitor passes are also issued by the NBC Pass and Identification office. Visitors must be cleared through the NBC Access Control Coordinator before a visitor pass will be issued (CNIC 2012).

2.2.6 Future Land Use

A draft Accident Overview Plan (AOP) has been developed for NBC to define the direction of operational and support facilities in broad mission readiness, functional, and geographic terms. Once the AOP has been finalized, projects from the final plan will be included within this INRMP. For planning, the most important aspect is to focus on those projects that may impact natural resources (i.e., those that may develop existing habitat or have an indirect effect on protected species. Following is a list of future projects that could potentially impact natural resources (Pers. Comm. Shepherd 2011).

- SSTC-S - NRSW and NBC are preparing an EIS to analyze a proposed project to develop facilities and associated infrastructure at NBC. This project will require extensive Environmental planning effort including consultation with the USFWS due to impacts to San Diego fairy shrimp and Western Snowy Plover.

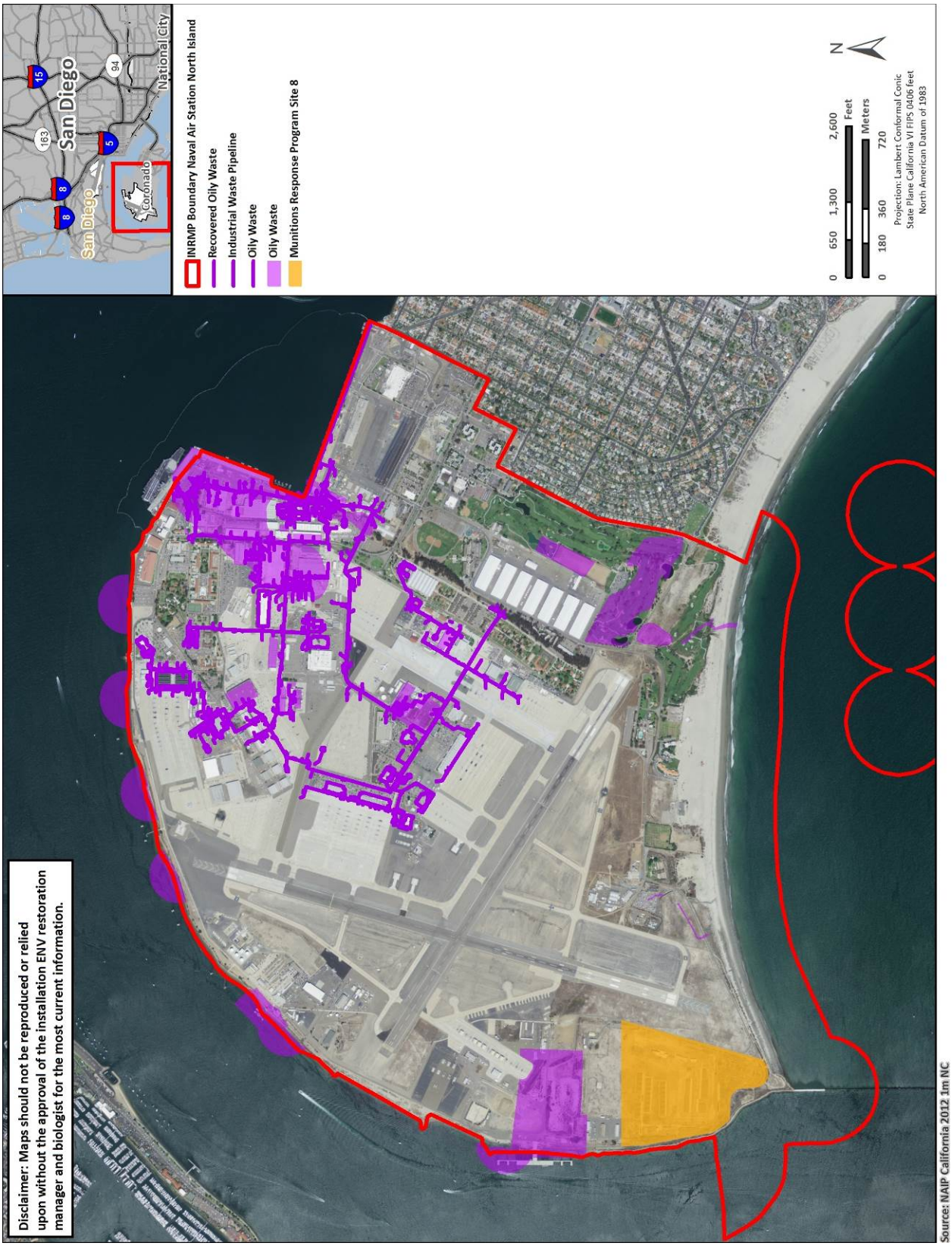


Figure 2-10: Naval Air Station North Island Environmental Restoration Sites

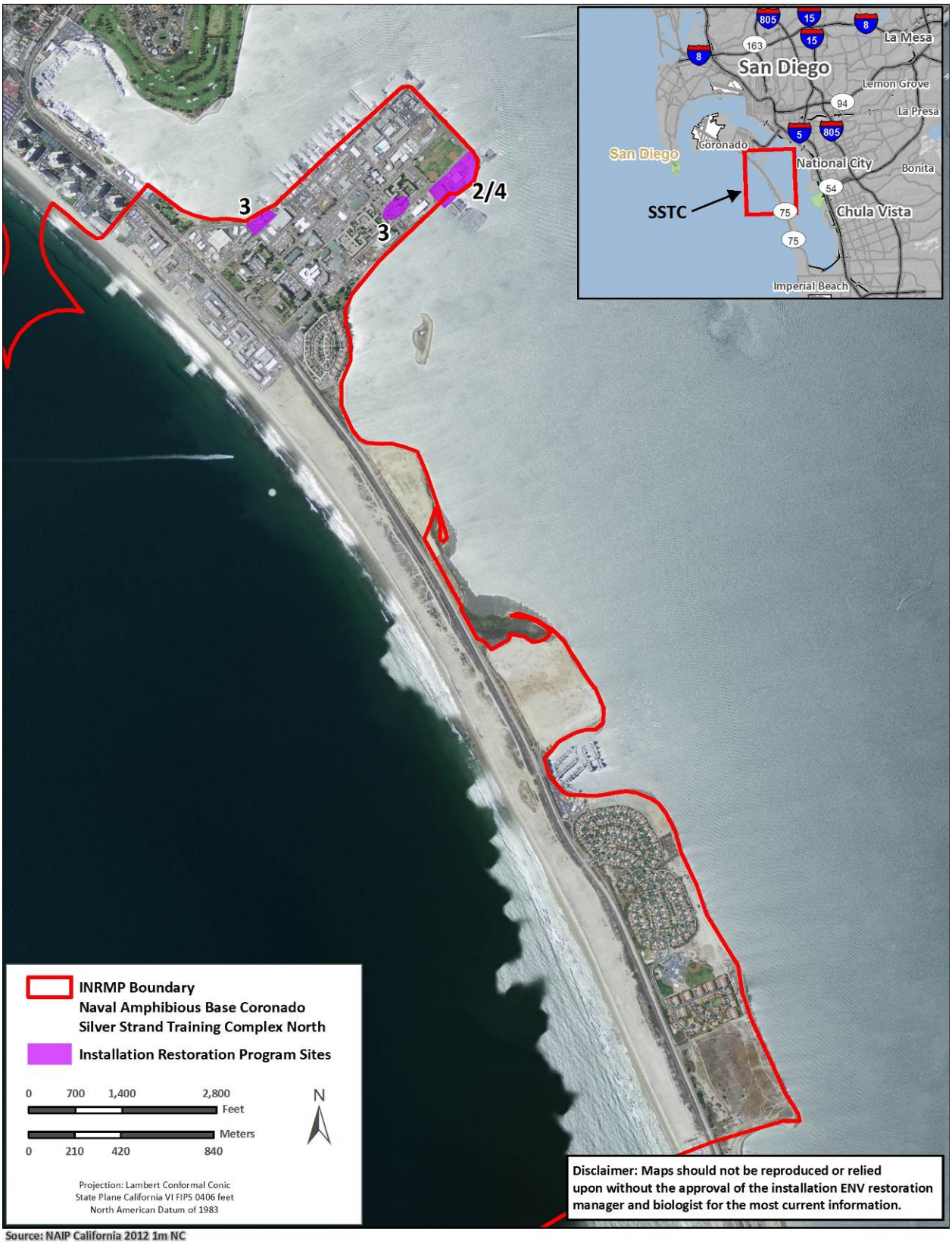


Figure 2-11: Naval Amphibious Base Coronado and Silver Strand Training Complex-North Environmental Restoration Sites

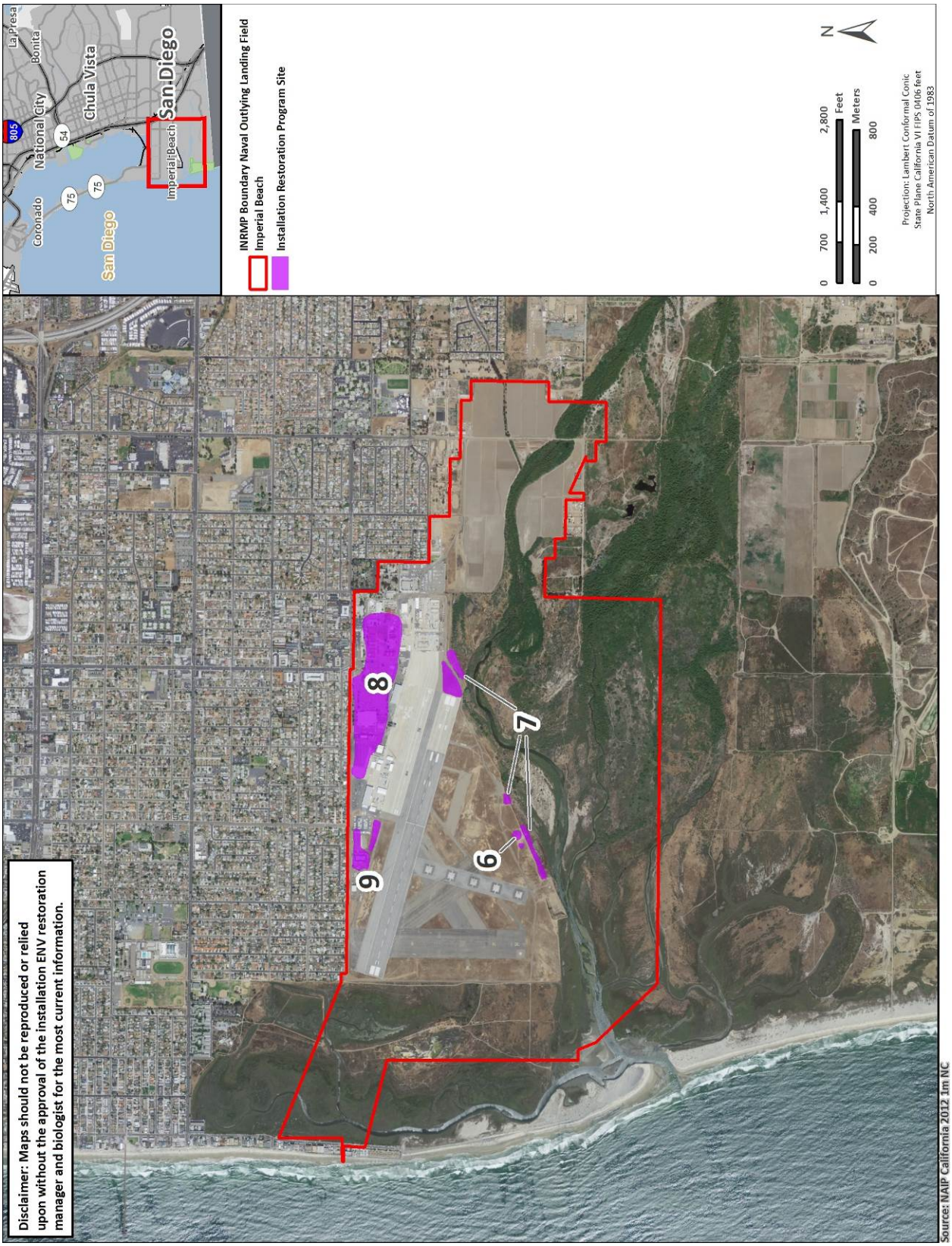


Figure 2-12: Naval Outlying Landing Field Imperial Beach Environmental Restoration Sites

- SSTC-N - NRSW has partially developed and is looking at the feasibility of finishing development of beach training lane Yellow 1 and the northern tip of Red 1. This is in the early stages of feasibility and may not move forward. It should just be mentioned as a possibility.
- NOLF IB - Navy is looking at feasibility of converting the agricultural lease to a training area. If pursued, this would include conversion of some or all existing agricultural lands to native grasslands. It would also require consultation with USFWS due to proximity of training next to Least Bell's Vireo habitat. This is in the early stages but can be mentioned as a possibility.
- CMM - NSW is developing a Training Complex Development Plan to summarize the plans and feasibility for future development here. The Navy is preparing a plan and performing a detailed analysis to ensure the optimum supportability for NSW at CMM to provide the necessary operational resources to perform their mission (i.e., infrastructure-facilities, training, etc.) (CMM TCDP 2011).

2.2.7 Surrounding Land Use

City of San Diego

The city of San Diego is located across the San Diego Bay from NASNI and NAB Coronado. Portions of NOLF IB are located in the southern portion of the city of San Diego. The city of San Diego's General Plan was updated in 2008. The General Plan also represents the individual 42 community plans that have been prepared for each major community. The update to the General Plan includes plans to update each community plan. Most relevant to the naval facilities is the Centre City (downtown). The Centre City Community Plan forecasts significant growth by 2030, including an increase in population from 27,500 to 90,000 (227-percent growth) and an increase in employment from 74,500 to 167,700 jobs (125-percent growth) (U.S. Navy 2010c).

Other than downtown, city of San Diego land uses surrounding the naval facilities are not anticipated to change. Across the bay from NASNI, zoning consists of primarily low to high density residential and neighborhood commercial uses. Across from NAB Coronado, zoning is industrial. In proximity to NOLF IB, zoning around the naval facility is open space floodplain, agricultural, and low-density residential uses (U.S. Navy 2010c).

Changes in the existing land use pattern will occur mainly through redevelopment of existing areas to mixed-use, higher density villages and commercial districts with neighborhood and visitor-serving facilities, including additional hotel development, mostly around the downtown area. Current long-range planning efforts focus on promoting the city of Villages strategy, which encourages growth to occur in compact, mixed-use activity centers that are pedestrian friendly and linked to an improved regional transit system. Such plans include revitalizing the under-utilized waterfront corridor along North Harbor Drive, expansion of the Convention Center and cruise ship terminals, and improving multi-modal transportation options throughout the city (U.S. Navy 2010c).

Development in the vicinity of NASNI and NOLF IB occurs right up to the fenceline on at least one side and consists primarily of residential housing intermixed with areas of commercial/industrial land use. City planners do not anticipate any changes in development or zoning in these areas (U.S. Navy 2010c).

City of Coronado

The city of Coronado is a small peninsula community located across San Diego Bay from downtown San Diego. The city is bounded by the Pacific Ocean on the west, San Diego Bay on the east and northeast,

NASNI to the north, NAB Coronado to the south, and city of Imperial Beach on the south of NAB Coronado (U.S. Navy 2010c).

The city of Coronado has grown significantly since 1980. Between 1980 and 1990, the population swelled 41 percent and then declined 9 percent from 1990 to 2000. The population is estimated to have further declined 4 percent to 23,101 between 2000 and 2008. The population is forecast to increase 29 percent to 31,038 by 2030 (U.S. Navy 2010c).

The city is largely developed and consists of residential neighborhoods, commercial corridors, and tourism-oriented facilities. The city now covers 36 square kilometers (14 square miles), all of which are in the Coastal Zone. Future growth includes plans to refurbish the existing floats and docks at the Glorietta Bay public boat launch and various traffic congestion relief projects.

City of Imperial Beach

Imperial Beach is a small beach community encompassing 11.4 square kilometers (4.4 square miles) immediately north of NOLF IB and south of SSTC-S and the city of Chula Vista. Imperial Beach consists of predominantly single-family residential neighborhoods and small areas of commercial development, mainly located along Palm Avenue. The city boundaries extend from the coastline to approximately 3 miles inland. The city of Imperial Beach experienced a moderate increase in population between 1980 and 2008. From 1980 to 1990, the population increased by 17 percent and between 1990 and 2000 the population increased by only 2 percent. Between 2000 and 2008 the population is estimated to have increased by 8 percent to 28,200. The population is forecasted to increase another 28 percent to 36,125 by 2030 (U.S. Navy 2010c).

The city is almost entirely developed with very limited land remaining that is suitable for development. In the vicinity of NOLF IB, land use is low-medium residential, consisting primarily of single-family units on individual lots, with small pockets of multi-family residential. A portion of the Tijuana Estuary falls within the city boundaries (U.S. Navy 2010c).

The city of Imperial Beach General Plan was last updated in 1998. Although there is no planned comprehensive revision to the General Plan document, individual elements and portions of elements are updated as needed. The land use map contained within the General Plan and the zoning map has not been revised since the last comprehensive update (U.S. Navy 2010c).

Changes in the existing land use pattern are expected to occur mainly through redevelopment of existing areas, particularly older single-family residential to higher density multi-family residential in the eastern areas of the city. Current long-range planning projects focus on preserving the small beach community character, revitalizing the underutilized commercial corridor along Palm Avenue and older residential neighborhoods, and increasing the ability to walk and bike throughout the city (U.S. Navy 2010c).

Future development trends that could result in encroachment impacts to NOLF IB and SSTC-S would be limited to indirect access impacts related to increased traffic congestion, beach access improvements, and potential trail/bike path concepts. These are unlikely to have a direct effect on SSTC-S or NOLF IB operations. Only general increases in urban growth and civilian activity consistent with existing land use and development patterns are anticipated (U.S. Navy 2010c).

Unincorporated Portions of the County of San Diego

RTSWS, CMM, and CM are located in the unincorporated area of the county of San Diego. The county has released its latest comprehensive draft of the General Plan Update (GPU) dated July 15, 2009. In

general, much of the rural portions of the county are being recommended for significant reductions in permitted land use densities. Among the key elements of the GPU are proposed changes to the land use designations for RTSWS, CMM, and CM from Open Space (Conservation) to a Federal- and state-lands designation called "Public Agency Lands." This change will affect all lands in Federal or state ownership, and will affect many of the lands owned by water agencies (such as VID lands next to RTSWS). NBC has been following the GPU process closely and supports these land use designation changes (U.S. Navy 2010c).

RTSWS is approximately 13 kilometers (8 miles) from the community of Warner Springs. CMM and CM are approximately 8 kilometers (5 miles) northeast of the community of Campo. Both Community Plans were evaluated for development trends that could affect NBC. No potential encroachment trends were identified in the General Plan or Community Plan documents (U.S. Navy 2010c).

2.3 Government Regulatory Requirements for Natural Resources Management

National Environmental Policy Act

The National Environmental Policy Act (NEPA, Public Law [P.L.] 91-190, 42 U.S.C. Sections 4321-4347 as amended) is a Federal statute requiring the identification and analysis of potential environmental impacts associated with proposed major Federal actions. NEPA established the Council on Environmental Quality (CEQ), which was charged with the development of implementing regulations and ensuring Federal agency compliance with NEPA. The process for implementing NEPA is codified in Title 40 of the Code of Federal Regulations (CFR), Parts 1500–1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (CEQ Regulations). The Navy implements NEPA through *Procedures for Implementing the National Environmental Policy Act* (32 CFR Part 775). Additional guidance is found in Secretary of the Navy Instruction 5090.6A, *Environmental Planning for Department of the Navy Actions.* The analysis is used as a decision making tool on whether to proceed with the proposed action. NBC had developed policy to guide the site approval and project review process conducted on the installation. For further information pertaining to how NBC complies with NEPA is discussed in **Section 11.6**.

Endangered Species Act

Section 7 of the ESA requires that all Federal agencies consult with the USFWS or the NMFS whenever proposed actions have the potential to impact federally listed threatened and endangered species including plants and animals (see **Appendix B** for ESA coordination diagram). Section 7 consultations will be initiated if warranted, otherwise, written documentation that there are no effects on threatened or endangered species will be generated by NBC and kept in project files. The USFWS policy does not use the term "mitigation" because it is not mentioned in the ESA. In the context of consultation under the ESA, conservation measures are voluntary actions proposed by the project proponent to minimize and avoid impacts to listed species and provide alternative or protected habitat that promote conservation.

At NBC Mainbase, proposed projects, operations, or other actions, are scrutinized for potential impacts to threatened and endangered species through a review process. The natural resources manager will use the installation's INRMP as a tool to identify at an early stage the potential impacts of planned U.S. Navy actions on endangered or threatened species and provide a basis for altering the action to prevent or minimize those impacts. USFWS or NMFS (or both) could require changes or minimization measures that could impact the military mission through delays and additional costs. It is imperative that the installation initiate early environmental/natural resources review of proposed actions, in order to assess risks, develop alternatives, and correctly identify costs associated with minimization measures both in terms of time and dollars.

For a list of key biological opinions see **Tables 2-1** through **2-7** and **Appendix I** for Terms and Conditions and Conservation Measures.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. Sections 703-712) protects all migratory birds and prohibits the taking of migratory birds, their young, nests, and eggs, except as permitted by the USFWS. The USFWS recommends that NBC avoid impacting birds protected under the MBTA by surveying for nesting birds in areas proposed for disturbance and if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends conducting activities outside of nesting areas or outside of the general migratory bird-nesting season that extends from mid-February through the end of August, to help avoid direct impacts. The MBTA implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful.

Prohibited Acts: Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not.

On March 15, 2005, the USFWS published in the Federal Register (FR 70(49):12710-12716) a final list of the bird species to which the MBTA does not apply. The list is required by the Migratory Bird Treaty Reform Act of 2004. The actual list of migratory birds protected by the MBTA is published in the CFR (Title 50, Part 10.13). When it became law in 2004, the Reform Act excluded any species not specifically included on the Title 50, Part 10 list from protection. In addition, DoD and the USFWS entered into an MOU in July 2006 to promote the conservation of migratory birds in accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (DoD 2007). This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations other than military readiness activities are consistent with the MBTA. The MOU also describes how the USFWS and DoD will work together cooperatively to achieve these ends. The MOU does not authorize the take of migratory birds; the USFWS, however, may develop incidental take authorization for Federal agencies that complete an Executive Order MOU. NBC, as part of DoD, benefits from the July 2006 MOU between the USFWS and DoD to Promote the Conservation of Migratory Birds.

The 2003 National Defense Authorization Act directed the Secretary of the Interior to promulgate regulations to exempt the Armed Forces for the incidental taking of migratory birds during military readiness activities. This task was delegated by the Secretary of the Interior to the USFWS. In signing the Authorization Act, Congress declared that the incidental take of migratory birds during military readiness activities did not contradict the prohibitions under the MBTA. Congress also indicated that the Armed Forces should give due consideration to the protection of migratory birds during the planning of such military readiness activities to the extent that such protections did not diminish the value of the military readiness activities. On February 28, 2007, the USFWS issued a Final Rule (50 CFR 21) authorizing the incidental take of migratory birds as a result of military readiness activities. This rule is referred to as "The Migratory Bird Rule." If the Armed Forces determine that the proposed military readiness activity has the potential to result in significant adverse effects on a population of migratory birds, then they are required to confer with the USFWS to develop conservation measures to minimize, or mitigate the significant adverse effect.

As of October 2012, the Navy holds two MBTA permits; a permit for predator control to protect the California Least Tern and Western Snowy Plover, and a second for the removal of certain migratory bird

species in and around NBC runways and taxiways in order to reduce BASH issues. These permits are renewed annually. Refer to **Appendix E** and Birds and Migratory Bird Management and BASH within each chapter for additional information on migratory bird management at NBC.

Clean Water Act

Regulatory authority for Section 404 of the CWA resides with the USACE. Section 404 regulates the discharge of dredge or fill material into the waters of the United States and adjacent wetlands. The USACE has set up the Nationwide Permit Program (NWP) to streamline the permit process for activities similar in nature and with minimal impacts. The NWP Program is re-evaluated every 5 years. If the thresholds identified within a particular NWP are exceeded or the General or Regional Special Conditions are exceeded the proposed action must be processed under a Letter of Permission or Individual Permit (IP), as appropriate. An IP requires a public notice, an alternatives analysis (the 404(b) (1) analysis), and a NEPA document specific to the proposed project. The USACE is required to implement a national policy for "no net loss of values and functions" for wetlands of the United States. In addition, dredging in San Diego Bay is conducted by the Navy, U.S. Army Corps of Engineers, the Port of San Diego, and some commercial marina operators and requires Section 103 permitting.

Shoreline construction or maintenance activity in waters of the U.S. is permitted under the CWA and the Rivers and Harbors Act which are administered by the USACE. In addition, material that is transported for ocean disposal is regulated by Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972. CWA jurisdiction starts at the Ordinary High Water Mark, or any adjacent wetlands, or the High Tide Line; and Rivers and Harbors Act jurisdiction starts at the Mean High Water Mark. Currently the Regional Water Quality Control Board and the USACE require a 401 certification on all Federal permits, including Section 10 of the Rivers and Harbors Act.

The USACE has a three-step mitigation sequencing procedure (MOA between the USACE and EPA, February 7, 1990). First, the project proponent must demonstrate avoidance and minimization of impacts to waters of the United States to the maximum extent possible. Avoidance includes demonstrating there is no practicable alternative which would have less adverse impact. Minimization requires consideration be given to redesigning or staging a project to reduce impacts. Compensatory mitigation is only authorized for unavoidable impacts and must replace the loss of values and functions of the waters of the United States proposed for impact. Compensatory mitigation includes creation, restoration, enhancement or preservation. All impacts must be avoided or minimized before compensating mitigation will be considered. In some cases, mitigation banking is the appropriate approach for compensatory mitigation (33 CFR S 320.4[r]).

Figure 2-13 presents the regulatory jurisdictions that must be considered for any activities that may occur in the San Diego Bay or on the ocean side of NBC boundaries.

Section 401 Water Quality Certification of the Clean Water Act protects water quality by regulating the dumping or flow of pollutants into streams, lakes, and rivers. A water quality certification, obtainable through California Regional Water Quality Control Board, must be obtained in order to receive a 404 permit or be authorized under the 404 nationwide permits (USEPA 2009).

All projects requiring USACE permits are reviewed by the Project Review Board. A current list of active USACE permits for NBC can be obtained from the Work Induction Board NEPA Planner.

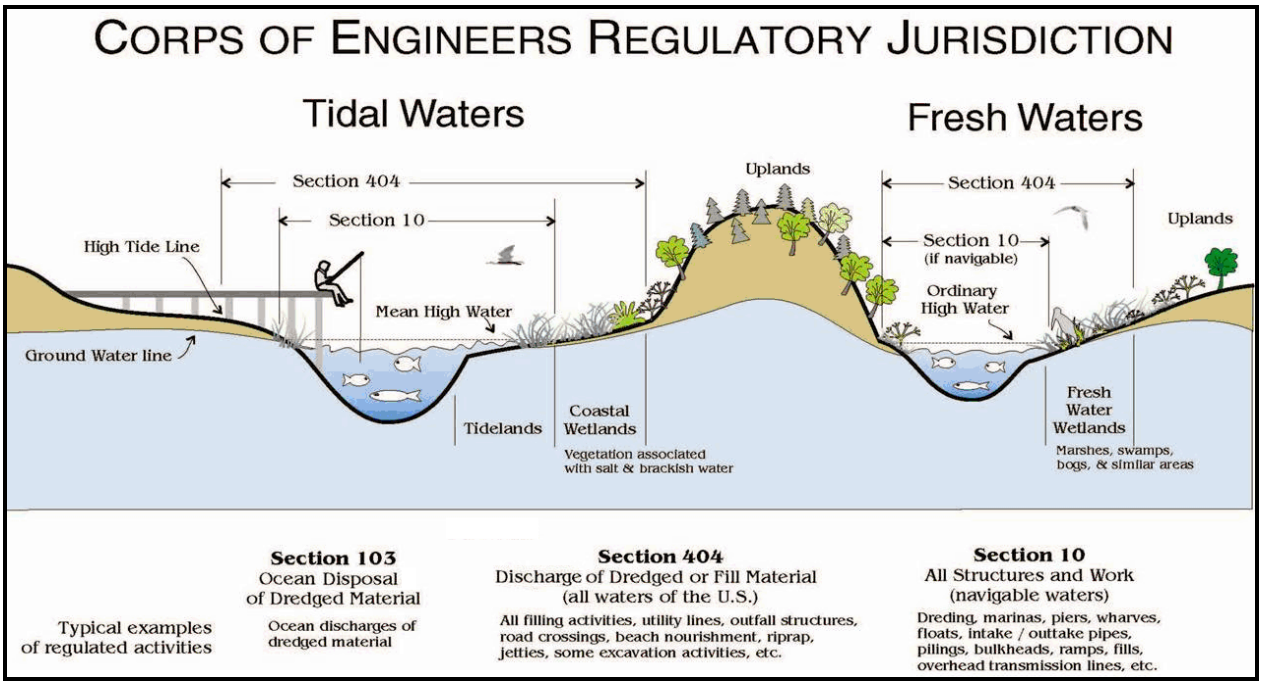


Figure 2-13: Regulatory Jurisdictions for Activities within San Diego Bay and Ocean Side

Magnuson-Stevens Act

Essential fish habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." For the purpose of interpreting the definition of EFH, "waters" include aquatic areas and the associated physical, chemical, and biological properties that are used by fish, and may include historic areas where appropriate; "substrate" includes sediment, hard-bottom structures underlying the waters, and associated biological communities; and "necessary" means the habitat required to support a sustainable fishery and a healthy ecosystem. The complete life cycle is included in spawning, breeding, feeding, or growth to maturity. The coastal waters of southern California, up to 4.8 kilometers (3.0 miles) offshore to 370.4 kilometers (200.0 miles) offshore (i.e., the U.S. Exclusive Economic Zone), are designated as EFH for the species listed in the Coastal Species Fishery Management Plans and the Pacific Coast Groundfish Fishery Management Plan (U.S. Navy 2010c).

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 or direct kills), indirect (e.g., loss of prey), site-specific, or habitat-wide impacts. Consultations are conducted in conjunction with other Federal statutes, such as NEPA, CWA, or ESA. NMFS provides recommendations to minimize, offset, or mitigate impacts. Within 30 days the Federal agency responds with a description of measures to be taken, or with a scientifically sound explanation for not following recommendations (U.S. Navy 2010c).

Section 305(b)(2) of the amended MSFCMA directs each Federal agency to consult with NMFS with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH identified under the MSFCMA. The Navy and NMFS signed an agreement in 2001 which allows the Navy's NEPA and Fish and Wildlife Coordination Act process to satisfy EFH analysis requirements. Therefore, the U.S. Navy will notify NMFS in writing as early as practicable regarding actions that may adversely affect EFH. Notification

will facilitate discussion of measures to conserve EFH. For any Federal action that may adversely affect EFH, Federal agencies must provide NMFS with a written assessment of the effects of that action on EFH. The level of detail required in the assessment is commensurate with the magnitude of potential adverse impacts, so an action that may only result in minor impacts would only require a brief assessment. Mandatory contents of the assessment are outlined in 50 CFR 600.920(e)(3). The U.S. Navy conducts an EFH assessment for Federal actions to establish all potential EFH impacts and has consulted and continues to consult with NMFS regarding potential effects to EFH (U.S. Navy 2010c).

Marine Mammal Protection Act

All marine mammals are protected by the Marine Mammal Protection Act (MMPA) of 1972, as amended. The MMPA prohibits the take (hunting, killing, capture or harassment) of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products. The USFWS is responsible for the following marine mammals: sea and marine otters, walrus, polar bear, three species of manatees, and dugong. The USFWS may authorize and permit take (with limitations and mitigation measures) of marine mammals under their purview. Those mammals that are truly marine inhabitants, cetaceans and pinnipeds, other than walrus, are the responsibility of NMFS.

3. Regional Ecological Setting

Ecoregions of the United States were first determined in 1978 by the USFS, Intermountain Region located in Ogden, Utah (Bailey 1995). The purpose of the original study was to provide a general description of the ecosystem geography of the United States, which resulted in a map titled "Ecoregions of the United Sates." The technique of mapping ecoregions was subsequently expanded to include the rest of North America and the world. In 1993, as part of the Forest Service's National Hierarchical Framework of Ecological Units, ecoregions were adopted for use in ecosystem management (see **Figure 3-1**) (Bailey 1995).

Source: Bailey 1995

Figure 3-1: California Ecosystem Division

Naval Base Coronado (NBC) lies within the Mediterranean Ecosystem Division (Ecological Unit [EU] 261) of the Humid Temperate Ecosystem Domain (EU 200) (see **Figure 3-2**) (Bailey 1995). The Mediterranean Division is situated along the Pacific coast between Latitudes 30 and 45 North zone, and is subject to alternate wet and dry seasons. This transition zone between the dry west coast desert and the wet west coast is governed by both tropical and polar air masses (Bailey 1995). The climate classification of these lands is a temperate rainy climate with dry, hot summers, and wet winters (Bailey 1995). The combination of wet winters with dry summers is unique among climate types and produces a distinctive natural vegetation of hard leaved evergreen trees and shrubs called the sclerophyll forest (Bailey 1995). Sclerophyll trees and shrubs must withstand the severe summer drought (2 to 4 rainless months), and severe evaporation.

The South Coast Region of EU 261 is characterized with average temperatures ranging from 8 to 20 degrees Celsius (ºC) (46 to 68 degrees Fahrenheit [ºF]). Annual rainfall averages 23.4 centimeters (9.2 inches); most of this precipitation occurs between November and early April. Humidity averages approximately 70 percent. Days are warm and sunny and nights moderate, with warm summers and mild winters. Prevailing northwest winds are moderated by the Pacific Ocean.

Seasonal Santa Ana winds bring hot winter winds from the east. In addition, this region is recognized as one of the world's hotspots for diversity (CDFG 2007). The region is home to 476 vertebrate animal species, which is approximately 38 percent of all the vertebrate species found in California. The coastal California area is also a major migration route for both water and land birds (Bailey 1995).

NBC also lies within the California Coastal Chaparral Forest Shrub Province (CCCFSP) that is characterized by discontinuous coastal plains, low mountains, interior valleys, land-surface forms (Bailey 1995). The CCCFSP is adjacent to the Pacific Ocean, ranging from San Francisco to San Diego. Elevation ranges from mean sea level (MSL) to 732 meters (2,400 feet) and covers approximately 0.3 percent of the United States, or 26,677 square kilometers (10,300 square miles) (Bailey 1995). Soils are characterized as mostly Alfisols and Mollisols, which have very low acidity and are quite fertile when the region is not experiencing drought conditions (Bailey 1995).

3.1 Ecological Drivers

Ecological drivers are environmental factors that exert a major influence on the fitness of individual organisms and their populations, and help constitute the physio-chemical template of an ecosystem (Winters et al. 2004). Environmental factors such as, geology, glacial history, climate or precipitation regime, flow regime and stream gradient determine the natural form and function of environments, such as aquatic, riparian, and wetland ecosystems. Ecological drivers control physical features such as land slope and aspect, stream form and gradient, thermal and moisture regimes, soil depth and fertility, and stream substrate and chemistry that constrain biological composition and processes (Winters et al. 2004). For example, combinations of ecological drivers can be analyzed to provide information on the landscape structure, which may be conducive to the presence and abundance of aquatic, riparian, and wetland resources (Winters et al. 2004).

3.1.1 Water Resources

The San Diego Region experiences a Mediterranean climate, and precipitation follows a strong seasonal pattern. More than 90 percent of the annual precipitation typically occurs during the 6-month period of November through April. Likewise, the majority of evaporation, approximately 80 percent, occurs during the summer and autumn months and ranges from approximately 1.1 meters (3.7 feet) per year in coastal valleys to more than 1.3 meters (4.2 feet) per year in inland valleys (RWMG 2007).

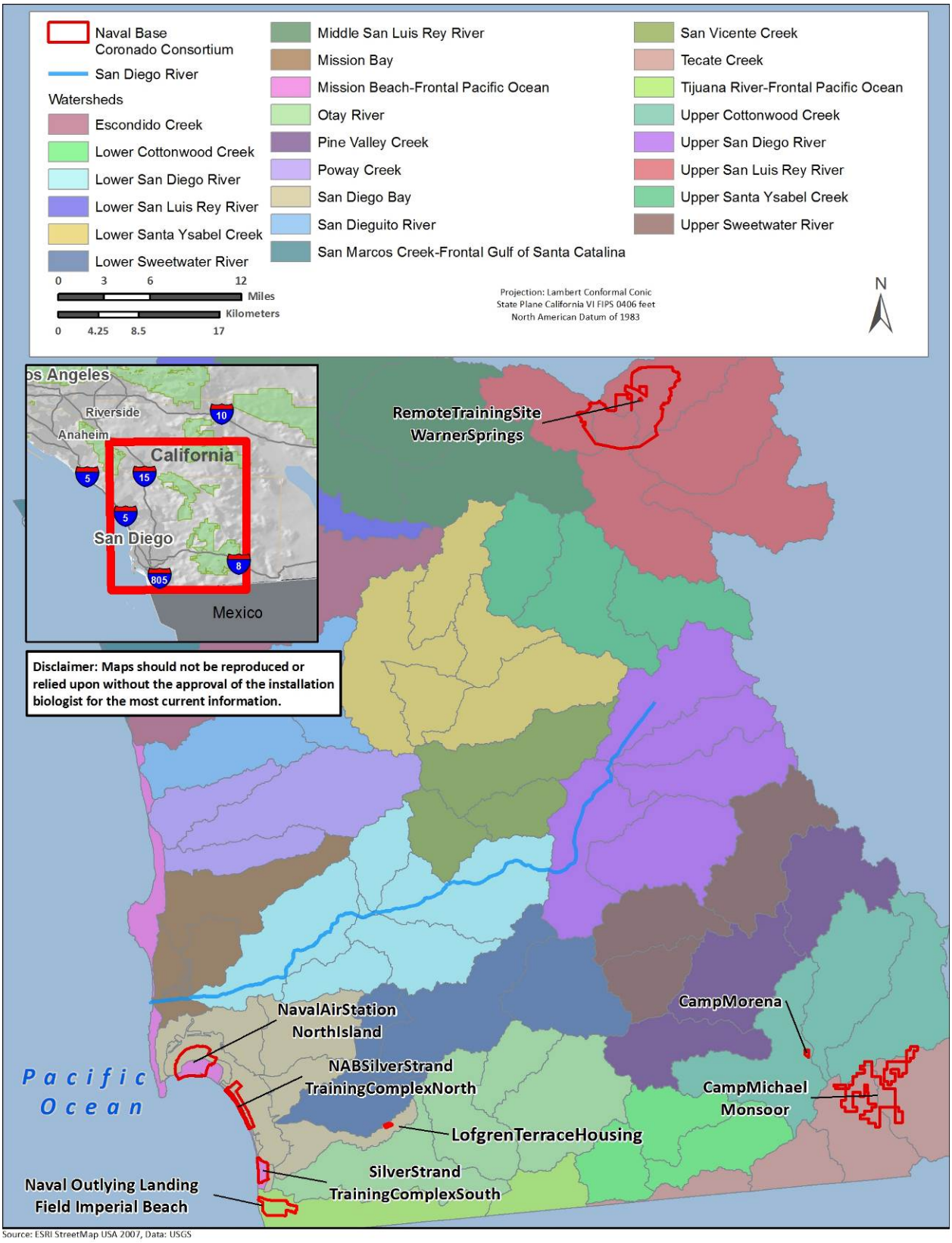


Figure 3-2: Naval Base Coronado Watershed Hydrologic Units

The San Diego Region is comprised of eleven parallel and similar hydrologic units that discharge into coastal bays, estuaries, lagoons, and the Pacific Ocean (RWMG 2007). Precipitation and streamflows are highly seasonal with approximately 90 percent of the Region's streamflow occurring from December through May. Groundwater, inland surface waters, and coastal waters within the Region support a wide variety of water supply uses, recreational uses, and important ecosystems and habitats (RWMG 2007).

Regional water resources are comprised of surface water in the form of streamflow and coastal waters, and groundwater driven by localized alluvial aquifers (semi-consolidated, or consolidated sediments, and fractured rock) (RWMG 2007). Groundwater pumping, water imports from other regions, and increased runoff from impervious land cover and residential and agricultural irrigation also affect river systems. Invasive plant species—particularly arundo and tamarisk—can also alter river flows substantially. Surface water within the region is characterized by streamflow (primarily driven by precipitation runoff), accounting for the majority of surface flow in streams and rivers, and coastal waters which support wildlife habitats, endangered species, and recreational uses. Groundwater resources support regional municipal, agricultural and industrial processes. In addition, riparian habitat and groundwater-dependent vegetation are known to exist in the Region (RWMG 2007).

The U.S. Geological Survey (USGS) and USDA Natural Resources Conservation Service (NRCS) developed *Federal Guidelines, Requirements, and Procedures for the National Watershed Boundary Dataset*, which establishes interagency guidelines, requirements, and procedures that created a national, consistent, seamless, and hierarchical hydrologic unit dataset based on topographic and hydrologic features across the United States (USGS and USDA NRCS 2009). This Watershed Boundary Dataset (WBD), at a 1:24,000 scale in the conterminous United States consists of digital geographic data that include two additional levels of detailed hydrologic unit boundaries nested within existing or modified 1:250,000-scale hydrologic units.

In 2009, the WBD was revised based on NRCS guidance entitled *Federal Standard for Delineation of Hydrologic Unit Boundaries, Version 2.0*, dated October 1, 2004, and through contributions of the WBD Technical Support Team, as requested by the Subcommittee on Spatial Water Data. According to the revised WBD, NBC lies within the Laguna-San Diego Coastal Basin 180703 (9,531 square kilometers [3,860 square miles]) of the Southern Subregion 1807 (28,749 square kilometers [11,100 square miles]), which is further located in the California Region 18 (352,135 square kilometers [135,960 square miles]). The Laguna-San Diego Coastal Basin drainage system is further defined by eleven hydrologically connected watersheds stemming from the Moro Canyon drainage basin near Laguna Beach to the California-Baja California international boundary, and ultimately discharging into the Pacific Ocean.

3.1.2 Fire

According to the California Wildlife Action Plan, wildfire is a natural and important ecological process in the South Coast that allows vegetation to grow and store energy via biomass production (CDFG 2007). Growth is restricted by the availability of other resources, particularly precipitation, and energy stored as vegetative biomass that is released as it is consumed by herbivores, detritivores, and fire (Millington 2003). Widespread forest management practices, as well as increases in human-caused wildfires, have altered fire regimes, and in some cases caused dramatic changes in regional habitats. Efforts to establish fire regimes that mimic historical fire patterns and frequencies, while also minimizing loss of property and life, are important to maintain and restore wildlife habitat. Dry conditions, along with annual hot, dry Santa Ana winds, make the San Diego Region's ecosystems fire-prone (CDFG 2007).

The expansion of residential development into rural and natural areas has increased the incidence of human-caused fire. In the 1990s and early 2000s, extensive wildfires affected the entire region, and costs from property loss and fire suppression rose to billions of dollars annually. Wildfires in the San Diego

region occur throughout the year, but most strongly during late summer and early fall. Over the twentieth century, the area burned by wildfires has undergone substantial fluctuations, but in the last 10 years the extent of these wildfires was unprecedented, greatly exceeding that during any past decade. In 2003, almost 161,874 hectares (400,000 acres) burned, costing more than $1.2 billion for fire suppression efforts and to repair damages resulting from the fires (CDFG 2007). In October and November autumn 2007, San Diego County experienced a series of wildfires, where in approximately 135,323 hectares (334,390 acres) burned.

The causes and ecological consequences of wildfires differ among the region's ecological communities. In sage scrub, chaparral, and grassland systems, lightning-induced fires are fairly infrequent; however, human-caused fires have resulted in unnaturally high fire frequencies, especially along roads and near the urban-wildland interface, with some locations experiencing three fires within a period of 15 to 20 years (CDFG 2007). Increased fire frequencies favor non-native Mediterranean grasses. Once established, these grasses grow in a dense-thatch pattern that chokes out some native vegetation and lowers habitat quality for wildlife, while providing ample fuel for the cycle of frequent burning. It is the rate of human-caused fire and the Santa Ana wind conditions rather than fuel build-up that often determines the extent and frequency of wildfire in these systems.

Areas with a history of fire suppression may also be creating less frequent but larger, more destructive fires in the portions of the county.

Most "problem fires" in southern California are driven by autumn Santa Ana winds, but big fires can occur at other times of the year. Other factors such as terrain, drought, fuels, and accessibility interact with wind to make simple categorization of the southern California "fire problem" difficult. However, one factor that is common across the overwhelming majority of large fires is that they are largely the result of anthropogenic ignitions. Differences in their causal factors aside, almost all southern California fires are potentially preventable. The two lessons we can draw from the 2007 fires can be summarized as follows:

1. Most large fires in southern California occur after the long summer dry period and are driven by high winds under hot and dry conditions (Santa Ana winds). The largest of these fires burn through chaparral fuels under conditions that defy efforts at control. Increasing housing density in the southern California foothills is escalating the complexity and danger of fire control efforts under these challenging conditions. During Santa Ana wind events such as those that drove the autumn 2007 fires, chaparral fires are not constrained by previous fire boundaries. Stated another way, young fuels in chaparral are not a reliable barrier to fire spread under Santa Ana conditions. The extreme frequency of fire in the southern California foothills is driving large-scale vegetation-type conversion, as shrub-dominated landscapes cede to more fire resilient (largely exotic) grasses.
2. Although it is a major factor in driving fire size, wind does not cause all large fires in southern California. Using a 2007 example, the immense Zaca Fire burned for 2 months with only 6 days of high winds. Factors responsible for the size and duration of the Zaca Fire included historically low fuel moistures due to the 2006 – 2007 drought; steep, inaccessible terrain that both limited fire control options and fueled "topographic" fire runs; and large areas of old chaparral that supported high levels of dead fuels. Spring and summer fires in southern California chaparral are usually easily contained because of the general absence of high wind events (Keely 2009).

In crown fire shrubland ecosystems, cover in the first growing season is only weakly correlated with fire severity; rather, environmental parameters, such as elevation and substrate, are much more deterministic. Diversity in the first year is negatively affected by fire severity, and much of this is tied to the sensitivity of alien propagules to high-intensity fires. The strongest effect of fire severity is the negative effect it has

on alien species cover and diversity. Chaparral shrublands are not only well adapted to fire-prone environments, but are highly resilient to high intensity burning. This has implications for fire management of these landscapes. For example, prefire fuel manipulations are sometimes justified as having positive resource benefits because they reduce subsequent fire intensity and severity. However, lower fire intensity/severity does not contribute to better native regeneration. In fact, reductions in fire intensity or severity may have negative impacts because lower fire intensities are likely to favor alien plant invasion. The potential for remote sensing techniques to contribute to postfire management has not yet been fully realized, and it is suggested that this will develop best if we tease out the separate contributions of fire severity and ecosystem responses (Keely et al. 2008).

3.1.3 Drought

According to the California Natural Resource Conservation Service (CA-NRCS), drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. Droughts in California typically occur gradually over several years. California's extensive water supply system can mitigate the effects of short-term dry periods; however, California's dependence on water for agriculture, industry, and recreation makes drought planning an economic necessity. When a drought occurs, the impacts are felt first by those most reliant on annual rainfall (CA-NRCS 2007).

Most definitions of a drought refer to abnormal dryness, as opposed to normal dryness that occurs during the summer in the southwestern United States (McNab and Karl 1991). The strongest drought signals occur during seasons when substantial precipitation is expected, but fails to fall. Therefore, if precipitation is the carrier of the drought signal, then climate describes the long-term characteristics of this signal. The climatic factors associated with drought, which include various aspects of local climate (e.g., anticipated precipitation, temperature, atmospheric water vapor, atmospheric circulation patterns, sources of moisture, vertical movement of air, storms, atmosphere and ocean and land-surface boundaries, and climatic anomalies), are related to atmospheric circulations that could extend well beyond the local area. Drought is commonly perceived as an abnormally long period without precipitation; however, decreased frequency of precipitation is not the only climatic factor that causes precipitation deficiencies. Droughts are also associated with weather systems resulting in minimal precipitation. For example, if minimal precipitation is delivered by an anticipated storm along a coastline, then a severe drought could ensue (McNab and Karl 1991).

Precipitation anomalies are a naturally recurring feature of global climate, and affect various components of the hydrologic cycle (McNab and Karl 1991). Precipitation, temperature, and atmospheric moisture rates provide an indication of the frequency and intensity of precipitation, the correlation of precipitation and temperature, and the atmospheric drying that occurs during a drought. Likewise, atmospheric circulation patterns illustrate that drought is associated with persistent, or persistently recurring, circulation patterns that produce little or no precipitation. A drought does not occur as a result of discernibly unique daily circulation patterns. Monthly average circulation patterns indicate the importance of descending air, dry-air advection, and the absence of destabilizing temperature gradients during a drought. The search for causes of atmospheric drought goes far beyond the immediate area affected by drought, due to the global (or at least hemispheric) nature of atmospheric circulations that produce sustained periods of less than normal precipitation (McNab and Karl 1991).

The relationship between droughts, soil moisture content, and water use in the San Diego region is also very important to understand how potentially more frequent and intense droughts might affect overall water demand. Based on the high degree of variability of annual precipitation, the region will remain highly vulnerable to drought (Keely et al. 2008).

3.1.4 Invasive Flora and Fauna

With the beginning of European settlement, non-native species were carried to California attached to the hulls of ships, submerged in the ships' ballast, or carried along in shipments of grain. Today, there are many different ways in which non-native species are introduced to the state. Commercial shipping remains a source of unintentional introductions, along with smaller commercial fishing boats and recreational watercraft (CDFG 2007). People and animals traveling between natural areas, farms or waterways for work or recreation unintentionally spread non-native species on their vehicles, boats, equipment and even clothing. Both historically and today, non-native plant species have been introduced purposely for erosion control, livestock forage, landscaping and aquarium or garden ornamentals without an understanding of the potential consequences of those introductions (CDFG 2007). In addition, various animal species brought into California as sources of food, fur or pets, have turned into major pests (CDFG 2007). For the purposes of this INRMP non-native species refers to those species introduced to California after European contact, and as a result of human activity. Invasive species refers to those non-native species that threaten natural and native habitats, threaten diversity or abundance of native species, and does or is likely to have environmental or economic impacts (Cal-IPC 2006, CDFG 2009b).

Even though in general Californians have benefited from the introduction of flora and fauna, many introduced species can severely impact the state's environment and economy (CDFG 2009b). Invasive species (plant and animal) threaten the diversity of native species through competition for resources, predation, parasitism, interbreeding with native populations, transmitting diseases, or causing physical or chemical changes to the invaded habitat (CDFG 2007). In addition, invasive plants sometimes outcompete native species for light, water, and soil, and may also offer inferior habitat and nutritional values for native animal species and sometimes alter ecosystem processes, such as natural fire regimes (CDFG 2007). Likewise, "invasive animals outcompete, prey upon, or disturb the habitat of native wildlife and may spread diseases" (CDFG 2007). Invasive species that occur on NBC are addressed in detail in **Sections 4** through **10**.

Examples of the impacts invasive species can have on a native community that could or do occur within NBC include the following:

- Southern California grasslands have become invaded by non-native grasses and forbs, as well as becoming highly fragmented. Remaining grassland habitats are threatened by a multitude of interacting influences such as, urbanization and development, over-grazing, public use, changes in fire regime, climate changes and pollution. These stressors place increasing pressure on the management of grasslands in public and private reserves to maintain, or restore, native plant and animal species, especially in Southern California (Keeley 1990).
- The coastal plains and interior valleys have been impacted by the introduction of Australian species, such as blue gum eucalyptus (*Eucalyptus globulus*), along with urban development and irrigated agricultural (Bailey 1995).
- Riparian systems around the state have been adversely impacted by giant reed (*Arundo donax*) and tamarisk (*Tamarix* spp.) (CDFG 2007).
- Damage to riparian areas and the habitats of rare and endangered species [including arroyo toad (*Anaxyrus californicus*) and Stephens' kangaroo rat (*Dipidomys stephensi*)] by the foraging habits of newly introduced feral pig (*Sus scrofa*) (Pers. Comm. D.A. Smith 2013).

Through their impacts on natural ecosystems, agricultural and other developed lands, and water delivery and flood protection systems, invasive species may also negatively affect the economy, human health, and wildlife and wildlife habitats. A large population of an invasive species can start from a very small

number that may easily go unnoticed and become a multimillion-dollar problem for the state. Early detection and rapid response are the most effective and cost efficient responses to invasive species, after prevention (CDFG 2009c). *Caulerpa taxifolia* is an aggressive non-native alga that displaces numerous native marine plants and animals and causes negative economic impacts to the fishing and tourist industries. The *Caulerpa* invasion in Agua Hedionda in San Diego County demonstrates that Caulerpa poses an immediate and dire threat to the nearshore marine ecosystem of Southern California, especially to native eelgrass beds, which are critical habitat for numerous marine species (cite CWAP).

3.1.5 Ecological and Natural Resources Disease

Ecological and natural resources diseases refer to those diseases that have an effect on flora and fauna species health, fecundity, and ultimately diversity. The National Biological Information Infrastructure (NBII) identifies four hot topic diseases impacting wildlife species populations including chronic wasting disease (CWD), avian flu, whirling disease and West Nile virus (WNV) (NBII 2009).

Likewise, NBII describes avian flu as a disease that is usually an unapparent or nonclinical viral infection of wild birds that is caused by a group of viruses known as type A influenzas. Avian influenza is caused by this collection of slightly different viruses rather than by a single virus type. Avian influenza viruses have been found in many bird species, but are most often found in aquatic birds, particularly ducks, shore birds, and gulls, which are considered the natural reservoirs for avian influenza viruses (NBII 2009).

According to the Center for Disease Control and Prevention (CDC) and the California Department of Health Services, one the most severe public and ecological health concerns has been the unimpaired spread of WNV (Reisen et al. 2004). The WNV is an insect-borne flavivirus that is commonly found in Africa, western Asia and the Middle East, and never reported in the Western Hemisphere before 1999 (Reisen et. al. 2004). It has been detected in at least 48 species of mosquitoes, over 250 species of birds, and at least 18 mammalian species, including humans (USGS 2009).

The University of California Cooperative Extension (CCE) identifies and keeps track of the impact of plant diseases on native and agricultural plant species. A couple of the diseases that the extension tracks include Sudden Oak Death, and Witch Broom/Mistletoe Infestations. The California Oak Mortality Task Force (COMTF) is a nonprofit organization formed in 2000 to analyze the cause and determine solutions for reducing oak mortality in California (COMTF 2009). The organization defines Sudden Oak Death as a forest disease caused by the *Phytophthora ramorum* pathogen resulting in the dieback of tanoak (*Lithocarpus densiflorus*) and oak tree (*Quercus* spp.) species in California and Oregon (COMTF 2009). Some of the species identified by COMTF in California include coast live oak (*Q. agrifolia*), California black oak, shreve oak (*Q. parvula*), canyon live oak (*Q. chrysolepis*), California bay laurel (*Umbellularia californica*), Douglas-fir (*Pseudotsuga menziesii*), and coast redwood (*Sequoia sempervirens*) (COMTF 2009). Likewise, septoria leaf blight (*Septoia quercicola)* and oak anthracnose (*Apiognomonia errabuna*) are fungi which affect the leaves of oak species (CCE 2005).

Goldspotted oak borer (*Agrilus auroguttatus*) is a buprestid beetle that is native to oak forests in southeastern Arizona. This species was first detected in San Diego County in 2004 and 2008 it was found in three species of oak trees in Cleveland National Forest: coast live oak, canyon live oak, and California black oak. This beetle is responsible for major oak mortality on Federal, state, and private lands in Southern California (UC Riverside 2012).

A major threat facing amphibian species and populations is the spread and introduction of the fungal disease chytridiomycosis, caused by *Batrachochytrium dendrobatidis* (Bd). Bd was first documented in California in 1961 in Palo Alto, California and has since been documented in the Sierra Nevada area, and Sonoma County (Fellers et al. 2011).

3.1.6 Climate and Climate Change

The metropolitan areas of Southern California have a Mediterranean climate, characterized by mild, (sometimes wet winters) and warm, very dry summers (NOAA 2009b). California owes its climate to a semi-permanent high-pressure area located over the eastern Pacific Ocean, which deflects storms northward and secures fair weather for the region. During the winter months, this high-pressure area breaks down allowing the jet stream to steer mid-latitude weather systems along a more southern track of the prevailing westerly winds (NOAA 2009b). For this reason, the vast majority of precipitation comes from winter storms between November and March (NOAA 2009b).

General characteristics of Southern California's climate are shaped by the influences of (NOAA 2009b):

- **Winter storms,** where cold air associated with deep troughs of low pressure become modified by the mild ocean waters.
- **Summer monsoon,** where a strong upper ridge builds over the four corners region or the Great Basin. The resulting easterly or southeasterly flow on the south side of this high, draws warm air from Mexico into the Southwest United States.
- **Marine layer,** in the form of dense fog or radiation fog, is the most dominating weather feature in Southern California. This feature starts with a semi-permanent high pressure over the eastern Pacific Ocean, which produces persistent northwest winds that parallel the West Coast.
- **Sea breeze,** where the sun warms both the ground and ocean at the same rate. However, since the heat in the ground is not absorbed well, it returns heat to the warm air. As the air cools, it begins to collect, resulting in an increase in pressure, creating a "high" wind pressure.
- **Santa Ana winds,** where strong, dry offshore winds blow from east or northeast. These winds are strongest below passes and canyons of the coastal ranges of Southern California.
- **Hurricanes,** where sea surface temperatures rise above 80 ºF, providing the necessary energy required for the formation of a hurricane. However, since the California Current is a cool ocean current that parallels the California Coast, hurricanes normally do not occur in the region.
- **El Niño and La Niña,** where air pressure rises over the western Pacific Ocean and lowers over the eastern Pacific. This change weakens or even reverses the trade winds and as a result brings heavy rains and strong winds to the region. La Niña is the opposite of the El Niño, where equatorial Pacific Ocean waters are cooler than normal.
- **Global warming (Greenhouse Effect),** where the observed average temperature of the earth is rising as a result of increased levels of carbon dioxide and other gases being released into the atmosphere, which could impact global climates.
- **Sun, earth, sea, space, and optical phenomena**, where naturally occurring phenomena such as: solar and lunar phenomena, optics, astronomy, space weather in the form of aurora borealis or solar flares, ocean behavior beyond sea state, earthquakes, and volcanoes can reshape or temporarily modify the regional climate.

The California Climate Change Center (CCCC) has determined that during the last 50 years, winter and spring temperatures have been warmer, spring snow levels in lower- and mid-elevation mountains have dropped, snowpack has been melting one to four weeks earlier, and flowers are blooming 1 to 2 weeks earlier (CCCC 2006). These regional changes are consistent with global trends. During the past 100 years, average temperatures have risen more than 1 °F worldwide (CCCC 2006).

Continued climate change in California could result in an increase in extreme climate conditions, which pose the most serious human health and ecological risk (CCCC 2006). By 2100, if temperatures rise to

the higher warming range, there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and above 95°F in Sacramento (CCCC 2006). There will be higher temperatures, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent (CCCC 2006). This loss of snowpack would pose challenges to water managers, hamper hydropower generation, and nearly eliminate snow-related recreational activities (CCCC 2006).

Hydrologic conditions in the San Diego Region, and in the Colorado River Basin could be altered as a result of global climate change (based on conditions observed over the past century) (RWMG 2007). Listed below are seven key probable global changes identified in the San Diego Regional Water Management Group (RWMG), 2007 Integrated Regional Water Management Plan (IRWMP), which potentially have an effect on the hydrologic conditions of the Region (RWMG 2007):

- **Snowpack Changes:** While snowpack represents a negligible component of the water balance within the Region's local water supplies, decreased snowpack in the Sierras will result in decreased runoff during October through March, adversely affecting California's water storage and potentially affecting the amount of imported water available to the Region.
- **Hydrologic Patterns:** Global warming may result in a shift in storm tracks. Existing data provided by the California Department of Water Resources indicates a trend of increasing precipitation in Northern California and decreasing precipitation in Southern California during the past century, but El Niño effects (increased Pacific Ocean temperatures) have been shown to result in a shift of the Pacific Coast winter storm tracks toward the south.
- **Storm Intensity:** Flood management, erosion, and water quality impacts could occur if climate change results in increased precipitation intensity and a reduction in healthy plant cover.
- **Sea Level Rise:** Sea level rises associated with global warming could increase coastal erosion, impacting ecosystems and tidal wetlands. Sea level rises would also increase salinity intrusion into various bays, adversely impacting the quality of State Water Project supplies delivered to the region.
- **Water Temperatures:** Increased air temperatures and modified storm patterns may result in increased reservoir water temperatures, adversely affecting cold water and other species and increasing the intensity of algae blooms.
- **Water Demand:** Potential global warming effects on vegetation evapotranspiration are currently unknown. While increased temperature results in increased evapotranspiration, this may be partially offset by the fact that increased atmospheric carbon dioxide can result in reduced vegetation water consumption.
- **Energy Demand:** Global warming effects may result in increased energy demands that will require increased conservation and efficiency measures.

Climate is a primary determinant of fire patterns, and climate change may add a significant variable to efforts to understand historical fire regimes and to find management measures that can maintain the region's mosaic of habitats (CDFG 2007). Additionally, the expansion of residential communities into fire dependent ecosystems creates a conflict between maintaining ecological integrity and protecting property (CDFG 2007).

Finally, noxious and invasive weeds currently infest more than 81 million hectares (20 million acres) of California farmland (CCCC 2006). Climate change may cause noxious and invasive weed ranges to shift into, and alter native plant ranges. Continued climate change could also result in the abundance of many pests, lengthen their breeding seasons, and increase pathogen growth rates (CCCC 2006).

Impacts to the San Diego area as presented in the San Diego Foundation Regional Focus 2050 Study include sea level rise, increased risk of large wildfires, increasingly uncertain water supplies from the Sacramento Delta and Colorado River imports, increased energy demands, increased pressure on wildlife populations (particularly special status species), and public health issues associated with heat waves and an increase in some infectious diseases like WNV. The authors relied on analysis of results from three climate models (the National Center for Atmospheric Research's Parallet Climate Model, NMFS's Geophysical Fluids Dynamics Laboratory version 2.1, and the French Centre National de Recherches Meteorologiques) to predict the impacts to San Diego weather (e.g., precipitation and El Nino), sea level and coastal impacts, impacts to regional drinking water sources, projected changes in wildfire, threats to regional biodiversity and ecological processes, effects of climate change on public health, and potential infrastructure impacts (e.g., electricity generation and use) (Keely et al 2008). The full report can be accessed by visiting the San Diego Foundation website (*www.sdfoundation.org*) or using the following link:
http://www.sdfoundation.org/Portals/0/Newsroom/PDF/Reports/Focus2050glossySDF-limateReport.pdf.

Climate change is being addressed on a regional level. These include sea level rise modeling; establishment of local programs, including the 2002 San Diego Sustainable Community Program; and creating and finalizing the Climate Mitigation and Adaptation Plan. This plan provides policy direction and identifies actions that the city and community can take to reduce greenhouse gas emissions. The Navy is aware of these efforts and when applicable is involved with these or similar activities to address climate change.

3.2 Ecosystem Function

Ecosystem function is the culmination of four basic fundamental processes: water cycling, mineral cycling, energy flow, and community dynamics (also called succession), that operate simultaneously in order to create a functioning ecosystem (Keppel 2003). Ecosystem function is also dependent on abiotic and biotic resources. Abiotic (nonliving) resources consist of sunlight, temperature, precipitation, fire, water or moisture, and soil or water chemistry (Keppel 2003). Biotic (living) resources include members from each trophic level in the food chain (primary producers, herbivores, carnivores, omnivores, and detritivores) (Keppel 2003). In other words, ecosystem function is the interaction between organisms and their physical environment (Keppel 2003). Modification to any one of these processes, or removal of a resource, could potentially change the entire function of the ecosystem. For example, to have an effective water or mineral cycle, or adequate energy flow, an ecosystem must have communities of living organisms. For living things to thrive, they need effective energy flow to feed them (interlocking food chains or food-web), a water cycle that supplies adequate moisture, and a mineral cycle that supplies vital nutrients (Keppel 2003).

NBC supports a number of varying ecosystems from estuarine beach communities to chaparral and grassland habitats. For a more regional overview of ecosystem function, the crucial role fires plays on the biological integrity of the ecosystem needs to be considered. In grassland and chaparral ecosystems there is reasonably good evidence that ecosystem functions, such as transfer of water, nutrients and carbon, are sensitive to the reductions in diversity of growth forms (above- and belowground), phenologies, physiologies and recruitment strategies (Keely and Swift 1995).

3.3 Ecosystem Management of NBC and Mission Requirements

Conceptually, ecosystem management is an appropriate strategy for managing installation natural resources. Pragmatically, the approach is not currently defined well enough to develop an integrated management plan that will guide natural resources management. Additionally, the intricately connected components of the NBC ecosystem are not well understood across time and across large geographic areas.

Objective: Develop an effective natural resources management approach that integrates all ecological components into a comprehensive management program.

Strategies:

1. Foster landscape-scale thinking among NBC staff and provide them with appropriate training if needed.
2. Use the GIS to store, manage, analyze, interpret, and report data in a scientifically valid, efficient, and cost-effective manner.
3. Develop new, and enhance existing, databases, and acquire applicable databases from outside sources for application in GIS.
4. Implement actions identified in the INRMP once plans are developed or revised.
5. Use this INRMP as a beginning point to develop an ecosystem management approach to natural resources management.
6. Work with offsite land managers to develop partnerships that would allow the restoration of habitat for federally listed species on their lands.
7. Continue coordinating with agencies to allow for agency comment on management plans.
8. Define and identify the ecosystems and explain the purpose and goals of the management with specific success criteria, adaptive management, and reporting requirements.
9. Compile and maintain natural resources requirements for all real estate actions.

4. Naval Air Station North Island

4.1 Purpose, Approach and Rationale

Natural resources management at Naval Base Coronado (NBC) strives to integrate biodiversity conservation and an ecosystem-based approach into an adaptive management framework compatible with the military mission. As a result, the natural resources program consists of multiple resource disciplines that are frequently interconnected and share similar objectives. Management projects and plans often consist of multiple program elements with several different resource experts collaborating together.

A number of items have been identified in subject areas that affect the natural resources present on and immediately adjacent to NBC. The purpose of this section is to identify the goal, objectives, and strategies for natural resources management on NBC.

The goal for management of natural resources at NBC **is to provide an adaptive ecosystem-based conservation program that will efficiently support the NBC mission and provide for sustainability of natural resources.**

Specific concerns, current management, and the management strategies for each natural resources area are described below. A summary of the strategies as well as the estimated time frame for completion is presented in **Appendix C, Tables C-1** and **C-2 (Project Table).**

Some of the strategies described in this section will be accomplished through interactive partnerships with other Federal, state, and local organizations. Natural resources staff at NBC will initiate partnerships based on the benefits to the regional ecosystem and the local environment.

4.2 Natural Resources Current Conditions and Management

4.2.1 Topography, Geology and Seismicity

Naval Air Station North Island (NASNI) is located within the coastal plain of the Peninsular Ranges Geomorphic Province and is on the Coronado Peninsula. NASNI and the Coronado Peninsula are basically flat, with an average elevation of 6.1 meters (20 feet) above mean sea level (AMSL) (see **Figure 4-1**) (U.S. Navy 2006c). Much of NASNI's coastline consists of artificial structures such as sea walls and piers. The natural beach area, which occurs along the southern boundary of NASNI, slopes gradually to the toe of a low bluff in the southeast portion of NASNI (U.S. Navy 2006c).

NASNI is situated on a low-lying section of Quaternary-Tertiary terrace deposits and scattered deposits of recent alluvium, which is an erosion remnant within the larger geomorphic province known as the coastal plain of Southern California (U.S. Navy 2006c). This remnant is isolated from the mainland and encompassed by the Pacific Ocean to the west and San Diego Bay to the north and east. NASNI is connected to the mainland by a narrow northwest-trending spit of recent beach deposits known as the Silver Strand. Pleistocene deposits of marine and non-marine sedimentary rocks crop out along the coast and underlie NASNI to unknown depths. Most prominent is the Linda Vista Formation, a reddish brown marine deposit that is a commonly recognized bluff formed in San Diego County due to its iron oxide cementation. The sedimentary sequence is chiefly composed of gently westward-dipping beds of marine sandstone, shale, and conglomerates of Pleistocene to Quaternary age. The sedimentary section is underlain by a complex assemblage of Cretaceous-age granitic rocks from the California Batholith and a Jurassic volcanic and metavolcanic sequence from the Santiago Peak Volcanics (U.S. Navy 2006c).

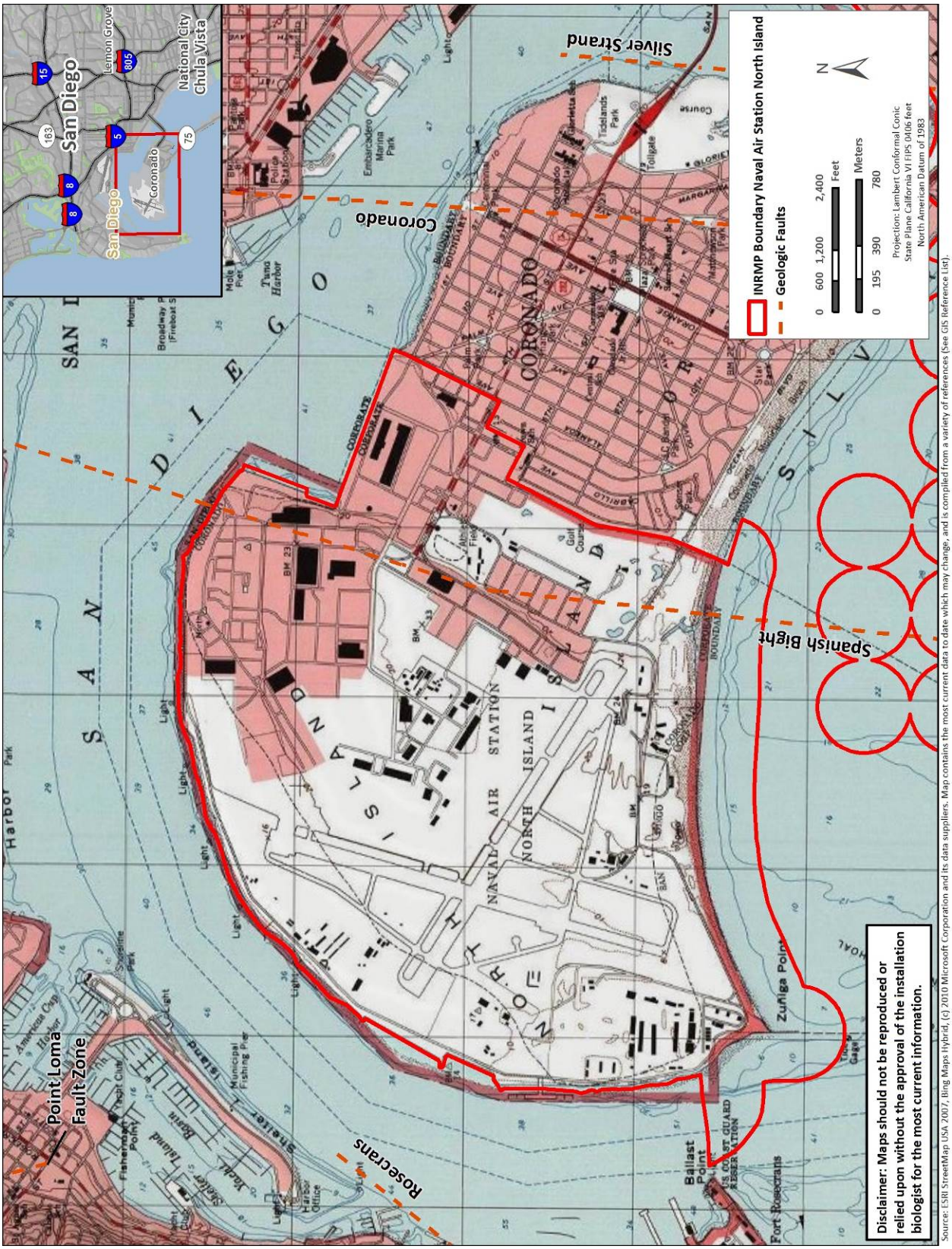


Figure 4-1: Naval Air Station North Island Topography and Faults

San Diego County rides atop the Pacific Plate, following a northwesterly path while grinding against the North American Plate. As a result of grinding, earthquakes, past volcanic activity, in combination with weathering processes, have shaped San Diego County into a geologically diverse area (U.S. Navy 2006c). A seismic structure in close proximity includes the Rose Canyon Fault Branch, which runs north to south along the eastern side of NASNI (see **Figure 4-1**) (U.S. Navy 2010c). The Rose Canyon Fault is considered the most potentially damaging fault in the area (U.S. Navy 2006c) and is believed to have the potential to produce a 7.5 magnitude quake (U.S. Navy 2010c).

There are five smaller fault lines around the NASNI project area (see **Figure 4-1**), Rosecrans, Coronado, Silver Strand, Spanish Bight, and Point Loma fault. The San Diego Bay area is the surface expression of a north-south-trending, nested graben, or depressed block of land bordered by parallel faults. The graben is bounded on its east side by the strands of the predominantly dip-slip, down-to-the-west, La Nacion fault zone and on its west side by strands of the down-to-the-east Point Loma fault zone. Oblique slip strands of the Rose Canyon fault zone run up its center. The deepest part of this graben lies at the south end of the bay where metamorphic/granitic basement was encountered at 1,829 meters (6,000 feet) (Marshall 2006). The Rosecrans fault consists of a series of step-faults running along the Point Loma Ridge from north of Naval Base Point Loma to the hillside above Ballast Point (EDAW, Inc. 2002) The Coronado and Silver Strand faults extend from offshore of Coronado and the Silver Strand toward downtown San Diego (MACTEC 2010). The Silver Strand fault has been mapped in downtown San Diego in conjunction with seismic "Downtown Graben." Both the Coronado and Silver Strand have segments of active strands in San Diego Bay (MACTEC 2010). The Spanish Bight fault, along with the Coronado and Silver Strand faults forms the western boundary of a tectonic basin centered in San Diego Bay. This fault runs through an area known as Spanish Bight, and beneath Navy owned land. Lastly, the Point Loma fault is a north-northwest trending normal fault approximately 12 kilometers (7 miles) long. It is located along the east side of Point Loma Peninsula. A fault branching to the northeast off of the Point Loma fault projects toward the extreme northwest portion of the Midway subarea. The main fault and the small northeast striking branch fault displace the late Pleistocene Bay Point Formation in excess of 30 meters (100 feet). The smaller northeast trending fault displaces the Bay Point formation about 3 meters (10 feet). On this basis, the Point Loma fault is considered potentially active (EDAW, Inc. 2002).

4.2.2 Watershed Management

NASNI is a part of the Coronado Subunit of Otay Hydrographic Unit; The Coronado Subunit consists of Coronado Peninsula. Watershed management is important to natural resources management because it directly affects both surface water and groundwater quality and is critical to maintain valuable aquatic habitats.

Healthy, stable soils are the foundation of a healthy ecosystem. As soils lose their structure and begin to erode, other systems also begin to fail. Vegetation and wildlife decline in numbers and diversity, and the quality of surface water declines as it becomes loaded with eroded sediments. Some soil types, take centuries to develop and are not easily replaced or repaired if lost or damaged. Inherent in the clay and sandy nature of NASNI's soils is a risk of significant erosion when vegetation is removed or, soil structures are disturbed. The fragile nature of these soils make the protection of NASNI's soils vital for maintaining many of the functional systems that make up a healthy ecosystem.

4.2.2.1 Soils

Soils of the central and western portions of NASNI are composed primarily of medium dense to very dense native materials. The remainder of the area is comprised of fill materials dredged from the Bay (U.S. Navy 2010c). The USDA Natural Resources Conservation Service (NRCS) mapped three soil types on NASNI (NRCS 2011). Soils on NASNI are shown in **Figure 4-2**. These soil types include:

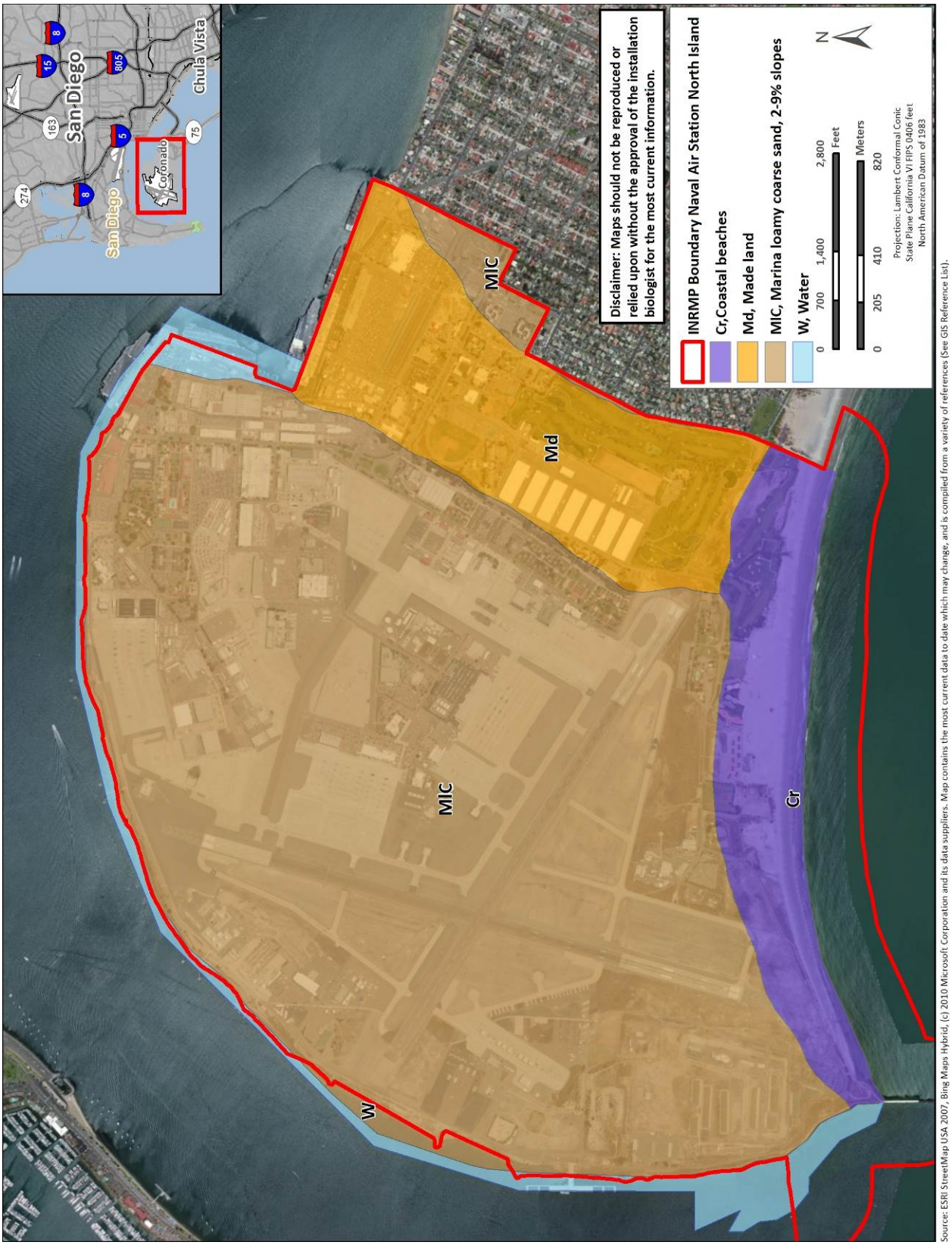


Figure 4-2: Naval Air Station North Island Soils Map

- ***Marina loamy coarse sand (MIC).*** Approximately 82 percent of NASNI is composed of Marina loamy coarse sands, with 2 to 9 percent slopes. Marina soils are situated on short rolling dune-like slopes at elevations of 30.4 to 213.4 meters (100 to 700 feet). They formed in old sand dunes near the coast. Marina soils are somewhat excessively drained, have slow to rapid runoff, and have moderate permeability.
- ***Made land (Md).*** Approximately 15 percent of NASNI is composed of made land. Made land consists of smooth, level areas that have been filled with excavated and transported soil material, paving material, and soil material dredged from lagoons, bays, and harbors.
- ***Coastal Beaches (Cr).*** The coastlines on NASNI, comprising approximately 1 percent of the total acreage of NASNI, are composed of coastal beaches with 1 to 5 percent slopes.

Specific Concerns

- Invasive species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

OPNAVINST 5090.1C CH-1 requires that installation sources of dust, runoff, silt, and erosion debris be controlled to prevent damage to land, water resources, equipment, and facilities, including adjacent properties. An erosion-and-sediment-control plan must be implemented where appropriate. Maintenance of vegetative cover is consistent with ecosystem management goals expressed earlier. Other materials can be used including bio-engineered bank stabilization techniques, gravel, fabrics, riprap, and recycled concrete and pavement that are environmentally safe and compatible with the site. Where bare ground is necessary, other measures for dust, sedimentation, and erosion control should be implemented (e.g., check dams, wind breaks, diversions). To minimize land maintenance expenditures and help ensure environmental compliance, physically intensive activities should be located on those areas least susceptible to erosion. The erosion potential of a site and adjacent water resources need to be identified and analyzed in preparing development, training, and land use plans.

Management Objective and Strategy

Objective: Minimize soil compaction and restore erosion sites.

Strategies:

1. Tailor land uses to appropriate soil type.
2. Continue to implement plans for eroded site rehabilitation.
3. Identify additional sites for land rehabilitation planning.
4. Survey areas where soil erosion and compaction might occur to ensure that best management practices (BMPs) within the erosion control plan are implemented and are effective.

4.2.2.2 Water and Sediment Quality

A wetland delineation was conducted in 2005 in order to identify and map the extent of the wetland and waters of the U. S. Two USGS blue-line streams were identified within the Boundaries of NASNI. The

brackish channel on the southeast corner of NASNI is also shown as a blue-line on the USGS map. Another brackish channel located on the south-central portion of the site empties directly into the Pacific Ocean, but is not mapped as a blue-line stream (U.S. Navy 2006c). Site drainage on NASNI is controlled by a series of collection basins and storm water drainages that discharge into San Diego Bay or the Pacific Ocean. These discharges are monitored on a quarterly basis to ensure compliance with permits issued to NASNI by the San Diego Regional Water Quality Control Board (U.S. Navy 2006c). There are artificial freshwater ponds on the golf course that are often used by birds, creating a bird/wildlife aircraft strike hazard (BASH) issue.

The groundwater gradient beneath NASNI is low, and the flow is west to northwest through the unconfined aquifer. Groundwater beneath NASNI is influenced by its proximity to the San Diego Bay and the Pacific Ocean and is too saline for general use. Because of high total dissolved solids content, the groundwater has no designated use as an available water supply (U.S. Navy 2010c). Based on a geotechnical investigation performed in 1995, groundwater on NASNI is anticipated to occur at depths of approximately 0.6 to 1.5 meters (2 to 5 feet) below the ground surface, which corresponds to a water elevation of approximately 2.4 to 2.7 meters (8 to 9 feet) AMSL (U.S. Navy 2006c).

All U.S. Navy facilities are subject to the statewide General Industrial Stormwater Permit. The U.S. Navy's General State Water Quality Certification was approved on November 2, 1998 (98C- 127), and the U.S Navy manages water quality in order to implement compliance measures required by such permits. San Diego Bay is on the Clean Water Act (CWA) 303(d) list for impaired water bodies. In accordance with CWA Section 303, Total Maximum Daily Loads (TMDLs) will be established for water bodies that are listed as impaired. These are the maximum levels of pollutants that a water body can receive while continuing to maintain specific water quality criteria targets. There are five sites around San Diego Bay that are considered by the Regional Water Quality Control Board (RWQCB) to be "toxic hot spots," none of which are associated with NBC (RWQCB 2010).

NASNI is within the Coronado Hydrologic Area of the Otay Hydrographic Unit as defined by the *Water Quality Control Plan for the San Diego Basin*. This plan identifies existing and potential beneficial uses and establishes water quality objectives within the San Diego region. Groundwater is influenced by its proximity to the Bay and the Pacific Ocean and is too saline for general use. Groundwater within the Coronado Hydrologic Area has been exempted from the municipal beneficial use designation by the RWQCB. There are no other existing or potential beneficial uses for either groundwater or surface water within the Coronado Hydrologic Area (RWQCB 2010).

Specific Concerns

- Erosion and sedimentation and
- Development/anthropogenic disturbances.

Current Management

The U.S. Navy currently manages water quality, primarily hazardous materials handling and waste disposal practices, based on requirements in OPNAVINST 5090.1. OPNAVINST requirements are designed to comply with Federal environmental regulations. NBC works to preserve and restore vegetation on the backsides of dunes along the shoreline to reduce erosion and thus reduce transport of sediments into adjacent surface waters.

Planning and Monitoring: Erosion of soils above NBC facilities and roadways is a factor to consider during construction planning. If natural erosion is occurring on a higher elevation terrace, the inputs of sediment can be drastic and pose a threat to facilities or traffic on roads. If the project is planned for an

area below undeveloped land, one simple assessment involves making visual scans of the surrounding habitat.

Stabilization techniques: More often than not on NBC, development yields areas that require long-term soil stabilization because of their characteristics. Cut and fill slopes, dirt roads, and drainages are examples of situations found on NBC that need a permanent erosion control strategy. Occasionally, construction projects are in areas where future erosion is not particularly a factor. Examples of this include island zones planned for landscaping in parking areas or as medians, or, relatively level areas in developed zones that are planned for landscaping only. Often, only temporary soil stabilization is required in these areas. Techniques for permanent soil stabilization in areas of high and low erosion potential and temporary erosion control include installing structures that act as a soil blockage to prevent earth movement and soil degradation (e.g., gabion-type retaining walls, soil-nail walls, crib walls, and gunite facings).

Landscape design: Construction projects will almost always include landscaping in the overall plan. Not only is it an essential part of long-term erosion control, but for aesthetics as well. Decisions about plant types (native vs. non-native) used in revegetation/restoration segments of construction projects can be affected by budget issues. There are major advantages to planting native plants in bare areas resulting from construction projects. Sensitive wildlife species have more habitats available for use, irrigation is not required for ongoing maintenance, and landscaped areas merge with undeveloped adjacent native habitat zones. If native vegetation coverage is successfully established, it can provide the best, most cost-effective, long-term erosion control because the plants have evolved to grow in this particular area of southern California. Revegetation/restoration and landscaping activities follow the Landscaping and Installation Appearance Plan Approved Plant List (see **Appendix H**).

Water control measures: Practically all forms of development require installations that will control the flow of water during storms and work related tasks. There are many different forms of water control installations made up of different materials. Wood, metal, plastic, rock, rubber, concrete, and plant material are all utilized when runoff must be controlled. On NBC, natural drainages/slopes, parking lots, and roads are the primary generators of mass amounts of runoff. In natural resource situations, measures are usually taken to simply slow the rate at which sheetflow is traveling. When construction projects result in cut and fill slopes, water flow will be heavier with lack of vegetation cover, consequently requiring an installation that will direct large amounts of water to adequate drainage systems.

Management Objective and Strategy

Erosion and Sedimentation

Objective: Protect soils by maintaining soils and reducing runoff, erosion, and gully formation.

Strategies:

1. Monitor and rehabilitate degraded soil resources. Soil resources will be monitored, evaluated, and rehabilitated. Survey results will be analyzed to assist with identification of degraded soil or eroded areas.
2. Update and include the Erosion Control Plan as a component plan to this INRMP when it is completed.
3. Develop and disseminate informational materials and a short seminar on the erosion control BMPs and watershed protection issues.

4. Educate personnel who are likely to impact the watersheds on erosion and sedimentation BMPs and watershed protection issues.
5. Ensure all personnel who conduct training activities or facilities construction be sufficiently trained regarding BMP's to reduce the potential for runoff, erosion, and sediment contamination.
6. Periodically review erosion control BMPs to ensure that they are still adequate to control adverse erosion and sedimentation on NBC. Conduct surveys to determine whether activities on NBC are adversely impacting soil and water resources on NBC as a result of erosion and sedimentation.

Surface Water

Objective: Protect waterways from adverse effects of storm water runoff from development sites to the maximum extent feasible.

Strategies:

1. Conduct surveys of all streams within the installation to identify erosion, sediment accumulations, or other threats to stream stability.
2. Develop actions specific to each unstable stream reach that can be undertaken to assist with stream recovery.
3. As funding allows, undertake natural channel design principles to restore stream reaches with highly unstable conditions.
4. Periodically evaluate streams to ensure that streams are not adversely impacted by installation activities.

4.2.3 Habitat Management

Habitat management is a broad term that encompasses a whole range of management issues that affect fish and wildlife, threatened and endangered species, and ecosystem goals.

4.2.3.1 Terrestrial Habitats, Vegetation Communities, and Land Cover

NASNI is primarily urbanized and includes developed areas, a golf course, and an airfield. The airfield is mowed regularly and is surrounded by ruderal habitat that is dominated by non-native herbaceous species. Three natural vegetation communities are present on NASNI: saltgrass series, cattail series, and sand verbena-beach bursage series. Ornamental trees and eucalyptus series surround much of the developed areas. Other land cover types include coastal beaches and the open waters of the Pacific Ocean and San Diego Bay. The acreages of the vegetation communities are summarized in **Table 4-1**. **Figure 4-3** shows the distribution of these vegetation communities on NASNI, eelgrass is discussed in **Section 4.2.3.3**. A total of 72 plant species were identified on NASNI during the 2005 natural resources survey. Of this total, 39 (54 percent) are species native to southern California and 33 (46 percent) are introduced species (U.S. Navy 2006c). The vegetation communities are based on the 1995 A Manual of California Vegetation which does not meet standards of the National Vegetation Classification System as required by the Federal Geographic Data Committee; therefore, they will not match the NatureServe vegetation types listed on the Navy Conservation Website.

For a complete listing of terrestrial floral species observed on NASNI, see **Appendix F**.

Table 4-1: Vegetation Communities and Land Cover on Naval Air Station North Island

Vegetation Type/Land Cover	Acreage
Sand verbena-beach bursage series	10.5
Sand verbena-beach bursage restoration site	1.2
Salt grass series	0.2
Cattail series	0.1
Eucalyptus woodland	16.6
Ruderal habitat	365.4
Potential nesting trees	28.9
Artificial beach (California Least Tern MAT Site)	20.5
Golf course	96.2
Unvegetated channel	1.1
Open water	21.8
Beach	83.6
Riprap	6.7
Urban/Developed	1,881.2
Total	**2,534.0**

Source: U.S. Navy 2006c

Developed areas and ruderal habitats dominate the site. It should be noted that the ruderal habitat on-site supports a variety of rare plant and wildlife species. The following provides a brief description of each vegetative community (U.S. Navy 2006c).

Sand Verbena-Beach Bursage Series. The sand verbena-beach bursage series occurs on sandy sites in the immediate proximity of the high surf line. This habitat type acted as a buffer to high storm-driven tides prior to development in coastal southern California. These dynamic dune systems are inhabited by plant species that are tolerant of an unstable environment, subject to strong winds with their desiccating effects and shifting sands. Plant species composition is zoned by exposure with red sand verbena (*Abronia maritima*), bursage (*Ambrosia* sp.), and non-native sea rocket (*Cakile* sp.) occurring in exposed sites and beach sand verbena (*Abronia umbellata*), primrose (*Camissonia* spp.), and morning glory (*Calystegia* spp.) typically occurring in less exposed areas. The sand verbena-beach bursage cover type has been greatly reduced by urban and other development between Point Conception and the Mexican border. Very few examples of this community type are still present in southern California, and all are disturbed to varying degrees. An approximately 0.49-hectare (1.2-acre) dune restoration site with replanted sand verbena-beach bursage vegetation is near southern portion of NASNI, east of the weapons compound (U.S. Navy 2006c).

Saltgrass Series. This vegetation type is within slightly alkaline areas and therefore contains halophytic species such as pickleweed (*Salicornia* sp.) and saltgrass (*Distichlis spicata*). Saltgrass is a resilient species and can revegetate sites quickly following disturbance. Two drainage channels on the southern part of NASNI support limited Saltgrass Series vegetation. Scattered patches of pickleweed have rooted in sediment build-up on the riprap in the upper ends of the channels. The patches of saltgrass occur closer to the mouth of the channel, outside the low-flow channel and within the channel bank. The vegetation is expected to fluctuate with seasonal flooding, occasionally being removed during high flood events and regrowing during normal rain periods (U.S. Navy 2006c).

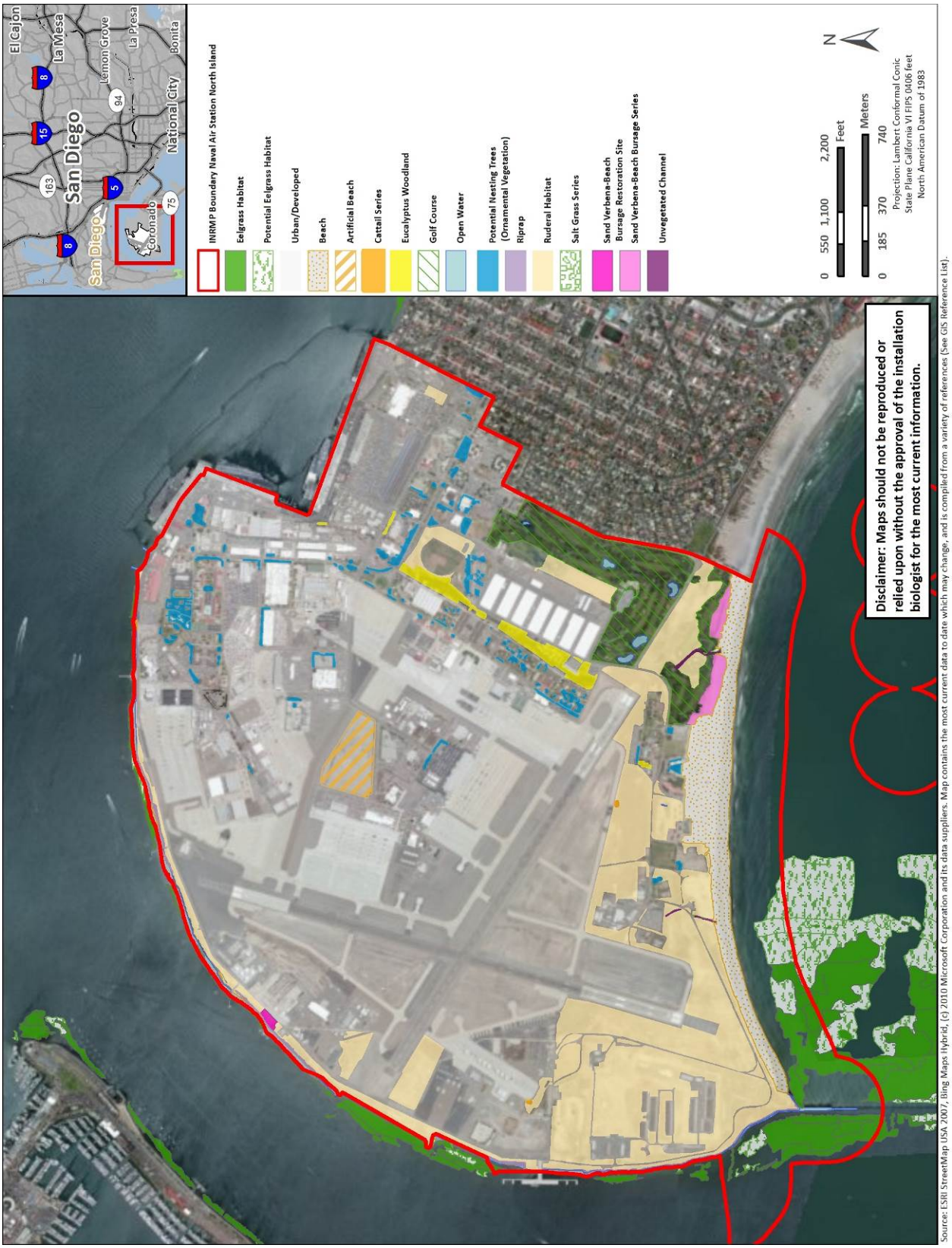


Figure 4-3: Naval Air Station North Island Vegetative Communities

Cattail Series. Cattail Series vegetation is dominated by cattails (*Typha* spp.). There are two small patches of cattail series vegetation on NASNI, one at the site of an historic spring and another in a swale adjacent to the airfield (U.S. Navy 2006c).

Eucalyptus Woodland. Eucalyptus trees (*Eucalyptus* spp.) are not native to the area and are considered invasive species because of their rapid growth rate, broad cover, and allelopathic chemicals contained in their leaf litter that prevent understory species from growing. Once established, eucalyptus groves often form dense canopies that displace native habitats over time. A uniform group of eucalyptus trees occurs on the eastern portion of NASNI near the residences. Additional eucalyptus trees are scattered around the site on the golf course and near developed areas. All of the eucalyptus trees offer potential nesting sites for various avian species (U.S. Navy 2006c).

Ruderal Habitat. The land around the airfield on NASNI is classified as ruderal (i.e., disturbed) due to the patchiness of vegetation and regular mowing. However, this designation should not be construed as implying that it lacks habitat value as the area does support numerous sensitive species. The vegetation within this community is comprised of a patchy distribution of native and non-native perennial and annual herbaceous species. Patches are dominated by weed species such as iceplant (*Carpobrotus edulis*) and filaree (*Erodium* spp.), and non-native grasses (*Avena* spp., *Lolium* sp., and *Bromus* spp.) and mustards (*Brassica* spp.). Because of the proximity to the airfield, these areas are regularly mowed. Some areas within this community are dominated by a low growing form of coast goldenbush (*Isocoma menziesii*). Nuttall's lotus, coast woolly-heads, and Brand's phacelia are present in large numbers in some areas (U.S. Navy 2006c).

Ornamental Vegetation. Ornamental landscape plantings, such as fig tree (*Ficus* spp.), eucalyptus, pepper trees (*Schinus* spp.), and myoporum (*Myoporum laetum*), occur within the developed areas on NASNI. These ornamental trees provide potential nesting sites for various avian species, including Herons (U.S. Navy 2006c).

Golf Course. The Sea 'N Air 18-hole golf course along the southeastern boundary of NASNI. The golf course includes an expansive manicured lawn with sand traps, water hazards (mapped as open water), and ornamental trees (U.S. Navy 2006c).

Unvegetated Channel. Two brackish channels occur on the south side of NASNI. The banks of these channels are supported by riprap (U.S. Navy 2006c).

Beach. Open sandy beaches occur on the south side of NASNI at the Pacific Ocean. Small patches of beach also occur around the northern perimeter of NASNI (U.S. Navy 2006c).

Artificial Beach Habitat. In the center of NASNI lies the California Least Tern MAT site. The artificial beach habitat mostly consists of an open sand area with low-growing herbaceous species including Nuttall's lotus. The artificial beach habitat is managed for California Least Tern including periodic mowing of the vegetation, enhancement of the soil, and predator control (U.S. Navy 2006c).

Riprap. The banks of the island on the bayside have been largely stabilized with riprap (U.S. Navy 2006c).

Urban/Developed. Urban/developed lands on NASNI include office and residential structures, the airfield and supporting facilities, paved roads, and parking lots (U.S. Navy 2006c).

Specific Concerns

- Invasive species encroaching on native species habitats and federally protected species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Overuse, or improper use, of fertilizers.

Current Management

Management of native habitats at NASNI includes their enhancement by the removal of invasive plant species and planting of native species, as well as habitat restoration of sorely disturbed areas. Removing invasive plants, planting native species, and restoring habitat activities are conducted through coordination with the NBC botanist.

Management Objective and Strategy

Objective: Develop and implement a program for natural land and habitat restoration and rehabilitation that is compatible with the military mission including BASH program.

Strategies:

1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue invasive and noxious weed identification and control as necessary.
3. Complete evaluation and prioritization of active erosion sites.
4. Update vegetation mapping.
5. Ensure that natural resources staff responsible for plant community conservation update training regarding management of these resources on a military installation on an annual basis.
6. Develop specifications and standards for reseeding/revegetation of disturbed sites for use in contracts, maintenance, and other projects.
7. Periodically review management to ensure it still meets ecosystem management goals.
8. Restore ruderal habitat on NASNI if compatible with the military mission and BASH requirements.

4.2.3.2 Wetlands and Floodplains

Wetlands and Other Waters of the United States

Wetlands, as defined by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE), are “areas that are inundated or saturated by surface or groundwater 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” (USACE 1987). In September 2008 the USACE published the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (*Version 2.0*). The Regional Supplement was part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. The definition of a wetland

was not changed (USACE 2008). In addition, USACE regulates activities within three nautical miles of land, including the San Diego Bay (U.S. Navy 2008c).

Wetlands and non-wetland jurisdictional waters of the United States, as defined by USACE, were delineated on NASNI in 2005. As shown in **Table 4-2**, a total of 0.08 hectare (0.2 acres) of wetlands and 26.0 hectare (64.3 acres) of non-wetland jurisdictional waters of the United States were delineated on NASNI. In addition, 0.04 hectare (0.1 acres) of wetlands and 1.1 hectare (2.7 acres) of non-wetland waters of the United States were considered exempt from USACE jurisdiction due to a lack of connection to navigable waters. **Figure 4-4** depicts the results of the jurisdictional delineation (U.S. Navy 2006c).

Table 4-2: Summary of 2005 Wetland Delineation Results on Naval Air Station North Island

USACE Jurisdictional Resources	Total Acres
Wetland	0.2
Non-wetland waters of the United States	64.3
Total	**64.5**

Source: U.S. Navy 2006c

Note: 2.7 acres of non-wetland waters and 0.1 acre of wetland habitat was considered exempt from USACE jurisdiction due to a lack of connection to navigable waters.

Wetland habitat on NASNI includes patches of hydrophytic vegetation within the two tidally influenced coastal brackish marsh channels on the south part of the site. Positive indicators of all three wetland parameters were observed at these locations and the channels connect directly to the Pacific Ocean (U.S. Navy 2006c).

Non-wetland waters of the United States delineated on NASNI include the majority of the brackish channels (beyond the wetland habitat), the beach from the high tide line to the open water, and the open waters of the ocean and San Diego Bay. USACE regulatory jurisdiction extends within a zone of 3 nautical miles of the limits of land, including bays and harbors, and therefore applies to open water on the San Diego Bay and ocean side within the limits of NASNI (U.S. Navy 2006c).

The water hazards on the Sea ‘N Air Golf Course on NASNI is considered exempt from USACE jurisdiction because they are artificial ponds excavated in dry land for primarily aesthetic reasons and recreation. These artificial ponds are maintained and kept free of vegetation. Grid wires have been installed above these ponds to minimize avian use, thereby reducing the risk of bird strikes. In addition, a culvert outfall occurs on the south side of NASNI within ruderal habitat. The occasional water flowing from this culvert has created a high water mark for a short distance; however, this was considered exempt due the lack of connectivity to navigable waters (U.S. Navy 2006c).

A small wetland found near the helicopter wash area on the airfield is considered exempt from USACE jurisdiction. This isolated wetland is within a swale adjacent to the runway and the routine washing of the helicopters is the likely source of runoff supporting this wetland. Evidence of positive indicators of all three wetland parameters were observed at the disturbed spring; however, the spring has been considered exempt from USACE jurisdiction (U.S. Navy 2006c).

Wetland management strategies vary depending primarily on the wetland type, size, location and condition. A wetland’s value is decided by the quality of the functions and value it provides, including its biomass production, habitat, erosion control, stormwater storage, water quality protection, aquifer recharge potential, and low flow augmentation. Some of the factors used to measure the quality of these

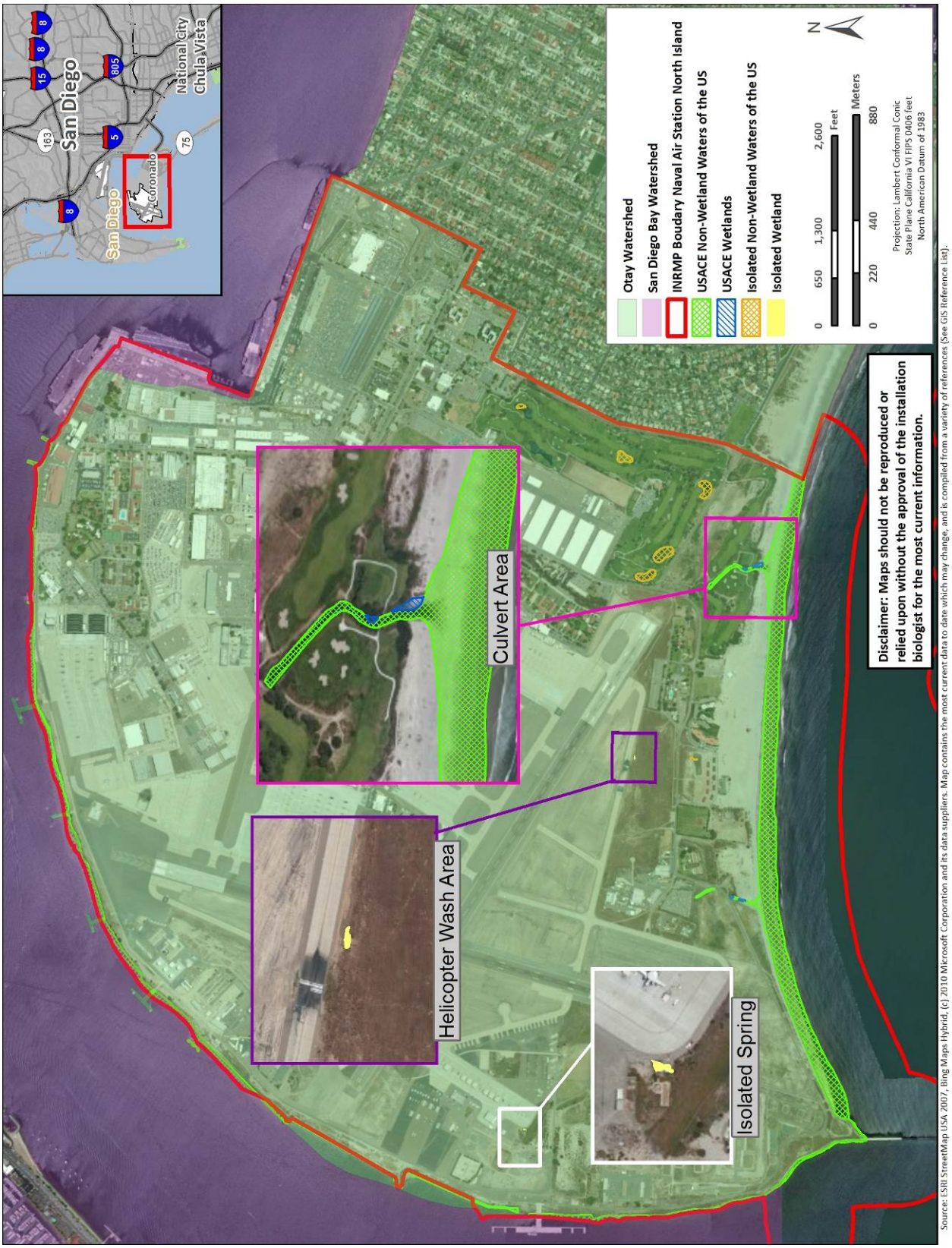


Figure 4-4: Naval Air Station North Island Watersheds and Wetlands

functions are the wetland's size, its location in the watershed, the amount of development in the watershed, vegetative structure and composition, rate of water flow through the wetland, the size of natural buffers, and surrounding land uses. Regardless of the habitat value, wetland areas are almost always poor choices for building sites or for most activities, other than providing non-consumptive enjoyment of the outdoors. Installation natural resources staff will ensure during the program/project review process that program/project managers are aware of the laws and regulations regarding the protection of wetlands. Refer to **Section 2.4.2** for additional information on regulatory compliance related to the CWA.

Floodplains

The 100-year floodplain on NASNI corresponds roughly to the 3-meter (10-foot) AMSL contour line. Water is expected to reach this level only with the simultaneous occurrence of a 100-year storm, an extremely high tide, or a seismic tidal wave (U.S. Navy 2006c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species encroaching into wetland habitat;
- Climate change (e.g., changes in temperature or sea level rise);
- Erosion and sedimentation from either anthropogenic or natural causes;
- Pollution and
- Wetlands attracting wildlife leading to elevated BASH risks on NASNI.

Current Management

The latest wetland delineation was conducted on NASNI in 2005. A total of .08 hectares (0.2 acres) of wetlands and 26 hectares (64.3 acres) of non-wetlands waters of the United States were delineated during the survey as shown in **Figure 4-4** (U.S. Navy 2006c). Future delineations will be conducted on a project-by-project basis.

The major goal in wetland and floodplain management is to minimize the impact that NASNI has on wetlands and floodplains. When possible, it is the goal to avoid and minimize impacts, direct and indirect; enhancing waters of the United States to increase functions and services provided by waters of the United States including wetlands. Through achieving these goals, and through mitigating for unavoidable impacts to wetlands, NASNI can manage for no net loss of wetland and floodplain acreage, functions, and services. Wetland management needs to be closely coordinated with the NBC BASH Biologists to ensure that wetland management does not lead to increased BASH risks (e.g., open water can attract wildlife).

According to OPNAVINST 5090.1C CH-1, the U.S. Navy will comply with the national goal of no net loss of wetlands, and will avoid loss of size, function and value of wetlands.

Management Objective and Strategy

Wetlands and Waters of the United States

Objective: Maintain healthy, functional waters of the United States on NASNI, including wetlands and non-wetland waters of the United States, and prevent indirect or unplanned encroachments.

Strategies:

1. Update the wetland delineation and inventory, including wetland distribution and categories, as necessary.
2. Conduct Environmental Review (e.g., wetland delineation) for activities that could affect directly and indirectly, waters of the United States, including wetlands.
3. Plan development and training activities to avoid wetland impacts to the maximum extent possible and minimize unavoidable impacts on Waters of the United States, including wetlands.
4. Maintain water quality to protect surface waters and wetlands from excessive sediment-laden runoff. Prevent erosion, scour to maintain water quality.
5. Remain in compliance with the CWA, RHA, etc. and implement procedures to manage for a no net loss of wetland and floodplain acreage, functions, and services.
6. Reduce habitat fragmentation and control the spread of invasive species.
7. Periodically review the natural resources management program to ensure that management actions do not adversely impact directly and indirectly, waters of the United States, including wetlands.
8. Implement erosion control BMPs to ensure adverse environmental impacts to waters of the United States, including wetlands do not occur.
9. Maintain accurate, usable, and informative GIS data for ease in management planning and documentation.

Stream Stability

Objective: Identify and control land use actions that could lead to excessive storm water entering streams or actions that might occur directly on riparian borders destabilizing stream banks.

Strategies:

1. Conduct surveys of all streams within the installation to identify erosion, sediment accumulations, or other threats to stream stability.
2. Develop actions specific to each unstable stream reach that can be undertaken to assist with stream recovery. Support stream stability by managing activities that affect riparian buffers and water entering streams.
3. As funding allows, undertake natural channel design principles to restore stream reaches with highly unstable conditions.
4. Periodically evaluate streams to ensure that streams are not adversely impacted by installation activities.

4.2.3.3 Marine Habitats

The San Diego Bay region supports at least 150 species of marine and terrestrial plants, more than 70 species of fish, 300 species of resident or migratory birds, and at least 650 species of marine, estuarine, and salt marsh invertebrates. In addition, the bay plays a vital role in the southern Pacific Ocean food web, and is a key spawning location for fish. As discussed in **Chapter 1**, this INRMP only focuses on the 274 meters (900 feet) extending seaward (beyond the mean lower low water [MLLW] line) of the NBC and does not include any waters within the San Diego Bay. The San Diego Bay INRMP covers waters

within the bay east and north of NASNI. A more specific description and management of the marine habitats in the San Diego Bay are discussed in the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*), which was developed in cooperation between the Navy and San Diego Unified Port District (SDUPD) along with their government and non-government partners.

The habitat categories adhere to the Coastal and Marine Ecological Classification Standard (*http://www.fgdc.gov/standards/projects/FGDC-standards-projects/cmecs-folder*).

The nearshore area is primarily soft bottom, and spans from exposed sandy beaches to the water column above the inner shelf. The coastal nearshore areas are classified as surf zone and coastal pelagic zone up to 160 kilometers (100 miles) westward. The high-energy surf zone and shallow (<30 meters [98 feet] MLLW) areas dominated by sand and low-lying (<2 meters [7 feet] MLLW) rocky reef and cobble are typical of much of the southern California coastline. Utilizing the habitat classification system developed for the San Diego Association of Governments (SANDAG) and California Coastal Conservancy, the majority of the area described as a Subtidal/Soft Bottom/Sand ecotype, with a low to moderate energy ecotype modifier, due to seasonal variability with respect to wave energy.

Bayside

Habitats within the San Diego Bay are categorized by depth with respect to the tides, then by substrate, water clarity, and other factors. Habitat types within the San Diego Bay at NASNI include intertidal zone, deep subtidal, shallow subtidal, and nearshore ocean and the surf zone. The following is a summary of the deep subtidal, moderately deep subtidal, shallow subtidal, intertidal, and nearshore artificial shoreline structure habitats described in the San Diego Bay INRMP (U.S. Navy 2011a).

Deep Subtidal

Deep subtidal (deeper than 6 meters [–20 feet] MLLW) describes the surface water, water column, and sediments for areas greater than 6 meters in depth. The MLLW number is the level at which coastal flooding commonly occurs. There are approximately 1,797 hectares (4,440 acres) of deep subtidal zone in the bay that is associated with maintained navigational channels. Except for a few areas in the north bay that have no dredging record, all deep subtidal habitat has been dredged since the 1940s; most was dredged in the 1960s or more recently (U.S. Navy 2011a).

Moderately Deep Subtidal

Moderately deep subtidal (-4 to -6 meters [-12 to -20 feet] MLLW) describes habitat that extends from the approximate lower depth of most eelgrass to approximate edge of the shipping channel. There is approximately 898 hectares (2,219 acres) of this habitat and it occurs primarily in the south-central bay of the coast of NAB Coronado and in inlets of the north bay. It represents areas that generally have been dredged in the past but are not maintained as navigational channels. The most recent dredging records for these depths are from 1941-1945 (U.S. Navy 2011a).

Shallow Subtidal

The shallow subtidal zone (–2.2 to –12 feet [–7 to –4 meters] MLLW) is separated into unvegetated and vegetated shallow soft bottom habitats approximately 0.8 to 4.8 hectares (2 to 12 feet) below the intertidal zone. These areas are continually submerged and extend from the low tide zone. Presently 1,511.1 hectare (3,734 acres) of subtidal habitat occurring in the south bay, portions of the south-central bay, and narrow strips along the shoreline of the north- and north-central bay. The South Bay area has seen the least amount of disturbance from dredging. The shallow waters are higher in number and

diversity of birds and fishes and are the preferred habitat of bottom feeders and plunge divers such as Surf Scoter, Scaup, and Terns (U.S. Navy 2011a).

Unvegetated Shallows. The unvegetated soft bottom habitats consist of unstable and shifting unconsolidated sediments disturbed by bottom feeding animals, currents, wind, and other abiotic factors.

Vegetated Shallows/Eelgrass. The vegetated shallow subtidal areas of the bay are composed mainly of beds of eelgrass (*Zostera marina*), a type of seagrass and a marine angiosperm (flowering plant). One of the most productive ocean habitats is the eelgrass habitat community. Eelgrass resources in the San Diego Bay are significant on a local and regional level, supporting 20 percent of the total amount of eelgrass resources and eelgrass dependent communities in California (U.S. Navy 2011a). Eelgrass is the preferred food source of the Black Brant Goose (*Branta bernicla*) and the green sea turtle (*Chelonia mydas*), and its numbers are often indicators of the health and abundance of eelgrass populations in the bay.

Intertidal

The intertidal (+2.4 to -0.7 meters [+7.8 to -2.2 feet] MLLW) habitat encompasses the area between high and low tides and is subject to varying degrees of tidal submergence. There are approximately 395 hectares (976 acres) of intertidal areas making up approximately 7 percent of the bay (U.S. Navy 2011a).

Intertidal Flats. Intertidal flats of San Diego Bay include mudflats, sand flats, and salt flats. They 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 0.7 to 0 meters (+2.3 to 0 feet) MLLW in San Diego Bay. This zone normally lacks vegetation (U.S. Navy 2011a).

Artificial Shoreline Structures

Unprotected shoreline sites will erode when exposed to tidal fluctuation, storm waves, storm surges, and surface runoff. Hard structures are used to protect developed sites along the bay. Pier pilings, bulkheads, rock riprap, floating docks, sea walls, mooring systems, and derelict ships/ship parts that form extensive artificial habitat in the northern and central portions of the bay and to lesser extent in the southern bay. Currently there is 73.1 kilometers (45.4 miles) of armored shoreline with the San Diego Bay (U.S. Navy 2011a)

Ocean Side

The offshore area also includes moderately deep subtidal, shallow subtidal, and intertidal zones with portions classified as Subtidal/Hard Bottom/Cobble/Understory algae and adjacent habitat within the region of influence (ROI) as Subtidal/Hard Bottom/ Boulder/Rock Reef/kelp Bed ecotypes (the latter associated with Point Loma). The algal communities such as kelp beds add structure in shallow water, fostering a richer species assemblage. The basic habitat data for nearshore ocean area provided by the San Diego Nearshore Program, as reported from surveys in 2002. This program uses a habitat classification system that integrates elements from a number of previously created classification systems, including the Marine and Estuarine and Habitat Classification developed by the National Oceanic and Atmospheric Administration (NOAA). The Nearshore Program is a cooperative effort of the NOAA-National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), and the USACE, among others (U.S. Navy 2010c). More specific data on ocean side marine resources is not currently available, general descriptions of the existing habitats have been provided below.

Moderately Deep Subtidal

Moderately deep subtidal (-4 to -6 meters [-12 to -20 feet] MLLW) describes habitat that extends from the approximate lower depth of most eelgrass to approximate edge of the shipping channel.

Shallow Subtidal

The shallow subtidal zone (–2.2 to –12 feet [–7 to –4 meters] MLLW) is separated into unvegetated and vegetated shallow soft bottom habitats approximately 0.8 to 4.8 hectares (2 to 12 feet) below the intertidal zone.

Unvegetated Shallows. The unvegetated soft bottom habitats consist of unstable and shifting unconsolidated sediments disturbed by bottom feeding animals, currents, wind, and other abiotic factors (U.S. Navy 2011a).

Vegetated Shallows/Eelgrass. The vegetated shallow subtidal areas of the bay are composed mainly of beds of eelgrass, a type of seagrass and a marine angiosperm (flowering plant). One of the most productive ocean habitats is the eelgrass habitat community. Eelgrass is a perennial marine flowering aquatic plant that provides habitat for several varieties of fish and invertebrates. Eelgrass beds also provide protective cover for juvenile fish. Eelgrass beds occur along the southwestern shores of NASNI (see **Figure 4-3**). The health of eelgrass beds at NASNI may be attributed to cooperation between Federal and state agencies to implement mitigation policies developed in 1991 to reduce impacts to this species.

Intertidal

The intertidal (+2.4 to -0.7 meters [+7.8 to -2.2 feet] MLLW) habitat encompasses the area between high and low tides and is subject to varying degrees of tidal submergence.

Sandy Beach. The sandy beach habitats consist of sandy soils that are have low water-holding capacity, low fertility, low humus content, and high concentrations of sea-salts (U.S. Navy 2011a).

Specific Concerns

- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Water pollution (e.g., decrease in light transmission);
- Facilities projects (e.g., construction and maintenance);
- Non-Navy Development/anthropogenic influence;
- Erosion and sedimentation and
- Navy training and operations.

Current Management

The U.S. Navy conducts presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted Disturbing Activity out in *Caulerpa*-Free Systems. In the event that *Caulerpa* is detected, best management practices are implemented to isolate and prevent the spread of this species.

In addition, eelgrass is managed in compliance with the California Eelgrass Mitigation Policy, created jointly in 1991 by the USFWS, NMFS, and CDFW, which established protocols for mitigating adverse impacts to eelgrass (U.S. Navy 2011a). A draft revision of the California Eelgrass Mitigation Policy was published in December 2011. The U.S. Navy has established several Navy Eelgrass Mitigation Sites

(NEMS) to compensate for past impacts and to mitigate future impacts on eelgrass habitat within the San Diego Bay. Eelgrass that has been planted and not used to compensate for previous losses has been banked for future use in accordance with the California Eelgrass Mitigation Policy. Five eelgrass mitigation sites contributing to the bank have already been constructed and met the 5-year performance standards required by NMFS. A Mitigation Technical Team, a multiagency team, provides technical expertise in and support for implementing the Bank. Besides the NEMS, the U.S. Navy maintains permanent eelgrass monitoring transects in San Diego Bay that are monitored every year and bay wide mapping of eelgrass density classes is conducted every 3 to 5 years (U.S. Navy 2011a). Detailed information on eelgrass mitigation can be found in the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*).

Management Objective and Strategy

Marine Habitats

Objective: Develop and implement a program for marine habitat restoration and rehabilitation.

Strategies:

1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue marine non-native species identification and monitoring as necessary.
3. Update eelgrass mapping.
4. Ensure that natural resources staff responsible for marine community conservation update training regarding management of these resources on a military installation on an annual basis.
5. Develop a database to integrate current and historical nearshore habitat monitoring data.
6. Conduct nearshore benthic habitat mapping as needed.
7. Avoid shoreline construction that results in a loss of coastal strand habitat.

Eelgrass

Objective: Conserve and enhance the attributes of eelgrass 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.

Strategies:

1. Continue enforcement of mitigation standards under the California Eelgrass Mitigation Policy.
2. Continue bay-wide eelgrass mapping efforts every 3 years.
3. Continue annual permanent eelgrass transects to evaluate success of eelgrass mitigation banks.
4. Apply BMPs (refer to the California Eelgrass Mitigation Policy for BMPs) during construction and dredging projects to keep turbidity to a minimum.
5. Determine why some eelgrass beds are more resilient than others to environmental or anthropogenic disturbance.

4.2.3.4 Wildland Fire

Not applicable to NASNI due to the highly urbanized locations.

4.2.4 Fish and Wildlife Management

For the purposes of this INRMP, wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. The primary goal of wildlife management at NASNI is to maintain wildlife populations at levels compatible with land use objectives while promoting the existence, importance, and benefits of nongame species. There are artificial freshwater ponds on the golf course that are often used by birds, creating a BASH issue.

The basis of managing a rich assemblage of nongame wildlife is to provide a mosaic of habitats that are structurally and biologically diverse. NASNI should employ these basic techniques for managing wildlife.

- ***Monitoring Wildlife.*** Creating, monitoring, and updating GIS data on wildlife species will allow NASNI to store, retrieve, present, and analyze the data to make informed management decisions.
- ***Managing for Migratory Birds.*** The Migratory Bird Treaty Act (MBTA) prohibits the taking of most birds, nests, and eggs, except as permitted by the USFWS. Impacts on birds protected under the MBTA will be avoided through surveying for nesting birds in areas proposed for disturbance and, if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends that conducting activities outside of nesting areas or outside of the general migratory bird-nesting season can help avoid direct impacts.
- ***Protecting Sensitive Areas.*** NASNI can maintain biological diversity by protecting, to the extent practical, sensitive areas that provide unique habitat niches. Protection measures might include restricting vehicle movement, and protecting habitats of exceptional biological value by establishing protective buffers and maintaining healthy and diverse ecosystems.

4.2.4.1 Invertebrates

For a complete listing of invertebrate species observed on NASNI, see **Appendix F**.

Terrestrial Invertebrates

The diversity of invertebrate species on NASNI is high. Common invertebrate species observed at NASNI include crickets (family Gryllidae), plant bugs (family Miridae), leafhoppers (family Cicadellidae), ground beetles (family Carabidae), rove beetles (family Staphylinidae), metallic wood-boring beetles (family Buprestidae), plume moths (family Pterophoridae), blue butterflies (family Lycaenidae), sulphur butterflies (family Pieridae), seaweed flies (family Coelopidae), house flies (family Muscidae), braconid wasps (family Braconidae), ants (family Formicidae), and sweat bees (family Halictidae) (U.S. Navy 2006c).

The spider fauna of the dunes is rather diverse and includes at least one endemic species. Crab spiders (family Thomisidae), jumping spiders (family Salticidae), lynx spiders (family Oxyopidae), and the endemic sand spiders of the genus lutica (family Zodariidae) were found during surveys. The nocturnal sand spiders are restricted to southern California coastal dunes and are adapted for burrowing in the fine sand (U.S. Navy 2006c).

Tarantula hawks (*Pepsis* sp.), of the spider wasp family (Pompilidae), can be seen flying around the dunes hunting for spiders and frequently landing on the sand. Other predatory invertebrates present on the beach include at least two species of robber flies (family Asilidae) (U.S. Navy 2006c).

A total of 18 butterfly species were observed during the 2005 surveys. Common butterfly species include orange sulphur (*Colias eurytheme*), fiery skipper (*Polites sabuleti*), and marine blue (*Leptotes marina*) (U.S. Navy 2006c).

Marine Invertebrates

Bayside

Marine invertebrate habitat on the bayside of NASNI consists primarily of riprap with a few sandy beach areas. Common marine invertebrate species observed within these types of habitats include tube-dwelling anemone (*Pachycerianthus fimbriatus*), sea pen (*Stylatula elongata*), sponges (*Tetilla mutabilis*), bryozoans (*Thalamoporella californica*), barnacle (*Balanus* spp.), native oyster (*Ostrea lurida*), mussel (*Mytilus* spp.), pacific jewel box (*Pseudochama exogyra*), tunicate (*Styela* spp.), yellow sponge (*Aplysina fistularis*), and red invasive bryozoans (*Watersipora* spp.) (U.S. Navy 2011a).

Ocean Side

Currently data is not available for ocean side marine invertebrates at NASNI.

Specific Concerns

- Pollution and oil spills;
- Improper use of pesticides;
- Increase and spread of invasive species and
- Habitat modification.

Current Management

The U.S. Navy currently manages marine invertebrates on the bayside through participation in the national water quality monitoring program called Mussel Watch. NMFS's National Status and Trends Program Mussel Watch Project (1986-present) monitors bioaccumulation in mussels, plus other parameters offshore in south San Diego Bay and intertidal in the north San Diego Bay. NMFS also conducts the National Benthic Surveillance Program (1984-present) to examine physical, chemical, and biological (diseases and bioaccumulation in fish) parameters in offshore areas of central and north San Diego Bay (U.S. Navy 2010e). Spill prevention plans are implemented as necessary to avoid and minimize impacts from pollution and oil spills. Ocean side marine invertebrates are managed by recording and monitoring all incidental observations at NASNI.

Management Objective and Strategy

Objective: Maintain biodiversity of the invertebrate community at NASNI.

Strategies:

1. Develop and implement a strategy for pollution management.
2. Conduct regular surveys for invertebrates that may be present within NASNI boundaries.

3. Develop and distribute outreach and education materials on invertebrates to personnel, operators and visitors on NASNI.

4.2.4.2 Pollinators

A pollinator is an agent (e.g., insects and birds) that transfers pollen grains from flower to flower (DoD Legacy 2010a). Pollinators are responsible for pollinating 80 percent of the crops we consume, as well as the majority of plants and fruits consumed by wildlife. Examples of pollinators in the San Diego region include bees, butterflies, moths, beetles, flies, and birds. Several potential invertebrate and avian pollinator species occur on NASNI. Invertebrate species include honey bee (*Apis mellifera*), western pigmy blue (*Brephidium exile*), orange Sulfur (*Colias eurytheme*), Harford's sulfur (*Colias harfordii*), queen (*Danaus gilippus*), funereal duskywing (*Erynnis funeralis*), southern blue (*Glaucopsyche lygdamus*), fiery skipper (*Hylephila phyleus phyleus*), common buckeye (*Junonia coenia grisea*), marine blue (*Leptotes marina*), mourning cloak (*Nymphalis antiopa antiopa*), wandering skipper (*Panoquina errans*), true wasp (*Vespula* sp.), checkered white (*Pontia protodice*), cabbage white (*Pieris rapae rapae*), acmon blue (*Plebejus acmon*), sandhill skipper (*Polites sabuleti sabuleti*), common gray hairstreak (*Strymon melinus pudica*), painted lady (*Vanessa cardui*), and western tiger swallowtail (*Papilio rutulus rutulus*). In addition, avian species, such as Anna's Hummingbird (*Calypte anna*) are common on NASNI.

Pollinators ensure that native landscapes on installations do not become barren, or overrun with invasive species. The DoD acknowledges that habitat restoration and invasive species removal go hand in hand. Through enhancing and restoring pollinator habitat by restoring native plant communities and removing and controlling invasive species, DoD installations can save money, protect threatened and endangered species, and contribute to biodiversity (DoD Legacy 2010a).

For more information on DoD's work to support pollinators, visit *http://www.DoDpollinators.org*. Another source for information on enhancing pollinator populations can be found within The Pollinator Partnership™/North American Pollinator Protection Campaign (NAPPC) publication *Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners in the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast* available online at:

http://www.pollinator.org/PDFs/Calif.Coastal.Chaparral.rx2.pdf

Specific Concerns

- Improper use of pesticides;
- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Fire.

Current Management

NASNI is currently managing for pollinator species through implementation of many programs; such as landscaping, invasive species control, and restoration efforts that indirectly benefit pollinators. In addition, the Navy limits beach raking (due to presence of nesting Western Snowy Plover) on NASNI which also benefits invertebrates.

Management Objective and Strategy

Objectives: Maintain and enhance pollinator populations and their habitat when not in conflict with health and safety or the military mission.

Strategies:

1. Inventory and monitor populations and habitat composition of pollinators.
2. Develop BMPs to ensure that pollinator species are not adversely impacted by NASNI activities.
3. Identify and develop pollinator friendly landscapes.
4. Develop and distribute outreach and education materials on pollinators to personnel, operators and visitors on NASNI.
5. Revegetate and restore land with plants that attract pollinators, and include pollinator-friendly plants with native species contained on the NAVFAC SW recommended plant list.
6. Control the spread of invasive species.
7. Review existing literature on pollinators.
8. Work with San Diego County Agricultural Department to explore feasibility of developing and implementing a management program that supports bee relocation as opposed to bee eradication.
9. Provide connectivity between vegetation areas by creating corridors of perennials, shrubs, and trees that provide pollinators shelter and food as they move through the landscape.
10. Provide windbreaks and nesting areas (e.g., sites without high vegetation) for bee nests.
11. Inventory and become knowledgeable of local pollinators.
12. Maintain a minimum of lawn areas that support recreational needs.
13. Restrict the use of pesticides, including herbicides and insecticides when possible.
14. Provide water sources in large open areas. Should only be done on NASNI if it is compatible with mission and BASH requirements.
15. Maintain natural meadows and openings that provide habitats for wildflowers and grasses.

4.2.4.3 Fish and Essential Fish Habitat

Fish Bayside

For a complete listing of fish species observed on NASNI, see **Appendix F**.

The San Diego Bay supports an abundant population of coastal marine, and juvenile fish species, and a large number of fish nurseries (U.S. Navy 2006c). Since 1994 the Navy and Port have collaborated to conduct regular surveys (every 3-5 years) in the San Diego Bay in order to identify, determine and quantify the seasonal utilization of the fishery populations, identify habitats that support juvenile fish species, and determine geographic and/or habitat areas that support significant populations of fish species utilized by federally listed avian species for forage. During these surveys 58 species of fish were collected. Topsmelt (*Atherinops affinis*) was the most abundant species followed by deepbody anchovy (*Anchoa compressa*), slough anchovy (*Anchoa delicatissima*), northern anchovy (*Engriaulis mordax*), and shiner perch (*Cymatogaster aggregata*).

Fish Ocean Side

The habitats and associated fish species of the nearshore coastal areas are classified as surf zone and coastal pelagic zone (U.S. Navy 2010f). Coastal pelagic species inhabit the open water environment over the inner shelf, but they usually occur within a few kilometers of shore. In addition, fish species associated with rocky reefs and kelp beds overlap other nearshore habitat types (U.S. navy 2010e). Common southern California surf zone fish species and common reef fish species are presented in **Table 4-3**.

Additionally, beach areas on NASNI are known to be or have the potential to be grunion spawning habitat. California grunion are known to spawn on nearby Imperial Beach and the Coronado Strand. California grunion spawn at night as the highest tides recede; after approximately 2 weeks the recently hatched fish larvae are swept out to sea during high tides. California grunion use the upper intertidal habitat on beaches for spawning from late February to early September; grunion activity is expected to be concentrated from late March to early June (U.S. Navy 2010e).

Essential Fish Habitat

In 1998 the Pacific Fishery Management Council delineated and designated essential fish habitat (EFH) in San Diego Bay for coastal pelagic species (CPS) and Pacific Coast Groundfish. The following provides a brief description of the EFH surrounding the NBC facilities.

Coastal pelagic species are schooling fish, not associated with the ocean bottom, that migrate in coastal waters. The federally managed CPS species include market squid (*Doryteuthis opalescens*), northern anchovy (*Engraulis mordax*), pacific sardine (*Sardinops sagax*), pacific mackerel (*Scomber japonicus*), and jack mackerel (*Trachurus symmetricus*). The east-west geographic boundary of EFH in southern California for each individual CPS finfish and market squid is defined as all marine and estuarine waters from the shoreline along the coasts of California offshore to the limits of the Exclusive Economic Zone (EEZ) and above the thermocline where the sea surface temperatures range between 10 degrees Celsius to 26 degrees Celsius. The southern extent of EFH for CPS finfish is the U.S.-Mexico maritime boundary. The northern boundary is more dynamic and variable due to the seasonal cooling of the sea surface temperature (U.S. Navy 2006c).

Groundfish species typically live on or near the bottom of the ocean, thus the terms groundfish or bottomfish are often used to describe them. The groundfish management unit consists of 83 species from groups including rockfish, flatfish, sharks and skates, groundfish, and others. The groundfish fishery EFH includes all waters from the mean higher high water line and the upriver extent of saltwater intrusion in river mouths, along the coast of California seaward to the boundary of the U.S. EEZ.

The Pacific Coast Groundfish Fishery Management Plan groups the various EFH descriptions into seven units called “composite” EFHs. The seven major habitat types proposed as “composites” have distributions that are relatively stationary and measurable over time and space. The seven composite EFH habitats include estuarine, rocky shelf, non-rocky shelf, canyon, continental slope/basin, neritic zone, and oceanic zone. The estuarine composite, defined as those waters, substrates, and associated biological communities within bays and estuaries of the EEZ, describes the waters of San Diego Bay.

Specific Concerns

- Overharvesting;
- Pollution from oil spills and other hazardous wastes into the San Diego Bay;
- Improper use of pesticides;

Table 4-3: Common Southern California Surf Zone and Reef Fish Species

Common Name	Scientific Name
Barred surfperch	*Amphistichus argenteus*
Sargo	*Anisotremus davidsonii*
Deepbody anchovy	*Anchoa compressa*
Jacksmelt	*Atherinopsis californiensis*
White seabass	*Atractoscion nobilis*
Kelp surfperch	*Brachyistius frenatus*
Ocean whitefish	*Caulolatilus princeps*
Swell shark	*Cephalosyllium ventriosum*
Black croaker	*Cheilotrema saturum*
Blacksmith	*Chromis punctipinnis*
Blackeye goby	*Coryphopterus nicholsii*
Pile perch	*Damalichthys vacca*
California moray	*Gymnothorax mordax*
Rock wrasse	*Halichoeres semicintus*
California hornshark	*Heterodontus francisci*
Walleye surfperch	*Hyperprosopon argenteum*
Rainbow perch	*Hypsurus caryi*
Garabaldi	*Hypsypops rubicundus*
Black surfperch	*Embiotoca jacksoni*
California corbina	*Menticurrhus undulatus*
Halfmoon	*Medialuna californiensis*
Gray smoothhound	*Mustelus californicus*
Senorita	*Oxyjulis californica*
Kelp bass	*Paralabrax clathratus*
Barred sand bass	*Paralabrax nebulifer*
CO turbot	*Pleuronichthys coenosus*
Rubberlip surfperch	*Rhacochilus toxotes*
Spotfin croaker	*Roncador stearnsii*
California scorpionfish	*Scorpaena guttata*
Kelp rockfish	*Sebastes atrovirens*
Treefish	*Sebastes serriceps*
California sheephead	*Semicossyphus pulcher*
Queenfish	*Seriphus politus*
Giant black seabass	*Stereolepis gigas*
Barcheek pipefish	*Syngnathus exilis*
Leopard shark	*Triakis semifasciata*
Yellowfin croaker	*Umbrina roncador*
Salema	*Xenistius californiensis*

Source: U.S. Navy 2010e

- Habitat loss;
- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Predators;
- Re-suspension of contaminants during pier replacement efforts;
- Increases in turbidity associated with dredging and construction projects and
- Sea level rises.

Current Management

The San Diego Bay resources are managed through the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*), the health and presence of fish species in the San Diego Bay are intermittently evaluated through the regular fish inventories and EFH studies. In 2011, the U.S. Navy funded a project to map the marine habitat within the ocean side beach and boat training lanes in accordance with the SSTC Essential Fish Habitat consultation with the National Marine Fisheries Service also in the process studying EFH throughout the San Diego Bay. In 2012, that study was expanded to map the marine habitat surrounding the ocean side beach and boat training lanes, including areas adjacent to NASNI. These studies will facilitate the valuation of EFH with special focus on the habitat types most likely to be impacted by U.S. Navy activities. In addition, eelgrass is managed in compliance with the California Eelgrass Mitigation Policy, created jointly in 1991 by the USFWS, NMFS, and CDFW, which established protocols for mitigating adverse impacts to eelgrass (U.S. Navy 2011a). A draft revision of the California Eelgrass Mitigation Policy was published in December 2011. The U.S. Navy has established several Navy Eelgrass Mitigation Sites (NEMS) to compensate for past impacts and to mitigate future impacts on eelgrass habitat within the San Diego Bay. Eelgrass that has been planted and not used to compensate for previous losses has been banked for future use in accordance with the California Eelgrass Mitigation Policy. Five eelgrass mitigation sites contributing to the bank have already been constructed and met the 5-year performance standards required by NMFS. A Mitigation Technical Team, a multiagency team, provides technical expertise in and support for implementing the Bank. Besides the NEMS, the U.S. Navy maintains permanent eelgrass monitoring transects in San Diego Bay that are monitored every year and bay wide mapping of eelgrass density classes is conducted every 3 to 5 years (U.S. Navy 2011a).

Management Objective and Strategy

Objective: Employ a systematic approach to managing fish and EFH resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for marine resources management and conservation obtain focused training as related to conservation on a military installation on an annual basis.
2. Develop a database to integrate current and historical nearshore habitat monitoring data.
3. Conduct nearshore benthic habitat mapping as needed.
4. Avoid shoreline construction that results in a loss of coastal strand habitat.
5. Continue documenting invasive non-native species that are observed during regular surveys.
6. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
7. Control the spread of invasive species.

8. Ensure compliance with Department of Fish and Wildlife regulations, Federal regulations, and NBC instructions for fishing.
9. Maintain and promote partnerships with agencies and groups (e.g., NMFS and NOAA) involved in marine resources management.
10. Develop and implement a strategy to reduce population impacts from oil spills and other hazardous waste in San Diego Bay.

4.2.4.4 Reptiles and Amphibians

The only reptile documented on NASNI is the common side-blotched lizard (*Uta stansburiana*). Higher densities of reptiles were found in ruderal areas and within the northwestern portion of NASNI. The common side-blotched lizard can live in various habitats including sand, rock, hardpan, loam with grass, shrubs, and scattered rocks. They are also often found along sandy washes with scattered rocks and low-growing bushes (U.S. Navy 2006c).

No amphibian species were detected on NASNI during the 2005 amphibian surveys. Amphibians require moisture for at least a portion of their life cycle, with many requiring a permanent water source for habitat and reproduction. Terrestrial amphibians have adapted to more arid conditions and are not completely dependent on a perennial or standing source of water. Some species avoid desiccation by burrowing beneath the soil or leaf litter during the day and during the dry season (U.S. Navy 2006c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Fire.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing wildlife resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting species that are incidentally observed during special status species surveys.

3. Periodically review the monitoring program to ensure it still meets ecosystem management goals
4. Survey for and monitor herpetofauna populations using guidelines recommended by PARC.
5. Once finalized, implement DoD PARC Strategic Plan.
6. Revegetate areas on base with native species using species on the recommended plant list.
7. Control the spread of invasive species.
8. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

4.2.4.5 Birds and Migratory Bird Management

For a complete listing of avian species observed on NASNI, see **Appendix F**. Due to the BASH potential many migratory bird species pose (particularly large-bodied, flocking, and soaring species), migratory birds are managed closely under the installation's BASH program, see also **Section 4.2.4.6**. Several special status bird species are known to occur on NASNI and are discussed in **Section 4.2.5**.

A total of 76 bird species were observed on NASNI during the natural resources surveys conducted in 2005. There are artificial freshwater ponds on the golf course that are often used by birds, creating a BASH issue. Beaches and coastal dunes on NASNI support a variety of native and migrant shorebirds. Waterbirds commonly occurring at the beach near Zuniga Point include California Brown Pelicans (*Pelecanus occidentalis californicus*), Double-crested Cormorants (*Phalacrocorax auritus albociliatus*), Marbled Godwits (*Limosa fedoa*), Sanderlings (*Calidris alba*), Forster's Terns (*Sterna forsteri*), Elegant Terns (*Sterna elegans*), and Willets (*Catoptrophorus semipalmatus*) (U.S. Navy 2006c).

Gull species observed on NASNI include Heermann's Gull (*Larus heermanni*), Ring-billed Gull (*Larus delawrensis*), California Gull (*Larus californicus*), and Western Gull (*Larus occidentalis*). Heermann's Gull and Western Gull are residents year-round at NASNI. Due to the BASH potential these species pose, gulls are discouraged from nesting near the airfield via the installation's BASH program.

A pair of Ospreys (*Pandion haliaetus*), the only raptor observed to nest on NASNI during the 2005 survey, was observed nesting on a tall light pole near Tower Three athletic field. This pair is known to have nested at this site for several years and has successfully fledged offspring. In 2010, this nest was relocated to a permanent artificial platform constructed on NASNI near the carrier entrance Gate 2. Other raptors observed foraging on NASNI include Cooper's Hawks (*Accipiter cooperii*), Red-tailed Hawks (*Buteo jamaicensis*), a Red-shouldered Hawk (*Buteo lineatus elegans*), and a Peregrine Falcon (*Falco peregrinus anatum)*. The ruderal habitat on NASNI and the surrounding bay and ocean provide good foraging sites for raptor species (U.S. Navy 2006c).

Common species in open areas on NASNI, particularly near the golf course and ruderal areas near the airfield, include Anna's Hummingbird (*Calypte anna*), California Horned Larks (*Eremophila alpestris actia*), Black Phoebe (*Sayornis nigricans),* Killdeer *(Charadrius vociferus),* and House Finch (*Haemorhous mexicanus frontalis*). A Loggerhead Shrike (*Lanius ludovicianus*) was observed foraging in the ruderal habitat at the remediation site during the winter 2005 survey. Other bird species observed within the golf course area include European Starling (*Sturnus vulgaris*), Bullock's Oriole (*Icterus bullockii*), Northern Flicker (*Colaptes auratus*), and Song Sparrow (*Melospiza melodia*). Wintering species observed in the ornamental trees on the golf course include Yellow-rumped Warbler (*Setophaga coronata*) and Orange-crowned Warbler (*Oreothlypis celata*). The installation of wires over the water hazards (ponds) on the golf course minimizes the use of these areas as open water habitat for waterfowl; however, Great Egrets (*Ardea alba*), Great Blue Herons (*Ardea herodias*), Willets, and other species were occasionally observed using and resting at the edge the ponds (U.S. Navy 2006c).

In addition to birds detected during the 2005 natural resources surveys, a variety of species were recorded at NASNI by San Diego County Bird Atlas volunteer surveys. The following additional species were recorded from the Bird Atlas' 2000 to 2004 surveys: Common Loon (*Gavia immer*), Western Grebe (*Aechmophorus occidentalis*), American White Pelican (*Pelecanus erythrorhynchos*), Sharp-shinned Hawk (*Accipiter striatus velox*), Merlin (*Falco columbarius*), Whimbrel (*Numenius phaeopus hudsonicus*), Short-billed Dowitcher (*Limnodromus griseus*), and Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*) (U.S. Navy 2006c).

Several species of herons and egrets are known to occur on and some nest on NASNI. **Table 4-4** provides a comparison of numbers of breeding pairs/active nests for the heron and egret species from year to year on NASNI (1997-2009).

Table 4-4: Heron and Egret Breeding Pairs/Active Nests (1997-2009)

Year	Great Blue Heron	Black-crowned Heron	Snowy Egret	Great Egret
1997	31	164	N/A*	0
1998	30	209	N/A*	0
1999	22	167	36	0
2000	26	184	25	0
2006	19	267	21	0
2007	23	234	66	0
2008	15	142	26	0
2009	18	163	33	0

Source: U.S. Navy. 2012

Specific Concerns

MBTA

- Development/anthropogenic disturbances;
- Habitat loss/or changes;
- Erosion and sedimentation;
- Invasive species (flora and fauna);
- Climate change (e.g., changes in temperature or sea level rise);
- Predators;
- Predation and
- Domoic acid toxicity.

Herons and Egrets

- Increased bird populations leading to elevated BASH risks;
- Predation by Herons/Egrets on Western Snowy Plover and California Least Terns;
- Removal of nesting trees and impacts from tree trimming;
- Loss of potential nesting trees throughout the San Diego Bay area has reduced the available nesting resources for herons and egrets;
- Disease (steatitis) and
- Domoic acid toxicity.

Current Management

MBTA

The MBTA (16 U.S.C. 703-712) protects all migratory birds and prohibits the taking of migratory birds, their young, nests, and eggs, except as permitted by the USFWS. The USFWS recommends that NASNI avoid impacting birds protected under the MBTA by surveying for nesting birds in areas proposed for disturbance and if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends conducting activities outside of nesting areas or outside of the general migratory bird-nesting season that extends from mid-February through the end of August, to help avoid direct impacts.

Prohibited Acts: Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not.

On March 15, 2005, the USFWS published in the Federal Register (FR 70(49):12710-12716) a final list of the bird species to which the MBTA does not apply. The list is required by the Migratory Bird Treaty Reform Act of 2004. The actual list of migratory birds protected by the MBTA is published in the CFR (Title 50, Part 10.13). When it became law in 2004, the Reform Act excluded any species not specifically included on the Title 50, Part 10 list from protection.

The 2003 National Defense Authorization 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.
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 February 28, 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.

DoD and the USFWS entered into an MOU in July 2006 to Promote the Conservation of Migratory Birds in accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (DoD 2007a). This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations other than military readiness activities are consistent with the MBTA. The MOU also describes how the USFWS and DoD will work together cooperatively to achieve these ends. The MOU does not authorize

the take of migratory birds; the USFWS, however, may develop incidental take authorization for Federal agencies that complete an Executive Order MOU.

Current management of migratory birds also includes habitat restoration, implementation of the DoD Coordinated Bird Monitoring (CBM), San Diego waterbird surveys, general bird surveys approximately every 5 years (during natural resource inventory surveys), annual Western Burrowing Owl surveys, and a Heron and Egret Management Plan.

Herons and Egrets

NASNI's mission does not directly conflict with the presence of Herons if the nesting birds are restricted to areas from the airfield. Management guidelines set forth in the draft 2012 Heron and Egret Management Plan include (1) restriction of non-essential activity adjacent to active Heron nests; (2) conservation of nesting habitat; (3) continued monitoring of nesting locations, phrenology (timing) of nesting, reproductive effort, and success; and (4) construction of parking covers or shelters to lessen impact of Heron droppings. These management issues will likely be revisited by NASNI (U.S. Navy 2012d).

In 2010 the U.S. Navy removed 30 ficus (*Ficus* spp.) trees located around the parking lot west of building 14 on NASNI. These trees were removed because they posed an immediate safety hazard to people and property. Additionally, Heron and Egret rookeries on NASNI, particularly those near active runways such as the rookery near building 14, present a significant BASH hazard because birds are frequently observed crossing Runway 18 to reach foraging areas in the bay. Removal of this rookery and the relocation of the nesting birds to an area further east of the runways reduced the BASH risks. In order to ensure future habitat availability, replacement of trees was conducted on the new Bachelor Enlisted Quarters P742 site.

Primary threats to Heron populations on NASNI include human alterations and/or removal of nesting habitat, repeated disturbance of nesting colonies at critical periods during the nesting cycle, predation, contaminants, and disease. Currently, while potential predators are present within the San Diego Bay area, little predation has been observed at the heron colonies on NBC (U.S. Navy 2010a).

Management Objective and Strategy

MBTA

Objective: Maintain and enhance populations, and nesting and foraging habitats of migratory birds on NASNI.

Strategies:

1. Assess the effects of all projects on migratory birds during NEPA process. Ensure compliance with the MOU between the USFWS and DoD on the Conservation of Migratory Birds and the "Migratory Bird Rule."
2. Identify any actions that require an MBTA permit and, if necessary, obtain appropriate permit for intentional take of migratory birds.
3. Develop effective management for minimizing the unintentional take of migratory birds.
4. Conduct regular surveys to determine what species of migratory birds may have the potential to be on NASNI.

5. Once finalized, implement monitoring protocols contained within the DoD Coordinated Bird Monitoring Plan. Contribute data to the Coordinated Bird Monitoring Database.
6. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed.
7. Develop migratory bird specific BMPs and ensure these BMPs are included in project plans (e.g., plan all tree trimming during the non-nesting season).
8. Develop and enhance partnerships with agencies and groups involved (e.g., USFWS and CDFW) in migratory bird management.
9. Develop and distribute outreach and education materials on migratory birds to personnel, operators and visitors on NASNI.
10. Revegetate with native species contained on the recommended plant list.
11. Control the spread of invasive species.
12. Participate in DoD Partners in Flight initiative.
13. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).
14. When feasible, pick up sick and injured migratory birds and take to wildlife rehab facility.

Herons and Egrets

Objective: Maintain nesting for Herons and Egrets on NASNI while balancing and coordinating management with BASH concerns and impacts to listed species.

Strategies:

1. Finalize and implement Heron and Egret Management Plan. Include management provisions for herons and egrets within plan into INRMP.
2. Maintain relationship with Wildlife Assist and Project Wildlife to rescue and rehabilitate injured herons.
3. Coordinate with local and regional efforts on disease research.
4. Reduce BASH risks by encouraging herons to nest in areas of NASNI that are furthest away from the runways (e.g., near Heron Park).
5. Conduct Heron and Egret surveys of metro area installations approximately every 3 years.

4.2.4.6 Bird/Wildlife Aircraft Strike Hazard

Bird strikes to aircraft are a serious safety and economic problem in the United States, annually causing millions of dollars in damage to civilian and military aircraft and occasionally loss of human life. The U.S. Navy has experienced approximately 20,000 bird/aircraft strikes since 1980 resulting in two deaths, 25 aircraft destroyed and over $300 million in damage. Naval Safety Center data indicates that 65 percent of all bird strikes occur within the primary surface area (PSA) of the airfield which is 229 meters (750 feet) in both directions from the centerline of the runway. In addition, at NASNI, data indicates that only 30 percent of bird/aircraft strikes are actually reported, thus underestimating the number and severity of the problem. The Federal Aviation Administration (FAA) PSA is 305 meters (1,000 feet) in both directions of the centerline of the runway (FAA Advisory Circular 159/5300-13). FAA Part 139.337, a wildlife assessment is triggered by one of the following: (1) multiple animal strikes; (2) substantiated

damage to the aircraft; (3) engine ingestion of wildlife; or (4) when size and numbers of wildlife on or near the airport are capable of causing a damaging event (U.S. Navy 2008d).

Specific Concerns

- Increased presence of wildlife on or near active runways.

Current Management

A BASH plan was developed for NBC in 2008 and a new BASH plan was finalized in 2012, these provided guidance to minimize wildlife populations on and around the airfield that pose a threat to aviation safety. The primary goal of the BASH program is to minimize the potential for loss of aircrew life. The BASH program achieves this objective by addressing the aviation safety hazard associated with wildlife on and near airfields. The BASH program needs to manage wildlife populations and work with installation personnel to improve bird strike reporting and communication of wildlife activities within the airfield environment. An effective BASH program also strives to minimize secondary BASH impacts, such as damage to aircraft and loss of training. Aircraft collisions with wildlife are too costly and hazardous to not be property addressed or managed (U.S. Navy 2008d). The purpose of the 2012 BASH plan included the following objectives (U.S. Navy 2011d):

1. To establish policy and procedures for implementing the Commander, Navy Installations Command BASH Program (CNIC INST3700, 7 July 2011).
2. To establish mandatory BASH event reporting and remains collection procedures in accordance with OPNAVINST 3750.6, CNIC BASH program Manual, and the FAA Advisory Circular 150/5200-32 a of December 22, 2004.
3. To establish BASH program procedures in accordance with reference CNIC BASH program Manual and FAA Advisory Circular 150/5200-33 b of August 28, 2007.

The BASH plan includes: (1) conduction of wildlife monitoring; (2) implementation of a habitat management program; (3) use of bird dispersal techniques when appropriate and warranted; (4) implementation of species specific population control program; (5) development of operation procedures to address bird/animal aircraft strike hazards; (6) adoption of a zero-tolerance policy for birds within the primary surface area, exceptions maybe granted by the Bird Hazard Working Group for specific birds such as threatened and endangered species or species of conservation concern; and (7) increased communications, safety and training of aviators, aircrews and operational personnel related to BASH issues (U.S. Navy 2008d).

Natural resource managers are responsible for ensuring BASH programs are addressed in this INRMP and is compliant with all applicable state and Federal natural resource laws and regulations as well as all applicable DoD, DoN, and U.S. Navy environmental policies, directives, and instructions (U.S. Navy 2012e) .

Management Objective and Strategy

Objective: Reduce hazards between wildlife and aircraft at NASNI.

Strategies:

1. Manage habitat near the airfield to reduce attractiveness to wildlife, particularly birds. The following guidelines are contained in the BASH plan to reduce habitat attractiveness to wildlife (U.S. Navy 2008d):

    a. Reducing "edges" between habitats that some birds, especially small passerines, use such as the edge between brush and a grassy area.

    b. When possible, replacing dirt (bare ground) with other materials such as gravel, asphalt or artificial turf to eliminate available grit sources that birds such as doves and pigeons need.

    c. Conducting surveys to determine if sensitive plant species occur in the vicinity of the airfield.

    d. Managing grass or forbs to a height that reflects the particular species of interest. At NBC it is recommended that grass next to the runway should be kept to a height of 3 to 4 inches to enable clear inspection of the area and also to ensure cutting before plants seed as described in the following:

        i. Mowing around the NASNI airfields must be closely coordinated with the natural resources manager due to the presence of sensitive plant species and nesting birds.

        ii. Mowing equipment must be thoroughly cleaned prior to arriving on site to prevent introduction of invasive weeds.

        iii. Equipment should be thoroughly cleaned after mowing at NASNI and before using the equipment elsewhere.

        iv. To slow the introduction and spread of invasive weeds, NASNI will be mowed in a counter-clockwise pattern, starting at the north end (Runway 18) and ending around the approach to Runway 29.

        v. Mowers should not come within 10 feet of the yellow Burrowing Owl nest burrow signs to avoid collapsing owl burrows. Weeds growing around the Burrowing Owl signs must be cleared using a hand-trimmer to avoid collapsing any burrows.

        vi. Mowing of the Brand's phacelia sites is not conducted under the NBC Facilities mowing contract, but instead, vegetation trimming is done within these sites by a natural resources contractor so that activities are only conducted after the plant goes to seed.

    e. Managing weeds for the entire airfield on a regular basis year round because they can provide a food source and cover for small passerine birds and rodents.

    f. Reducing, clearing, and/or thinning the number of trees or bushes that produce nesting, foraging, or roosting opportunities for birds around the entire airfield.

    g. Ensuring water areas within the PSA are filled, drained or covered with netting or a wire grid system. Depressions on the runways that collect water should be repaired to eliminate standing water.

2. Educate personnel at the airfield about the NASNI natural resources program.

3. Periodically review the BASH plan to ensure that it does not conflict with this INRMP.

4. Continue to participate in NBC Bird Hazard Working Group (BHWG) to identify and address BASH risks.
5. Coordinate natural resources projects with the BHWG including the USDA BASH Biologist assigned to NBC to ensure natural resources management is compatible with BASH program.

4.2.4.7 Mammals

For a complete listing of mammal species observed, or detected, at NASNI, see **Appendix F**.

NASNI has a low diversity of mammal species. Three mammal species were observed during the 2005 natural resources surveys, including San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), California ground squirrel (*Spermophilus beecheyi*), and California sea lions (*Zalophus californianus*) (see **Section 4.2.5**) just offshore in the Pacific Ocean. No bats were detected during the 2005 natural resources inventories; however, bats are expected to occur on NASNI (U.S. Navy 2006c). Common bats potentially occurring on NASNI include: Brazilian free-tailed bat (*Tadaria brasiliensis*), hoary bat (*Lasiurus cinereus*), big brown bat (*Eptesicus fuscus*), and California myotis (*Myotis californicus*). Sensitive bat species with the potential to occur on NASNI include: greater western mastiff bat (*Eumops perotis californicus*), pocketed free-tailed bat (*Nyctinomops femorosacca*), big Free-tailed bat (*Nyctinomops macrotis*), western red bat (*Lasiurus blossevillii*), western yellow bat (*Lasiurus xanthinus*), and Yuma myotis (*Myotis yumanensis*) (U.S. Navy 2006c).

Predator management activities are performed on NASNI as a requirement of USFWS Biological Opinions related to management strategies for the California Least Tern and Western Snowy Plover (see **Section 4.2.5.1**). The following species have been trapped at NASNI during predator control activities: feral cat (*Felis domesticus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), gray fox (*Urocyon cinereoargenteus*), black-tailed jackrabbit (due to trampling and predator attractant potential), California ground squirrel, black rat (*Rattus rattus*), and Norway rat (*Rattus norvegicus*) (U.S. Navy 2003a, U.S. Navy 2004b, U.S. Navy 2005, and U.S. Navy 2006c).

California ground squirrels are abundant at NASNI, occurring throughout the area, except in marsh areas. Their burrow systems cover extensive areas, especially in grassy habitats such as the ball field and magazines. These burrows are a hazard to people walking in the area, and the removal of vegetation required to construct burrows increases erosion potential. However, abandoned ground squirrel burrows provide primary habitat for Burrowing Owls (*Athene* spp.). It is believed that Burrowing Owls may occur wherever there are ground squirrel colonies as the owls use squirrel burrows throughout the year. Squirrels also provide food for raptors on NASNI, but in the absence of substantial populations of other natural predators, such as the fox (*Vulpes* spp.) and coyote (*Canis latrans*), squirrel populations will remain high unless a very labor-intensive control program is initiated (U.S. Navy 2006c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna)'
- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. At NASNI, management of some mammals (e.g. skunks, raccoons, opossums, ground squirrels) is conducted as part of the BASH and predator management programs if they are considered a threat to safety or federally listed species.

All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing terrestrial mammals, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation, as needed.

Strategies:

1. Continue documenting mammal species during Natural Resources inventory efforts and those that are incidentally observed during special status species surveys.
2. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
3. Install bat boxes where appropriate.
4. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.
5. At NASNI, ground squirrels are managed to benefit Western Burrowing Owls. Ground squirrel control will only be conducted where the ground squirrels increase the BASH risk or negatively affect other essential operations. To sustain ground squirrel populations, no rodent control will be conducted unless mandated by an outbreak of disease or the rodents are negatively impacting a listed species.
6. Coordinate and partner with Zoological Society of San Diego to help others increase jack rabbit/ground squirrel populations and help conservation of these species throughout the county.

4.2.4.8 Marine Mammals

For a complete listing of marine mammal species observed, or detected, at NASNI, see **Appendix F**.

Extensive natural history information for marine mammal species occurring within southern California waters has been summarized in previous works (Leatherwood et al. 1982, 1988; Reeves et al. 2002; DoN 2005c; Carretta et al. 2007; DoN 2008). Approximately 41 marine mammal species or stocks are known to occur within southern California waters based on NMFS Stock Assessment Reports (Carretta et al. 30 2007, DoN 2008). Of these, only two year-round species are expected to be found within the NASNI project area. These include the California sea lion (*Zalophus californianus*) and Pacific harbor seal (*Phoca vitulina richardii*). Similarly these are the two most common marine mammal species found in San Diego Bay.

Sea lions and seals belong to the Order Carnivora, which is a group that includes true seals, sea lions, and fur seals. Species within the group Carnivora, or otherwise called pinnipeds, hunt and feed exclusively in the ocean, with certain species in southern California coming ashore to rest, molt, breed, and bear young.

Specific Concerns

- Habitat loss and/or changes;
- Stranding;
- Climate change (e.g., changes in temperature or sea level rise) and
- Domoic acid toxicity.

Current Management

Marine mammal surveys are conducted on a regular basis in the San Diego Bay and along the ocean side NBC properties to determine species of marine mammals present in San Diego Bay and within the vicinity of NASNI. In addition to surveying for marine mammals, discrete water samples for chlorophyll analysis as well as continuous water quality data (chlorophyll, temperature, salinity, etc.) are collected. The U.S. Navy follows regional stranding and injured wildlife protocol established by the Southwest Region Marine Mammal Stranding Network. An MOU between NMFS and the U.S. Navy, *Assist in Marine Mammal Stranding Investigations* (Agreement No. PR-055) requires the development of the Regional Stranding Investigation Assistance Plan. The Regional Stranding Investigation Assistance Plan is being developed at the regional level with the Navy Stranding Response Coordinators. In addition, NBC Instruction 5090.1, Base Fishing Regulation, requires compliance with Federal and state laws concerning fish and wildlife, including marine mammals.

Management Objective and Strategy

Objective: Monitor, protect and maintain populations of marine mammals at NASNI.

Strategies:

1. Conduct regular (approximately every 1 to 2 years) surveys for marine mammals that may be present within NASNI boundaries, but outside the San Diego Bay INRMP areas.
2. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information gleaned to guide adaptive management.
3. Develop and distribute outreach and education materials on marine mammals to personnel, operators and visitors on NASNI.
4. Follow injured wildlife protocol.
5. Develop a database to integrate current and historical nearshore habitat monitoring data.
6. Conduct nearshore benthic habitat mapping as needed.
7. Avoid shoreline construction that results in a loss of coastal strand habitat.

4.2.5 Special Status Species (Federally Listed and Other Special Status Species)

Special status species include those species that are federally or state listed endangered, threatened, candidate, or California species of special concern and California fully protected species (CFP); birds on the Federal Birds of Conservation Concern list (see **Figure 4-5**); and plants identified by the California Native Plant Society (CNPS) as belonging to the Rare Plant Rank list of 1B. In addition, those migratory bird species that have been determined to be of the highest "concern" to the DoD and that have been

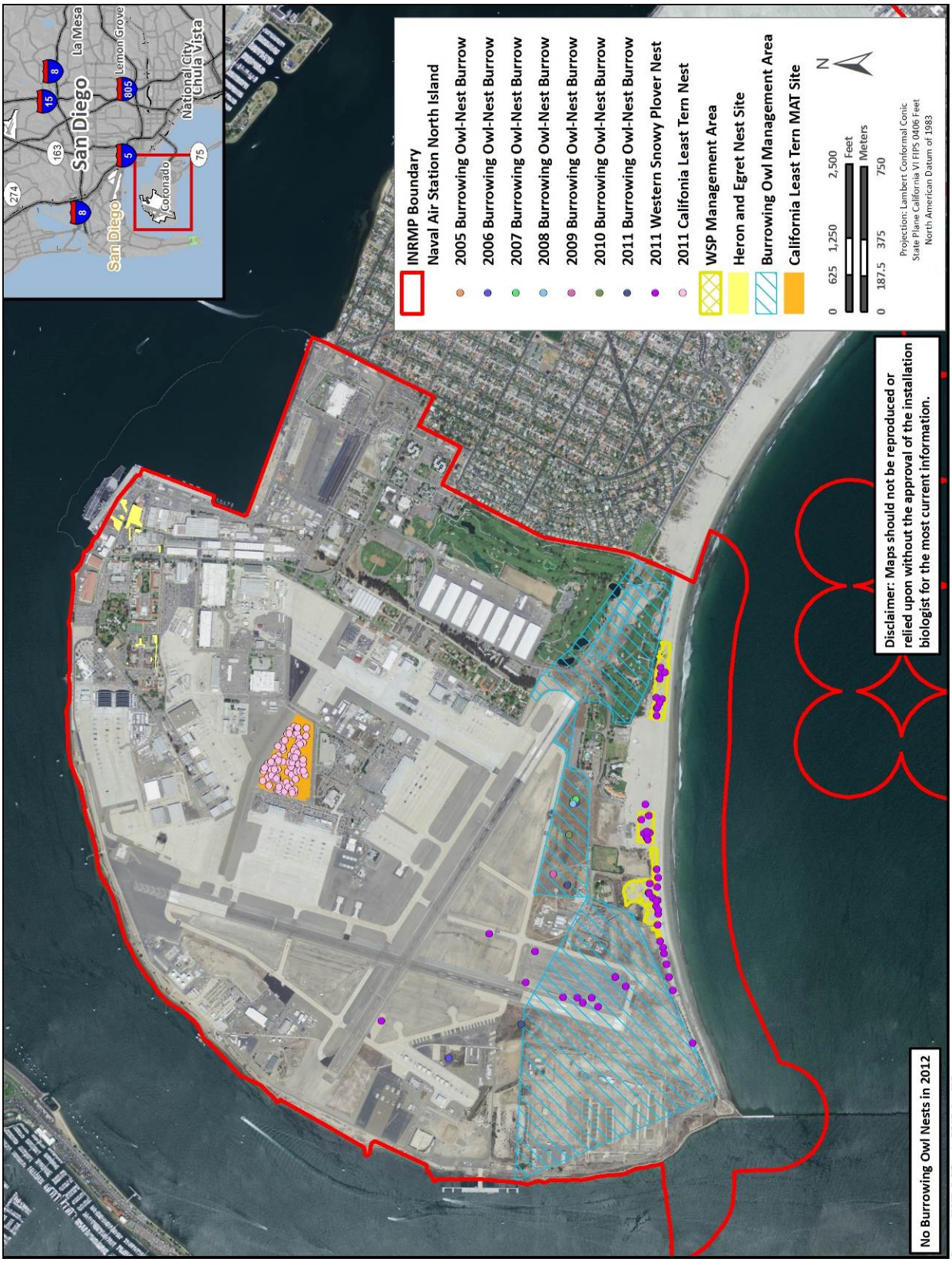


Figure 4-5: Naval Air Station North Island Special Status Bird Species

identified on the DoD Partners in Flight (PIF) Priority Species list have been included. **Table 4-6** includes species either observed on NASNI during natural resources surveys, or federally listed species with the potential to occur on the installation.

An installation's overall ecosystem management strategy must provide for protection and recovery of federally listed species. Under the ESA, an "endangered species" is defined as any species that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The USFWS has also presented an updated list of species that are regarded as candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and could warrant protection under the ESA. General management actions for listed species include the following:

- Preparation and implementation of specific management actions for listed species that include protocols for monitoring surveys and for site marking of sensitive areas;
- Maintaining GIS data on the distribution and habitat availability for listed species and sharing this information with the CNDDB;
- Implement Environmental Review requirements in accordance with OPNAVINST 5090.1C CH-1;
- Conduct Environmental Awareness briefings (e.g., natural resource training) as necessary;
- Minimization and conservation measures aimed at reducing the potential for accidental take;
- Investigating and implementing research projects to better understand ecological requirements of listed species and
- Investigation and implementation of habitat improvement and non-native species control to conserve listed species.

If threatened, endangered, or candidate species are discovered on the installation during a biotic inventory, species information and management actions should be incorporated into the INRMP.

The intent of this section is to identify objectives and strategies to manage NASNI using a regional ecosystem-based approach that manages special status species while protecting the operational functionality of the mission. While single-species management is not promoted as a general philosophical management approach on the installation, specific controls are used to protect special status species beyond management of the ecosystem. Other procedures in place for management of special status species are modifying the ecosystem and human interactions within this environment. The following sections include brief descriptions of those species actively managed by natural resources personnel at NASNI. Note that all wildlife species are considered for management and managed as needed for aircraft safety under the NBC BASH program, including Special Status Species.

For a complete description, background and species account including distribution, range, habitat and biology, of the Special Status Species described below, see **Appendix G**.

Table 4-5: Special Status Species Observed or with the Potential to Occur on Naval Air Station North Island

Common Name	Scientific Name	Federal Status	State Status	Other Status
Plants				
Nuttall's lotus[1]	*Acmispon prostratus*	–	–	CNPS 1B.1
Coast woolly-heads[1]	*Nemacaulis denudata* var. *denudate*	–	–	CNPS 1B.2
Brand's phacelia[1]	*Phacelia stellaris*	FC	–	CNPS 1B.1
Reptiles				
Green sea turtle[1&2]	*Chelonia mydas*	FT	–	–
Birds [3]				
Tricolored Blackbird	*Agelaius tricolor*	BCC	SSC	–
Golden Eagle	*Aquila chrysaetos*	BGEPA, BCC	CFP	–
Short-eared Owl	*Asio flammeus flammeus*	–	SSC	–
Western Burrowing Owl [1]	*Athene cunicularia hypugaea*	BCC	SSC	–
Brant	*Branta bernicla*	–	SSC	–
Ferruginous Hawk	*Buteo regalis*	BCC	–	–
Swainson's Hawk	*Buteo swainsoni*	BCC	–	–
Red Knot	*Calidris canutus roselaari*	BCC	–	–
Vaux's Swift	*Chaetura vauxi*	–	SSC	–
Western Snowy Plover [1]	*Charadrius nivosus nivosus*	FT, BCC	SSC	–
Mountain Plover	*Charadrius montanus*	BCC	SSC	–
Northern Harrier	*Circus cyaneus*	–	SSC	–
White-tailed Kite	*Elanus leucurus*	–	CFP	–
Prairie Falcon	*Falco mexicanus*	BCC	–	–
American Peregrine Falcon	*Falco peregrinus anatum*	BCC	CFP	–
Common Loon	*Gavia immer*	–	SSC	–
Gull-billed Tern	*Gelochelidon nilotica*	BCC	SSC	DoD PIF
Saltmarsh Common Yellowthroat	*Geothlypis trichas sinuosa*	BCC	SSC	–
Black Oystercatcher	*Haematopus bachmani*	BCC	–	–
Bald Eagle	*Haliaeetus leucocephalus*	FD, BCC, BGEPA	CFP	–
Least Bittern	*Ixobrychus exilis*	–	SSC	–
Loggerhead Shrike	*Lanius ludovicianus*	BCC	SSC	DoD PIF
Short-billed Dowitcher	*Limnodromus griseus*	BCC	–	–
Marbled Godwit	*Limosa fedoa*	BCC	–	–
Long-billed Curlew	*Numenius americanus*	BCC	–	DoD PIF
Whimbrel	*Numenius phaeopus hudsonicus*	BCC	–	–
Black Storm-petrel	*Oceanodroma melania*	–	SSC	–

Common Name	Scientific Name	Federal Status	State Status	Other Status
Birds[3] (continued)				
Belding's Savannah Sparrow	*Passerculus sandwichensis beldingi*	–	SE	–
Large-billed Savannah Sparrow	*Passerculus sandwichensis rostratus*	–	SSC	–
American White Pelican	*Pelecanus erythrorhynchos*	–	SSC	–
California Brown Pelican	*Pelecanus occidentalis californicus*	FD	CFP	–
Purple Martin	*Progne subis*	–	SSC	–
Light-footed Clapper Rail	*Rallus longirostris levipes*	FE	SE, CFP	–
Black Skimmer	*Rynchops niger*	BCC	SSC	–
Lawrence's Goldfinch	*Spinus lawrencei*	BCC	–	–
California Least Tern[1]	*Sternula antillarum browni*	FE	SE, CFP	–
Elegant Tern	*Thalasseus elegans*			DoD PIF
Mammals				
San Diego black-tailed jackrabbit[1]	*Lepus californicus*	–	SSC	–

Source: U.S. Navy 2006c, CNPS 2010
Notes:
[1] Special Status Species with focused management. [2] Federally listed species with the potential to occur. [3] Birds are named using the American Ornithologists' Union nomenclature.
Key:
BCC = USFWS Bird of Conservation Concern
SSC = California Species of Special Concern
CFP = California Fully Protected Species
FT = Federally Threatened
FD = Federally Delisted
DoD PIF = DoD Partner in Flight Priority Species
FE = Federally Endangered
FC = Federal Candidate Species
ST = State Threatened
SE = State Endangered
BGEPA = Bald and Golden Eagle Protection Act

4.2.5.1 Federally Listed and Candidate Species

Two federally listed species, the threatened Western Snowy Plover (*Charadrius nivosus nivosus*) and the endangered California Least Tern (*Sternula antillarum browni*) and one candidate species, Brand's phacelia (*Phacelia stellaris*) are known to occur on NASNI. Additionally, one federally listed species, the green sea turtle, has the potential to pass through offshore of NASNI and occurs in areas managed by the San Diego Bay INRMP.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

In general management needs of threatened, endangered, and candidate species and their habitats are based on results contained within surveys performed regularly at NASNI. NASNI will continue to conduct species surveys as deemed necessary and subject to available funding. Management strategies will be developed or revised based on the recommendations of those surveys. Other procedures in place for management of threatened, endangered, and candidate species are modifying the ecosystem and human interactions within this environment.

The Navy currently conducts management of listed species at NASNI in accordance with applicable Biological Opinions that are discussed in detail in the below appropriate sections. Examples of management strategies include annual surveys and assessment of species status on the installation, minimization of disturbances, and site preparation where necessary.

There is no critical habitat for any of the listed species in NBC. This is, in part, due to U.S. Navy environmental planning through INRMPs. ***Appendix D*** *identifies within the INRMP all management and conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.*

Management Objective and Strategy

Objective: Maximize effectiveness and efficiency of the NBC Endangered Species Program to achieve the best conservation possible while maintaining and improving training activities at the desired level.

Strategies:

1. Investigate the need for implementing research projects to better understand ecological requirements of listed species.
2. Continue use of the established Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists to reflect presence of threatened, endangered, and other sensitive species.
5. Conduct regular surveys for threatened, endangered, and candidate species that may be present on NBC.
6. Continue monitoring sensitive species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
8. Establish an education program for military personnel who might have contact with sensitive species or their habitats.
    a. Maintain updated educational materials (e.g., develop a demonstration garden).
9. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats.

10. Reduce habitat fragmentation.
11. Implement erosion control BMPs to ensure adverse environmental impacts to threatened, endangered, and candidate species habitat do not occur.
12. Revegetate with native species included on the NBC recommended plant list. Include sensitive plant species in the recommended plant list when appropriate.
13. Periodically review the natural resources management program to ensure that management actions do not adversely impact special status species habitat.
14. Coordinate and consult with USFWS in situations where activities may affect listed species.
15. Continue to protect existing native plant communities whenever possible.

Brand's Phacelia

Brand's phacelia is a candidate proposed for listing under the ESA, and a CNPS List 1B.1 species. This annual herb is generally found growing in sandy openings in Diegan coastal sage scrub near the coast, and is found at six locations in the entire United States. These include Borderfield State Park, Silver Strand State Park, NAB Coronado (ocean and bayside), NASNI, Camp Pendleton, and one location in riverside (Pers. Comm. Munson 2012).

Beginning in 2007, NBC conducted census counts for Brand's phacelia because this species was recently discovered on NASNI. Census counts were conducted again in 2009, 2010, and 2011. This species was documented and monitored on-site in the ruderal habitat south of the airfield referred to as the SE Runway 36 Site at NASNI. The number of individuals varied from year to year. In 2007 12,971 individuals were observed and the total number peaked in 2010 with 354,606 individuals observed at this site (Pers. Comm. Munson 2012). This site may be the largest known population within the United States. The current mowing of the ruderal habitat around the airfield does not appear to negatively affect this species and may reduce competition with non-native grasses. The current mowing activities do not appear to significantly have a negative impact on this species. The species appears to thrive with a moderate level of disturbance (Pers. Comm. Munson 2012). There is an iceplant (*Carpobrotus edulis*) spreading into the Brand's phacelia habitat which may be a concern. In 2010 NBC conducted a plant biomass reduction in the area where this species is known to occur. One of the primary non-native species targeted for removal was iceplant. The iceplant was removed by hand and is currently being controlled (U.S. Navy 2010g). An important factor in the management of this species' occurrence on NASNI may be continued weed control. The number of individuals may not be as important as the density and overall area of the patch(es) of this species.

Specific Concerns

- Invasive species;
- Training (e.g., trampling from foot traffic);
- Uncertainty about habitat requirements (and management needs) of the species;
- Climate change (e.g., changes in temperature or sea level rise) and
- High vegetation cover. At NASNI, mowing done as BASH reduction measure keeps cover low. Mowing is both a threat and benefit. Threats include spreading weed seeds, and killing phacelia and other native plants before they set seed. Benefits include keeping cover low.

Current Management

Brand's phacelia is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the Navy as part of the project planning (U.S. Navy 2010c). **Appendix D** identifies within the INRMP all management and conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.

Surveys are conducted approximately once a month to monitor population health of Brand's phacelia, assess overall habitat conditions, and track the state of the various occurrence areas over time via photo documentation. During these visits, population data including estimated population size and demographic information are collected. Data collected for habitat conditions included plant community composition and effectiveness of non-native species control. During the peak growth periods of Brand's phacelia, a census is conducted. In addition, two weed exclusion zones have been established and an experiment involving removal of non-native species in potential habitat for Brand's phacelia is being conducted (U.S. Navy 2012f).

Management Objective and Strategy

Objective: Maintain existing populations and distribution of Brand's phacelia on NASNI and identify the best implementation and timing for current management practices (i.e., mowing).

Strategies:

1. Implement mowing BMPs to ensure that activities do not adversely impact species. Mowing performed after phacelia has set seed;
2. Annual monitoring;
3. Coordination between the NBC botanist and operators to minimize impacts associated with training;
4. Develop a candidate conservation agreement with the USFWS;
5. Seed banking;
6. Vulnerability assessment (e.g., disturbance analysis);
7. NEPA/SAR process to identify potential threats and avoid/minimize adverse impacts;
8. Vegetation management, including invasive species control to keep cover down;
9. Remove biomass offsite after activities to improve natural recruitment of native plants and
10. Incorporate into revegetation projects, as appropriate.

Green Sea Turtle

The population of green sea turtles in San Diego Bay numbers approximately 30 to 60 individuals; however, there is limited information about their movements or behavior (U.S. Navy 2010c). It is unknown how often they leave San Diego Bay or where they reside when they are outside the South San Diego Bay Power Plant channel. Female green sea turtles are believed to migrate from San Diego Bay to nesting grounds in Mexico prior to nesting season while the remaining male adults and subadults continue

to be present within San Diego Bay. Eelgrass beds and associated algae and invertebrates known to be food for turtles are extensive in the south and south central San Diego Bay as well as seaside southwest of NASNI. Recent information on turtle foraging has broadened the general understanding of targeted food items as well as expanded the idea that adult green sea turtles are more omnivorous than previously thought. Considering recent foraging studies, resident turtles near U.S. Navy-managed areas along the San Diego Bay may be utilizing invertebrates within deeper areas of San Diego Bay in conjunction with eelgrass and algae as food sources (U.S. Navy 2011a).

Green sea turtles have the potential to occur offshore of NASNI while in transit in and out the San Diego Bay, and within the eelgrass beds on the ocean and bay sides of NASNI.

Specific Concerns

- Small boat collisions with green sea turtles;
- Development on and adjacent to beach and
- Stranding.

Current Management

Green sea turtle surveys are conducted on a regular basis in the San Diego Bay and along the ocean side NBC properties to determine if green sea turtle are present in San Diego Bay and within the vicinity of NASNI. The San Diego Bay INRMP footprint includes the marine portions of NBC within the bay. The green sea turtle is managed under the San Diego Bay INRMP. A more specific description and management of this species in the San Diego Bay is discussed in the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*).

Management Objective and Strategy

Objective: Maintain and enhance populations of green sea turtle on NASNI.

Strategies:

1. Conduct regular (approximately every 1 to 2 years) surveys for the green sea turtle that may be present within NAB Coronado and SSTC-N boundaries.
2. Develop and distribute outreach and education materials on the green sea turtle to personnel, operators and visitors on NASNI.
3. Follow injured wildlife protocol.

Western Snowy Plover

Western Snowy Plovers nest on the beach and within the airfield at NASNI (see **Figure 4-5**). Surveys of the nesting activity of the Western Snowy Plover are conducted throughout the year (January through December) to document both nesting and non-nesting populations and distribution to determine the species' abundance, distribution, and nesting success (U.S. Navy 2011e). In 2011, 52 nests were documented at NASNI (40 on the beach and 12 on the airfield). Of those 52 nests, an estimated 59 chicks fledged. Fifteen Western Snowy Plover nests containing 47 eggs were collected from the airfield and beach at NASNI by U.S. Navy personnel, with concurrence from the USFWS, and taken to Project Wildlife to be incubated until hatched and then the chicks to be raised in captivity, and subsequently released (U.S. Navy 2011e). The USFWS and CDFW are notified by the Navy of all nests collected from the airfield through a weekly email report.

Western Snowy Plovers are observed yearly during migration and winter at NASNI. Winter roosting flocks are observed regularly at NASNI.

Specific Concerns

- Dogs on beach;
- Recreational beach users;
- Development on and adjacent to beach;
- Other natural resources management objectives (e.g., invasive species removal during the nesting season);
- Facilities maintenance;
- Stormwater management;
- Military training on beach;
- Implementation of BASH plan, including removal of Western Snowy Plover nests from the airfield;
- Predation;
- Invasive plant species on beaches that results in increased cover;
- Increased cover of native species;
- Beach raking;
- Climate change (e.g., changes in temperature or sea level rise) and associate impacts (e.g., changes in food resources) and
- Potential domoic acid toxicity.

Current Management

Biological Opinions that impact Western Snowy Plover management at NASNI include: the 2005 BO on NASNI Ongoing Operations addressing Bird/Animal airstrike hazards on the runway, as well as recreational and military training use of the southern NASNI beaches (FWS-SDG-3908.3 2005); the 2005 Navy Lodge Expansion BO (FWS-SDG-2908.5 20 July 2005) addressing the expansion of the Navy Lodge and its potential effect on Western Snowy Plover that nest on adjacent beaches; the 2005 Amendment to the April 1, 2005 BO on the Navy's proposed and ongoing operations (FWS-SDG-3908.3); and the 2010 Biological Opinion on the U.S. Navy's Silver Strand Training Complex Operations (FWS-SDG-08B0503-09F0517).Among other requirements, the BOs required: (1) continued marking for 30-meter (98-foot) diameter buffers and monitoring; (2) avoidance of staked areas when beach raking; (3) setting aside of 6 hectares (14.9 acres) of suitable (and historically used) plover habitat as off-limits to foot traffic, vehicle traffic, beach raking, and pets during the Western Snowy Plover breeding season; (4) implementation of predator controls including anti-perch materials on buildings; (5) placement of signage and distribution of educational materials to patrons, employees, life guards; (6) training for construction workers; and (7) shielding of lighting away from the beach during the nesting season. For a complete list of Terms and Conditions and Conservation Measures see **Appendix I**.

In 2010 the U.S. Navy installed an educational interpretative Western Snowy Plover sign on the beach in from of the Navy Lodge Expansion site. In addition, in 2011 the U.S. Navy produced and educational

DVD and brochure to be distributed to patrons, employees, lifeguards, and contractors. No designated critical habitat currently exists on NASNI.

Management Objective and Strategy

Objective: Enhance productivity to maintain the Western Snowy Plover population and meet goals outlined within current NBC Biological Opinions and 2007 USFWS Recovery Plan. This includes support of at least 12-13 pairs on NASNI and maintenance of 5-year average (2005-2009) baseline population levels. Increase plover population where it is compatible with the military mission. In addition, coordinate plover management with BASH program.

Strategies:

1. Continue to manage dogs to eliminate dog/plover interactions (per the NBC Instruction 5100.2G [10 Jan 2006] regarding Animal Control on board Naval Base Coronado Installations and Dog Beach, and the Handbook for Residents of Navy Region Southwest Military Family Housing).
1. Educate the workforce and beach users on sensitive wildlife species, including breeding season restrictions.
2. Implement site approval process and NEPA to avoid and minimize impacts to beach (e.g., direct development away from beach, direct lighting away from beach, and minimize predator perches).
3. Maintain a program for Western Snowy Plover predator management. Encourage the USFWS to develop a strategy to manage predation by Gull-billed Terns.
4. Amend stormwater management plant to recognize nesting seasons of Western Snowy Plovers and ensure clearing of outfalls adjacent to plover areas occurs during non-breeding season. Follow the stormwater management plan regarding monitoring Storm Water Technical Advisory's (SWTAs).
5. Coordinate all beach impacts with the natural resources office.
6. Coordinate with all stakeholders on a regular basis.
7. Control invasive species to provide sufficient open areas for nesting.
8. Enhance habitat through revegetation projects.
9. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
10. Work to establish a natural resources law enforcement program on base.
11. Complete nest monitoring on an annual basis and band birds when it is determined to be appropriate to meet management goals.
12. Annually review and ensure continued compliance with USFWS BOs (see **Appendix I** for a complete list of requirements) for plover management at NASNI.

California Least Tern

Efforts to monitor the species, control predators, protect habitat, and create colony sites have resulted in population increases. California Least Tern populations are monitored yearly under an on-going U.S. Navy-funded and managed monitoring program on U.S. Navy training facilities, currently implemented by the San Diego Zoological Society.

NASNI currently has one active Least Tern nesting site (see **Figure 4-5**): the MAT Site. Surveys of the nesting activity of the California Least Tern were conducted from April to mid-September 2011 on the airfield MAT site at NASNI to determine the species' nesting success at this site. A total of 83 nests were observed within the MAT site in 2011. An estimated 82 pairs of California Least Terns nested within the MAT site. Within the 83 nests, a total of 152 eggs were documented. Of those 152 eggs, an estimated 25 chicks fledged. Of the 25 estimated fledglings, an estimated 21 fledglings survived and left the site (U.S. Navy 2011e).

The MAT site is located on valuable land with potential for multiple missions and essential operational uses**.** The NBC Public Works office, in coordination with NBC NRO, is currently preparing a test site on NASNI with future plans to relocate the MAT site if the test site is successful. The USFWS requires that it can be demonstrated California Least Terns use an alternative nesting site on North Island before the MAT site can be developed. The test site requires annual preparation in order to encourage nesting. A categorical exclusion was issued for construction of alternative California Least Tern nesting sites (U.S. Navy 2008b). Vegetation at the new alternative California Least Tern nesting site was recently cleared (in 2009 and 2011) and sand was added to enhance the substrate. NBC NRO also place Least Tern decoys on the site at the beginning of each nesting seasons and will be experimenting with audio attraction in 2013. The Terns have not used the site for nesting to date (Pers. Com. Shepherd 2012).

Specific Concerns

- Aircraft taxiing on Taxiway Lima;
- Development or construction adjacent to colony;
- Other natural resources management objectives;
- Facilities maintenance;
- Predation;
- Invasive species on California Least Tern colony;
- Increased cover of native species;
- Climate change (e.g., changes in temperature or sea level rise) and associate impacts (e.g., changes in food resources) and
- Domoic acid toxicity

Current Management

Several BOs and informal consultations discuss Least Tern management at NASNI and resulted in changes in the action area regarding how California Least Terns are managed including the Biological Opinion (1-F82F-123) between the U.S. Navy and USFWS regarding preparation of alternate California Least Tern nesting sites in and around the airfield at Naval Air Station North Island 1980, the Formal Endangered Species (1-1-82—F-123) on the MAT Repair/Lamps MKIII Project at NASNI 1983, and the and 2003 BO issued for the Military Training Operations on the Silver Strand and Naval Air Station North Island and Associated Management Strategies for the California Least Tern and Western Snowy Plover during the 2003 breeding Season (FWS-SDG-3452.1); Among other requirements, the BOs required: (1) control of mammalian and avian predators of the Least Tern and (2) nesting substrate enhancement. For a complete list of Terms and Conditions and Conservation Measures see **Appendix I**.

Management Objective and Strategy

Objective: Enhance productivity to maintain California Least Tern population on NASNI and increase population in areas determined to be compatible with the military mission.

Strategies:

1. Implement site approval process to avoid and minimize impacts to colony (e.g., direct development and lighting away from colony, and minimize predator perches).
2. Implement a predator management program.
3. Educate the NASNI workforce on California Least Tern nesting colony presence and breeding season restrictions.
4. Coordinate with all stakeholders on a regular basis, including the USFWS and CDFW.
5. Control invasive species.
6. Enhance habitat through revegetation projects.
7. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
8. Complete nest monitoring on an annual basis and band birds when it is determined to be appropriate to meet management goals.
9. Annually review and ensure compliance with USFWS BOs for Least Tern management.

4.2.5.2 Other Special Status Species

In addition to federally threatened and endangered species, NASNI recognizes species that occur at a level of rarity that currently does not warrant Federal listing. **Table 4-5** lists other special status species and their corresponding CDFW or other status. No focused management or surveys currently take place on NASNI for most other special status species.

Other Special Status Species with Focused Management

Nuttall's Lotus

Nuttall's lotus is prevalent at NASNI and is commonly found in the sand verbena-beach bursage habitat, ruderal areas, and even in the cracks of the pavement near the developed areas (sees **Figure 4-6**). This plant has the potential to occur on any surface that is not completely developed (i.e., without paving or landscaping). Although easy to map, it is nearly impossible to count individuals due to its sprawling, mat-like growth form. Therefore, when mapping Nuttall's lotus populations, a visual density estimate was made in lieu of counting or estimating numbers of individuals (U.S. Navy 2006a).

Specific Concerns

- Invasive species;
- Training;
- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- Other natural resources management (e.g., Least Tern site preparation).

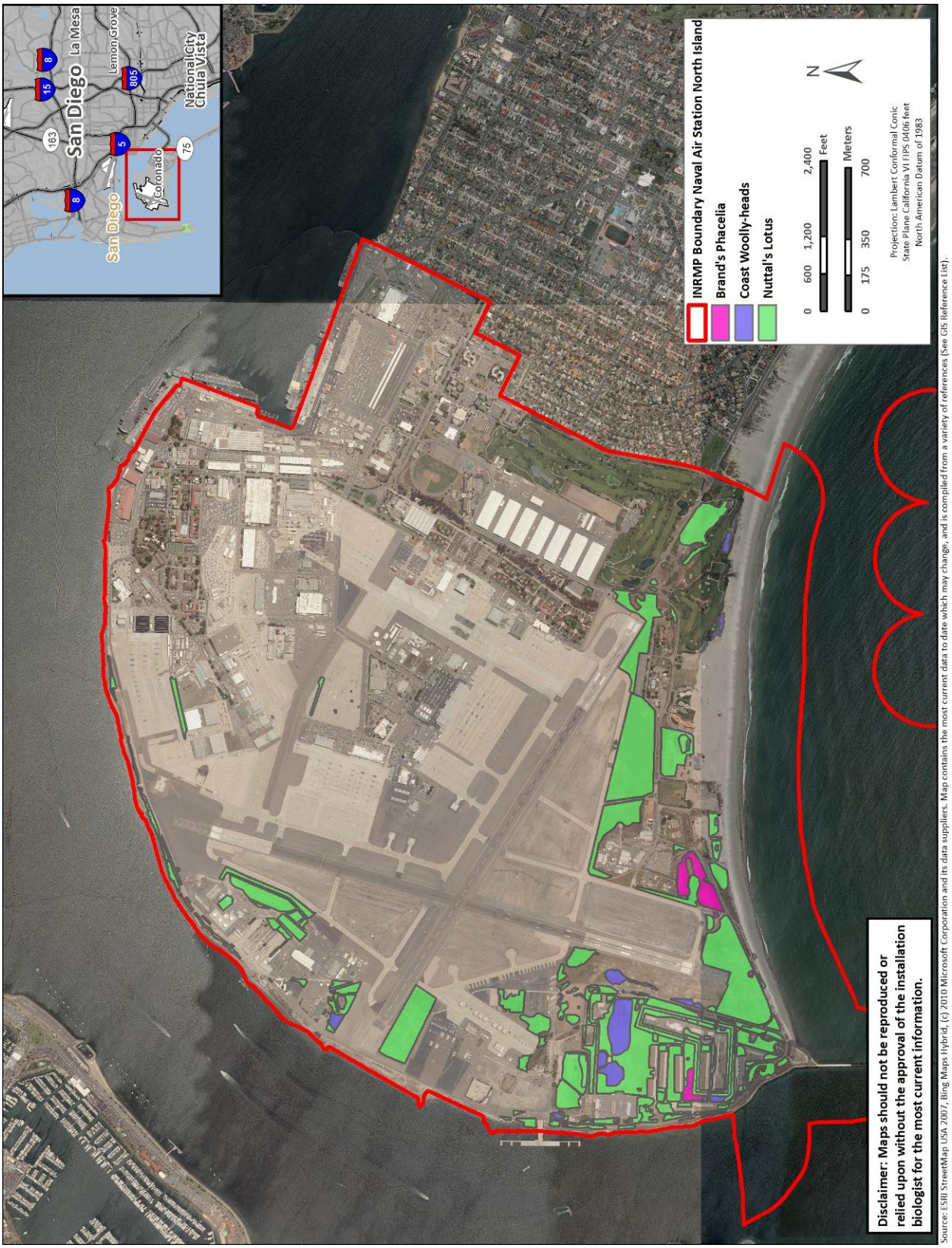


Figure 4-6: Naval Air Station North Island Special Status Plant Species

Current Management

Nuttall's lotus is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations. Invasive plant control and some habitat enhancement are periodically undertaken by the U.S. Navy as part of the project planning (U.S. Navy 2010c).

Management Objective and Strategy

Objective: Maintain populations of Nuttall's lotus on NASNI.

Strategies:

1. Perform invasive species control in areas where Nuttall's lotus is known to exist.
2. Conduct periodic monitoring (recommend at least every 3 years or as appropriate).
3. Complete a vulnerability assessment to assess threats to existing populations.
4. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats). Location and timing.
5. Create a seed bank to increase plant stock in future years and ensure viable populations following drought or flood years.
6. Incorporate Nuttall's lotus into revegetation projects, where appropriate.
7. Ensure coordination with natural resources program specific to Least Tern site preparation.

Coast Woolly-heads

Coast woolly-heads were observed and mapped during the 2004/2005 rare plant surveys (U.S. Navy 2006a) (see **Figure 4-6**). This species is located along the beach and sand verbena-beach bursage in the southern portion of the NASNI, and throughout the installation in sandy ruderal habitat. As it is extremely abundant where it occurs, each population was mapped, and an estimation of the number of individuals was made for each.

Specific Concerns

- Invasive species;
- Training;
- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- Other natural resources management (e.g., Least Tern site preparation).

Current Management

Coast woolly-heads is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the U.S. Navy as part of the project planning (U.S. Navy 2010c).

Management Objective and Strategy

Objective: Maintain populations of Coast woolly-heads on NASNI.

Strategies:

1. Perform invasive species control in areas where Coast woolly-heads is known to exist.
2. Conduct periodic monitoring (recommend at least every 3 years or as appropriate).
3. Complete a vulnerability assessment to assess threats to existing populations.
4. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).

Western Burrowing Owl

Western Burrowing Owls are commonly observed on NASNI. The NASNI owls have been monitored by the U.S. Navy for many years (see **Table 4-6**), with numbers varying from about 8 to 30 pairs (Garcia and Conway 2007). Over the last decade, the number of owls on NASNI has declined significantly.

NASNI had the largest coastal colony of Burrowing Owls in San Diego County (U.S. Navy 2002, Winchell and Pavelka 2004) prior to 2007. The San Diego Bird Atlas (published in 2004) indicated that the most viable population of Burrowing Owls in the county was probably on NASNI (Unitt 2004). From 1990 to 2006, the number of Burrowing Owl nests on NBC varied annually from eight to about 30 pairs, and more recently (2007-2011) numbers declined to one to three pairs annually (**Table 4-6**). In 2012, there were no successful nests on NASNI. During recent winters and migration periods (2009-2011), the number of owls seen on NASNI during each survey was approximately 5 to 10 individuals (U.S. Navy, unpubl. data).

Burrowing Owl nests from 1990-2011 were primarily in the southern and western portions of NASNI.

Specific Concerns

- Development within suitable habitat and habitat fragmentation;
- Lack of nesting burrows;
- Lack of habitat maintenance and mowing due to infrequent mowing. Grass and shrub height within owl habitat should be maintained between 4 to 8 inches;
- Facilities maintenance;
- Other natural resources management (e.g., increased cover of tall native shrubs);
- Predation by owls on Western Snowy Plover and California Least Terns;
- Predation by raptors;
- Lack of sufficient food resources (i.e., insects);
- Regional declines impacting local population;
- Invasive species altering habitat (e.g., fountain grass) and
- Climate change (e.g., changes in temperature or sea level rise) and associate impacts (e.g., changes in food resources).

Table 4-6: Naval Air Station North Island Burrowing Owl Data

Year	NASNI Burrowing Owl Estimate	
	Pairs	Nests
1989	---	14
1990	14	13
1991	17	---
1992	26	---
1993	27	---
1994	---	---
1995	---	20 to 31
1996	---	---
1997	---	---
1998	---	---
1999	11.5	13
2000	---	---
2001	---	8
2002	6	12
2003	6	8
2004	4 to 8	14 to 16
2005	4 to 7	10
2006	4 to 7 (7 unpaired owls)	12
2007	3 pairs (2 unpaired owls)	---
2008	3 pairs (3 unpaired owls)	---
2009	1 pair (3 unpaired owls)	---
2010	1 pair (2 unpaired owls)	---
2011	2 pairs (2 unpaired owls)	---
2012	0 pair (1 unpaired owl)	---

Current Management

The Navy manages owl-nesting sites at NASNI as required in the CVN I EIS as burrowing owl management areas (U.S. Navy 1995). A Western Burrowing Owl management plan is being developed and owl monitoring (including burrow marking) continues every year based on funding availability. Mowing in areas of potential Western Burrowing Owl habitat continues on a regular basis.

The following procedures are common to all Western Burrowing Owl management areas:

- Small signs are placed next to each active burrow to identify the site as a nest and restrict any potentially harmful activities.

- The use of rodenticides and insecticides is forbidden. Herbicides are permitted for use with approval from the natural resource department. The use of pesticides that may affect ground squirrels in Western Burrowing Owl habitat is explicitly restricted in the NBC INRMP.
- Surveys are conducted during the breeding and nonbreeding seasons. Burrows are examined for condition and predation on sensitive species. Adults, and any relocated juveniles, are banded during breeding season surveys using USFWS colored leg bands. Winter surveys are conducted to measure productivity of each site. Artificial burrows have been installed in recent years.
- Burrowing Owls and their habitat are managed to encourage successful breeding and sustainability with the goal of supporting a minimum number of nesting pairs.
- All active burrows are marked with standard markers to ensure that burrows are not destroyed by maintenance activities (e.g., mowing, pest management, and golf course maintenance).
- Beneficial mowing continues each year to allow for the success of Western Burrowing Owl foraging. Mowing contracts include language to avoid burrow markers.
- Ground squirrels are managed to benefit Western Burrowing Owls. Burrowing Owls use burrows created by ground squirrels. Ground squirrel control is done in areas where the ground squirrels increase the BASH risk or negatively affect other essential operations. Golf Course management and maintenance personnel avoid using rodenticides and ground squirrels are not removed in areas that support Western Burrowing Owls. To sustain ground squirrel populations, no rodent control is conducted unless mandated by an outbreak of disease or the rodents are negatively impacting a listed species. Squirrel burrows are never filled, buried, or gassed without consulting the NBC Wildlife Biologist.
- Specific areas that support Western Burrowing Owls as well as current nesting areas and/or nesting areas from the previous year are considered mitigation sites, excluding areas on the Golf Course north of Sherman Road.
- Burrowing Owls that are documented predators of the federally listed California Least Tern and Western Snowy Plover are removed or managed in a manner that eliminates their impact on the listed birds (e.g., covered with a flight cage).

Management Objective and Strategy

Objective: Maintain and enhance Western Burrowing Owl populations on NASNI while considering BASH concerns and impacts to listed species.

1. Average of 12 pairs or active burrows each year over a 3-year period on NAS North Island (from Navy Lodge EA). The Navy will work with USFWS and CDFW to revise the goal for the average number of burrowing owl pairs or active burrows.
2. Coordinate owl management with BASH program.
3. Manage existing Burrowing Owl Management Areas (see **Figure 4-5**) and enhance these areas within Radar Field and Approach to Runway 29.

Strategies:

1. Finalize and implement the NBC Burrowing Owl Management Guidelines.
2. Educate workforce on owl management.

3. Implement site approval process and NEPA to avoid and minimize impacts to owls (e.g., direct development away from habitat, direct lighting away, and minimize predator perches).
4. Install and maintain artificial burrows per the direction in the final NBC Burrowing Owl Management Guidelines.
5. Maintain healthy population of California ground squirrels.
6. Monitor grass growth around airfield and maintain grass height of approximately 4 inches.
7. Reduce predator pressure by continuing BASH and T&E predator control programs.
8. Coordinate with all stakeholders.
9. Control invasive species to provide sufficient open, grassy areas for nesting and wintering.
10. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
11. Continue burrow monitoring through BASH program (weekly surveys during nesting season and twice monthly during non-nesting) and quarterly base-wide surveys at NASNI/NOLF. Ensure that all owl chicks are banded.
12. Ensure owls found preying on threatened, endangered, and candidate species are not lethally removed.
13. Mark all burrows with standard markers and prevent maintenance activities that may destroy burrows.
14. Issue a command instruction from the NBC Commanding Officer supporting and identifying the management practices.

San Diego Black-tailed Jackrabbit

The San Diego black-tailed jackrabbit is commonly observed on NASNI, primarily in the ruderal habitats. They are occasionally observed on the beach and in the sand verbena-beach bursage habitat as well. Although this animal is listed as a California Special Concern Species, it is successfully breeding on NASNI and the population appears to be unique as it occurs in high densities within a low plant diversity habitat (U.S. Navy 2010c).

Specific Concerns

- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise);
- Jackrabbit considered pest in urban/developed areas on NASNI and
- High jackrabbit population leading to elevated BASH risks.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. Plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Maintain healthy populations while considering flight mission and BASH concerns.

Strategies:

1. Educate workforce and residents about the sensitive status of the jackrabbit.
2. To avoid lethal removals, work with local scientists (e.g., San Diego Natural History Museum) and California Fish and Game to relocate jackrabbits to areas of the county where numbers are low.
3. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.

Other Special Status Species with General Management

In addition to birds detected during periodic natural resources surveys, several other special status bird species that are considered USFWS, BCC, California SSC, and/or California CFP have been observed and are known to occur on NASNI (see **Table 4-5** for a complete list). No focused management or surveys currently take place on NASNI for these other special status bird species. In general the management of these species is conducted in accordance with the Birds and Migratory Bird Management objectives (See **Section 4.2.4.5**).

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. Plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Minimize the potential for adverse effects on special status species and their associated ecosystems while protecting the operational functionality of the installation mission by using an ecosystem-based management approach.

Strategies:

1. Investigate the need for implementing research projects to understand ecological requirements of special status species.
2. Continue use of the established NBC Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists and constraints maps to reflect presence of threatened, endangered, and other special status species.
5. Conduct regular surveys for species that may be present on NASNI.
6. Continue monitoring special status species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
8. Augment education program currently conducted at NASNI for military personnel who might have contact with sensitive species or their habitats.
9. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats. Implement erosion control BMPs to ensure adverse environmental impacts to sensitive habitat do not occur.
10. Revegetate with native species included on the NBC recommended plant list. Include suitable sensitive plant species in the NBC recommended plant list.
11. Periodically review the natural resources management program to ensure that management actions do not adversely impact habitat for special status species.
12. Maintain accurate, usable, and informative GIS data for ease in management planning and documentation.
13. Continue to protect existing native plant communities whenever possible.

4.2.6 Invasive Species Management

In 2006 the California Invasive Plant Council (Cal-IPC) updated the 1999 *Exotic Pest Plants of Greatest Ecological Concern in California* inventory list (U.S. Navy 2008f). The updated California Invasive Plant Council (Cal-IPC) inventory ranks invasive species using a *High*, *Moderate*, *Limited*, or *Evaluated but not listed* scale based on ecological impact of the species (U.S. Navy 2008f). Invasive species were ranked based on four criteria that included: (1) the ecological impact of the species on native California ecosystems, (2) potential for species to either be or become invasive, (3) species distribution, and (4) documented levels of the species within a region or ecosystem (U.S. Navy 2008f). A description of each ranking level based on these four criteria as defined by Cal-IPC, is presented below (U.S. Navy 2008f):

High: These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. These species are usually widely distributed ecologically, both among and within ecosystems.

Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology is conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited: The ecological impacts of these species are minor or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasion. Ecological amplitude and distribution are generally limited (these species may be locally persistent and problematic).

Evaluated but not listed: In general, this designation is for plant species that did not have enough information to warrant a rating or the information available indicated that the plant species does not currently have significant impacts within California.

Alert: This is an additional designation for some species in either the high or moderate category, but whose evaluation is limited. The designation alerts managers to species that are capable of rapidly invading unexploited ecosystems, based on initial localized observations and on observed ecological behavior in similar ecosystems elsewhere.

While Cal-IPC is a valuable resource, new infestations appear frequently, and the sheer number of invasive species in the state of California can make it difficult for one agency to track in a timely manner. Installation staff may be required to do independent research to ensure that a potentially invasive species are not introduced to an area. Additionally, some species that have not previously appeared to be invasive may quickly become invasive due to climatic or other factors (Pers. Comm. Munson 2012).

In 2005 NBC conducted a focused invasive plant species survey on NASNI. Several invasive species were observed and identified as high priority for treatment and eradication. Invasive species, observed on NASNI with a Cal-IPC rating are presented in **Table 4-7** and locations of several of the species present on NASNI are illustrated in **Figure 4-7**. In 2010 NBC conducted plant biomass reduction of invasive plants in a 13.28 treatment area on NASNI. The primary invasive plants that were targeted were sea rocket (*Cakile maritima*), wild radish (*Ramhanus sativus*), mustards (*Hirschfeldia incana, Brassica nigra*), and highway iceplant (*Carpobrotus edulis*) (U.S. Navy 2010g).

Invasive species management is a large part of pest management activities. The Federal Noxious Weed Act and Executive Order (EO) 13112 require Federal agencies to control noxious and invasive species on Federal lands. The Federal Noxious Weed Act, enacted January 3, 1975, established a Federal program to control the introduction and spread of foreign noxious weeds into the United States. Amendments in 1990 established management programs for undesirable plants (including noxious weeds) on Federal lands. There are several plant species that are considered noxious and control is mandatory for those found on the Federal list. EO 13112 requires that Federal agencies prevent the introduction of invasive species, detect and control populations of invasive species, and restore native species and habitat conditions in ecosystems that have been invaded. Invasive species are alien species (not native to the ecosystem) whose introduction does, or is likely to, cause economic or environmental harm, or harm to human health. All of the invasive weeds listed on the Federal list are not necessarily found at NASNI, invasive species known to occur on NASNI are presented in **Table 4-7**.

All installation pest management activity is coordinated by the installation Integrated Pest Management (IPM) Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide/herbicides authorized use list. All pesticides/herbicides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager. Chemical and manual exotic and invasive species treatments are required to be entered in the NAVFAC Online Pesticide Reporting System.

Table 4-7: Invasive Species Observed on Naval Air Station North Island

Common Name	Scientific Name	Cal-IPC Rank
Giant reed	*Arundo donax*	High
Slender wild oat	*Avena barbata*	Moderate
European sea rocket	*Cakile edentula*	Limited
Highway iceplant	*Carpobrotus edulis*	High
Tocolote	*Centaurea melitensis*	Moderate
Crown daisy (garland chrysanthemum)	*Chrysanthemum coronarium*	Moderate
Pampas grass	*Cortaderia* spp.	High
Bermuda grass	*Cynodon dactylon*	Moderate
Crystalline iceplant	*Mesembryanthemum crystallinum*	Moderate
Ngaio tree (myoporum)	*Myoporum laetum*	Moderate
Tree tobacco	*Nicotiana glauca*	Moderate
Crimson fountaingrass	*Pennisetum setaceum*	Moderate
English plantain	*Plantago lanceolata*	Limited
Castorbean	*Ricinus communis*	Limited
Russian thistle	*Salsola tragus*	Limited
Brazilian peppertree	*Schinus terebinthifolius*	Limited
Common mediterranean grass	*Schismus barbatus*	Limited
Saltcedar	*Tamarix* spp.	High
Rattail fescue	*Vulpia myuros*	Moderate

Source: U.S. Navy 2006c, Cal-IPC 2006

The California Wildlife Action Plan has identified the growth and spread of plant and animal invasive species in the state as a major concern to maintaining biodiversity in the state (CDFG 2007). As a result, natural resources personnel on NASNI and NAVFAC SW ensure that invasive species are not introduced on the installation, and have developed a program to control the spread of and the eradication of existing infestations of invasive species. Problems associated with invasive non-native plants and animals are currently being addressed at many different levels in California, within the constraints of budgets and staffing resources. Examples include the Cal-IPC which serves as the state's noxious weed coordination center for activities addressing noxious weeds within the state. The NRCS also has a lead role in coordinating an aggressive state/Federal/private effort to eradicate, or at least stop, the spread of invasive species.

Aquatic invasive species disrupt the balance of natural ecosystems by consuming or competing with native plants and animals, altering biogeochemical cycles, and reducing native biodiversity. Invasive marine species have arrived in the ROI from all over the world through direct and indirect means, and for intentional and unintentional purposes. Invasion risks stem from hull fouling, ballast water exchanges, and from aquarium, pet nursery, aquaculture, and seafood industry trade. The following vectors could pertain to the ROI (as identified by CDFG 2006): ships and boats; dry docks, navigation buoys and marine floats; floating marine debris; such as floating nets and plastic detritus; recreational boats and equipment such as small recreational crafts, snorkeling and self-contained underwater breathing apparatus (SCUBA) gear, fins, wetsuits, jet skis, and similar materials; restoration projects due to the movement of marsh, dune, or seagrasses as well as associated organisms; intracoastal spread by unknown and natural migrants to new areas.

Figure 4-7: Naval Air Station North Island Invasive Species Locations

USACE permit projects involving disturbing activities in bay substrates are require for controlling *Caulerpa taxifolia*, an invasive aquatic alga. The U.S. Navy conducts project and training related surveys within the bay and ocean side habitats along with routine inventories in San Diego Bay, such as monitoring eelgrass transects to evaluate eelgrass habitat and confirm the absence of *Caulerpa* spp. Native to the Indian Ocean and believed to be an accidental introduction of the aquarium trade into southern California waters, the alga produces large amounts of a single chemical that is toxic to fish and other would-be predators. In areas where the species has become well established, it has caused ecological and economic devastation by overgrowing and eliminating native seaweeds, seagrasses, reefs, and other communities. This alga is considered a substantial threat to marine ecosystems in southern California, particularly to the extensive eelgrass meadows that make coastal waters such a rich and productive environment for fish and birds.

Several marine invasive plant and animal species are known to occur in the San Diego Bay. These include red algae (*Caulacanthus ustulatus*, *Lomentaria hakodatensis*), seaweed (*Sargassum muticum*, *S. horneri*), brown kelp (*Undaria pinnatifida*), and sea squirts (*Styela clava*, *Styela plicata*, *Polyandrocarpa zorritensis*, *Symplegma reptans)*.

Specific Concerns

- Anthropogenic disturbances (e.g., vessel, vehicle, and aircraft movement within the ocean) can be a potential source of invasive species;
- Intake and discharge of ocean water for training purposes;
- Rapid spread of invasive non-native plants that displace native species and degrade habitat for native floral and faunal species;
- Plants, algae, and marine invertebrates and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

NASNI has developed a program to monitor and control the spread of existing infestations of invasive species, and to determine if new species populations have become established. Assessments of invasive species populations are conducted annually during the rainy season to determine extent of invasive species populations on NASNI. Once assessed, species are prioritized for treatment based on the extent of the infestation, and where the populations are located (e.g., next to listed species habitat). Additionally, the U.S. Navy conducts presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted Disturbing Activity can be carried out in *Caulerpa*-Free Systems. In the event that *Caulerpa* is detected, BMPs are implemented to isolate and prevent the spread of this species.

Management Objective and Strategy

Introduction and Spread of Invasive Species

Objective: Minimize non-native species encroachment in areas where severe to moderate encroachment occurs, and in new areas of encroachment where infestation might be spreading but is not yet severe.

Strategies:

1. Annually review and update NBC recommended plant list.

2. Develop and implement an Invasive Species Management Plan to control the spread of invasive species on NASNI. The plan should include specific prescriptions to evaluate individual invasive species, to identify targeted species, to control further spread of targeted species, and to develop and implement a program to monitor species abundance.
3. Conduct annual surveys to determine whether controls on existing infestations of species have been effective, and whether new populations have become established.
4. Develop and implement a review process for all projects that include a landscaping component to ensure non-native species are not introduced.
5. Coordinate with the Natural History Museum to identify unknown species that may be invasive.
6. Develop outreach and education materials for distribution within the NASNI community.
7. Continue to conduct presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted disturbing activity.

Early Detection and Rapid Response

Objective: Enhance current early detection and rapid response management capabilities.

Strategies:

1. Ensure the bio-security plan establishes early detection protocol and rapid response options, to include the following:
    a. Establish adequate monitoring locations to detect invasive species introduction and spread.
    b. Develop a communication network as a rapid response tool to quarantine specific invaders and identify the pathway.
    c. Support rapid response by determining funding sources, contract vehicles, and cooperative mechanisms that can be accessed quickly.
    d. Prepare Instructions that includes measures to prevent the introduction of invasive non-native species, detect early and respond rapidly to new introductions, and control and monitor established populations.
2. Prepare educational materials for NASNI military and civilian employees, contractors, and other visitors as a tool in early detection of non-native terrestrial species.

Project Planning

Objective: Ensure control and management of invasive species is included in project planning and maintenance projects.

Strategies:

1. Address non-native species in NEPA and other ground disturbing project plans.
    a. Ensure funding is secured for non-native removal during all phases (including post-project), if applicable.
    b. Monitor projects to ensure personnel are following BMPs, conservation measures, and other guidelines and requirements.

2. Manage roads, access routes, and new construction sites to minimize the spread of invasive non-native species and ensure that road or access routes are not created without authorization and project review approval.
    a. Require that maintenance or repair of existing roads stay within established footprints.
    b. Clean roadside mowing equipment of adhering dirt and vegetation between mowing cycles.
    c. Schedule roadside mowing to minimize weedy species seed distribution.
3. If applicable, project proponent must include invasive species treatments and revegetation of temporarily disturbed areas in project description. Wash vehicles and personnel boots, bags, and clothes before coming on site; before moving to a different site on bases, as applicable; and before leaving base, as applicable.
4. Implement standard operating procedures to ensure personnel are following guidelines.

Coordination with Regional Agencies

Objective: Promote cooperative interagency efforts to collect and analyze comprehensive monitoring data, including shared funding and staffing.

Strategies:

1. Coordinate with regional and local agencies on efforts undertaken by NASNI to control the spread of invasive and exotic species.

4.2.7 Grounds and Landscape Maintenance

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat. Planting windbreaks around buildings and parking areas, establishing wildflower areas, and reducing mowing are all ways to spend dollars more wisely, educate the public about the benefits of reduced maintenance, and become better stewards of the environment. In managing natural resources in the cantonment area, NASNI acknowledges its responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (1994). The memorandum's requirements include the following:

- Using regionally native plants for landscaping;
- Using construction practices that minimize adverse effects on the natural habitat;
- Reduce pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- Implementing water-efficient practices and
- Creating demonstrations of these practices to promote their use elsewhere.

Landscaping opportunities exist throughout NBC in association with administration buildings, training facilities, recreational areas, and housing. Normal grounds maintenance operations focus on lawn care, drainage ditch maintenance, road maintenance, landscaping maintenance, and pest management.

Specific Concerns

- Water use conservation requirements.

Current Management

1. The installation's representative botanist and wildlife biologist and NAVFAC SW landscape architect monitor landscaping and grounds projects to ensure that all projects follow the guidance contained in the NAVFAC SW recommended plant list (see **Appendix I**). This guidance includes landscape designs and plant lists shall be reviewed and approved by the installation botanist, installation wildlife biologist, and NAVFAC landscape architect in the planning stages of project design.
2. Ensuring that projects comply with the most recent version of the landscaping plant list.
3. It is vital that coordination with the U.S. Navy points of contact listed above occur early in the planning process to determine site-specific needs and constraints. Please note that not all species on this list are appropriate for all settings. For example, in some areas trees may not be approved due to the presence of federally listed species.
4. Additional species may be included in the landscape design contingent upon the approval of the U.S. Navy points of contact listed above. All plants shall be verified for availability in size and quantities needed for each project prior to specifying on plans or scopes of work.
5. The list is updated periodically. Prior to initiating a project, please obtain the most recent list from either of the U.S. Navy points of contact listed above.

Management Objective and Strategy

Objectives: Maintain an aesthetically pleasing landscape on NASNI that preserves natural ecosystem functions, conserves water in landscaped areas, and promotes pollinator species.

Strategies:

1. Provide professional advice to assist the grounds landscaping and maintenance program in the use of native species as identified in the NBC recommended plant list.
2. Maintain and annually update the list of recommended plants that can be used in landscaping.
3. Develop and implement BMPs for grounds maintenance at NASNI (e.g., water conservation). Periodically review the Landscape Management Plan to ensure plan BMPs still meet installation needs.
4. Restore native plant communities and collect seeds of native species for submittal to Natural History Museum.
5. Develop monitoring metrics, and set targets to ensure management strategies are meeting goals and objectives.

4.2.8 Pest Management

Authority for pest management activities on NASNI is directed under the Federal Insecticide, Fungicide and Rodenticide Act as amended (7 U.S.C. 136r-1), DoD Instruction 4150.07, San Diego Metro Area Installations (SDMAI) Integrated Pest Management Plan (IPMP), December 2009, and OPNAVINST 6250.4C, Pest Management Programs, OPNAVINST 5090.1C, Chapter 17. IPM is a sustainable

approach that incorporates the use of multiple techniques to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control might be an option used in conjunction with other methods. IPM strategies depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts. DoD Instruction 4150.07 establishes annual goals, or measures of merit, for IPM that include the following:

- *Goal 1.* 100 percent of DoD installations will have current pest management plans.
- *Goal 2.* Maintain the 55 percent pesticide use reduction achieved from 1993-2003 (in pounds of active ingredient).
- *Goal 3.* 100 percent of all installation DoD and contract pesticide applicators will be appropriately certified or licensed.

In addition, OPNAVINST 6250.4C directs the U.S. Navy and Marine Corps to (DoN 2012):

a. Prevent pests from adversely affecting military operations and missions.

b. Safeguard human health and morale by controlling pests that transmit diseases, annoy personnel, or represent a hazard to public health or safety.

c. Maintain and extend the service life of facilities, structures, and materiel by preventing economic pest damage.

d. Enhance the natural environment through the careful protection and management of ecosystems, endangered and threatened species, wildlife, watersheds and water quality in order to maintain optimal biodiversity.

e. Ensure pesticide use is safe and consistent with label directions.

f. Use the principles of IPM to avoid and minimize the use of pesticides when nonchemical alternatives are available and cost effective.

g. Comply with quarantine laws and regulations as related to protecting plants, animals and human health.

h. Comply with laws and regulations concerning pesticide storage, application, disposal of hazardous wastes, and transport of hazardous materials and substances.

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations. The NBC Instruction 5100.2G (10 Jan 2006) regarding Animal Control on board Naval Base Coronado Installations and Dog Beach and the Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

1. Installation residents should keep and feed pet animals indoors and under close supervision.
2. Support programs to neuter or spay animals before they reach reproductive age.
3. Require routine vaccinations for rabies and other diseases.
4. Require microchipping registration of all pets brought onto installations.
5. Prohibit the feeding of feral animals on the installation.
6. Provide educational materials to pet owners regarding installation regulations and general pet management.
7. Never abandon animals.

8. Comply with all humane and animal control regulations at the Federal, state, and local level.
9. Except for guide and military working dogs, animals are not allowed in the barracks, work spaces, or recreational facilities at any time, and those in duty status are not permitted to bring animals on board.
10. All dogs must be properly vaccinated, on leash at all times, must not become a nuisance due to noise/odor, and must be picked up after.
11. No animals shall be left unattended or in a poorly ventilated vehicle.

Specific Concerns

- Water use conservation requirements and
- Overuse of fertilizers.

Current Management

The IPMP for SDMAI, which includes a site-specific plan for NBC, describes pest management requirements, identifies pests for SDMAI, outlines roles and responsibility for IPM at each SDMAI, outlines procedures for pest control at each facility, and describes the administrative, safety, and environmental requirements of the program. Specific aspects of the program include pest identification, pesticide management (includes storage, transportation, and use and disposal), environmental health and safety, emergency pest management, and available program resources (U.S. Navy 2009a). All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager.

Threatened, endangered, or candidate species can be directly or indirectly affected by pest control activities. The following pest management operations require natural resource manager review:

- Weed and outdoor pest control in endangered/threatened species habitats and natural areas;
- Outdoor large area insecticide fogging;
- Pesticide applications to, over or adjacent to water bodies, waterways, or wetlands;
- Installation of bird barriers, exclusion devices, or repelling devices;
- Wildlife and feral animal control and
- Invasive species control.

Natural resources managers will obtain any necessary approvals, consultations, or permits. No pest management activities will violate the practices described for threatened, endangered, or candidate species by the California Department of Pesticide Regulation. NASNI will use the California Department of Pesticide Regulation Endangered Species Project website (*http://www.cdpr.ca.gov/docs/es/index.htm*) to determine the best chemicals to control pest species and their use limitation.

In addition, management of feral animals is a component of pest management at NASNI. Feral animals, especially feral cats and dogs, pose a potential threat to public health and safety. They also pose a threat to wildlife, especially federally listed species and migratory birds. Existing U.S. Navy policy included in SECNAVINST 6401.1A of August 16, 1994 regarding veterinary health services prohibits dogs, cats, and other privately owned or stray animals from running free on military installations. The CNO issued a policy letter on January 10, 2002 that clarifies the application of SECNAVINST 6401-1A. An objective of the existing policy is to control feral animals in a humane manner to prevent injury or disease to

U.S. Navy personnel and eliminate adverse impacts on native wildlife. The instruction requires U.S. Navy commands to institute proactive pet management procedures in order to prevent establishment of free-roaming cat and dog populations.

The 2009 SDMAI IPMP identifies a number of strategies to conduct pest management at U.S. Navy installations in the San Diego Metro area.

Management Objective and Strategy

Implementation of the Pest Management Plan

Objective: Ensure compliance with environmental legislation, regulations, and guidelines.

Strategies:

1. Update the SDMAI as necessary to ensure that the plan reflects changes in pest populations and current management issues. Incremental updates to the plan will be conducted annually.
2. Implement pest management controls from the SDMAI and other pest-related guidance and plans.
3. Conduct surveys of pests that pose a potential health risk to humans or natural resources.
4. Implement the control of wildlife and the effective elimination of concentrated and diseased populations.
5. Monitor pest and invasive species populations. Track usage of pesticide active ingredients and man-hours spent controlling pest and invasive species during implementation to ensure that the management strategies are sufficient.

Management of Feral Animals

Objective: Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations. The Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

Strategies:

1. Develop and implement a program to control feral animals on NASNI. Control populations of feral animals on NASNI.
2. Conduct surveys when appropriate to determine impact of feral animals on native species on NASNI.
3. Installation residents should keep and feed pet animals indoors and under close supervision.
4. Support programs to neuter or spay animals before they reach reproductive age.
5. Require routine vaccinations for rabies and other diseases.
6. Require microchipping registration of all pets brought onto installations.
7. Prohibit the feeding of feral animals on the installation.
8. Provide educational materials to pet owners regarding installation regulations and general pet management.
9. Comply with all humane and animal control regulations at the Federal, state, and local level.

4.2.9 Outdoor Recreation and Public Access

NASNI provides some outdoor recreation opportunities for military personnel and their families, and DoD civilian employees. Recreational use of natural resources is an integral part of ecosystem management. The outdoor recreation program is based on providing quality experiences while sustaining ecosystem integrity. Among the outdoor recreation activities provided are a few recreational fields, picnic areas, hiking, jogging, cycling, wildlife viewing, and recreational fishing.

Unfortunately, high levels of recreational use can have negative impacts on the environment so constant monitoring of recreational use is necessary to manage potential impacts and prevent permanent damage to the natural and cultural resources from occurring.

Specific Concerns

- Overuse of recreational areas on NASNI and
- Erosion and sedimentation.

Current Management

The outdoor recreation activities provided at NASNI include athletic/recreational field areas, tennis courts, volleyball courts, basketball courts, picnic areas, swimming pools, golf course, oceanfront beaches, beach cabanas, fishing pier, jogging, cycling, walking and wildlife viewing trails. In addition, recreational access should be compliant with the requirements associated with the provisions of the American with Disabilities Act of 1990 as amended and the Disabled Sportsman Access Act as amended.

Management Objective and Strategy

Objective: Provide quality outdoor recreation experiences while sustaining ecosystem integrity, and not conflicting with mission priorities.

Strategies:

1. Continue to limit public access and outdoor recreation for reasons that include general security and liability issues, the presence of federally endangered and threatened species, and fire safety.
2. Develop an outdoor recreation plan for NASNI. Identify and evaluate suitable outdoor recreation opportunities for installation personnel in undeveloped areas that do not contain or have the potential to impact sensitive species.
3. Develop and distribute outreach and education materials for recreational users of NASNI.

4.2.10 Law Enforcement of Natural Resources Laws and Regulations

Specific Concerns

- Unauthorized access or activities in natural areas, or areas used by nesting birds or marine mammals, may disrupt and limit the viability of native populations or habitats and
- Gaps in communication between NBC Environmental Division and NBC Force Protection, related to enforcement of closure areas or other areas requiring special protection, could result in mismanagement of natural resources, or non-compliance with Federal environmental regulations.

Current Management

NASNI has established the following objectives for enforcement: (1) Enforce laws and regulations pertaining to the implementation of the natural resources program; (2) Integrate natural resources enforcement into the overall natural resources program; and (3) Use enforcement personnel to enhance the natural resources program at NASNI.

There are no game wardens permanently stationed at NASNI. In 2011, NBC established a new partnership with CDFW Law Enforcement in which CDFW provided a specified number of weekend patrols focused primarily during the Least Tern and Snowy Plover nesting season. The game warden patrols are aimed at reducing recreational impacts on the nesting terns and plovers. NBC plans to continue this partnership as funding is available. The DoD police have the authority of the Commander (exclusive jurisdiction) and of the Sikes Act to enforce all Federal laws relating to the management of natural resources at NASNI, including the ESA, CWA and MBTA.

Management Objective and Strategy

Objective: Ensure compliance with state and Federal natural resources laws and regulations.

Strategies:

1. Provide training to personnel responsible for enforcement of applicable laws and regulations.
2. Continue to protect threatened, endangered, and candidate species and the natural communities.
3. Cooperate with other agencies, particularly the USFWS and CDFW, to ensure that natural resources laws are adequately enforced.
4. Periodically review Federal and state laws and regulations to ensure natural resources laws and regulations are adequately enforced.

4.2.11 Environmental Awareness and Outreach

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The NBC approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about the unique and valuable natural resources on the installation, the more responsibly they act toward using them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Activities such as fish stocking, land rehabilitation, and wildfire suppression can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public support these easily understood efforts. However, such issues as protection of sensitive areas for little known plant and wildlife species, prescribed burning, and permit fees and their uses require effective conservation communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

At NASNI a monthly bird walk was initiated in 2008 aimed at military and civilian personnel. This bird walk has been a valuable tool for promoting awareness and increasing interaction between natural resources personnel and the public. In addition, a Snowy Plover interpretive panel was installed in 2010 and a natural resources educational DVD and brochure was produced in 2011.

Specific Concerns

- Communication about the natural resources of NBC, environmental regulations, and protocols for situations where wildlife is trapped or injured, or birds are nesting or roosting in unwanted areas, may not be effectively conveyed due to staff turnover;
- Public access restricted in certain areas due to security and military training and
- Lack of outreach facilitator.

Current Management

The Sikes Act requires each military service to support environmental education for personnel and for the public where and when it is compatible with military safety and security needs. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program. The conservation effort on site will continue to expand as this INRMP and subsequent natural resource management programs are undertaken to ensure efficient and thorough management of the natural resources on base. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program. On NASNI, volunteers have been utilized regularly to install artificial burrows to benefit the Burrowing Owl population.

Management Objective and Strategy

Objective: Provide people on the installation and in the surrounding community with an understanding of the NASNI natural resources program. Promote environmental stewardship through training and awareness.

Strategies:

1. Provide decision makers with the information they need to make educated decisions about installation natural resources.
2. Provide general conservation education to the NASNI community, including the means to attend training.
3. Periodically review outreach and education materials to ensure that each is still current and meeting the goals of the outreach and education program.
4. Reach out to local community groups for volunteers.
5. Establish a watchable wildlife program.
6. Educate the local community, as well as installation personnel and tenants, about the installation natural resources program. Develop and distribute educational materials about the NASNI natural resources program to stakeholders near NASNI (e.g., neighborhoods, county, etc.). Periodically review outreach and education materials to ensure that each is still current and meeting the goals of the outreach and education program.
7. Reach out to local community groups for volunteers.
8. Establish a watchable wildlife program.
9. Educate the local community, as well as installation personnel and tenants, about the installation natural resources program. Develop and distribute educational materials about the NASNI natural resources program to stakeholders near NASNI (e.g., neighborhoods, county, etc.).

4.2.12 Geographic Information Systems Management, Data Integration, Access and Reporting

GIS is a computer system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface. GIS is used to create information layers used to develop and manipulate maps. GIS data are represented as different layers each containing data on a particular kind of feature (e.g., soils, wetlands, roads) from surveys, inventories, and other projects with spatial information. Each feature is linked to a position on the graphical image of a map. The data layers are organized to create maps and to perform analyses.

GIS will also provide support for the entire environmental program and the training community. NBC will use GIS for complex analyses such as project siting, data interpolations, and risk assessments.

GIS software enables installation staff to capture, store, update, manipulate, analyze, and display all forms of geographically referenced data and tabular information about NBC. The management of reports in one central database enables users to quickly respond to data calls and identify gaps in natural resources management. The training of the NBC Environmental, Facilities Management, and Training staff and the allocation of their time to data entry, mapmaking, analysis of data, and interpretation of the results will determine the success of the installation GIS.

Once fully developed, the installation central databases can be used for the following:

- Providing maps;
- Selecting suitable areas for construction activities;
- Planning land rehabilitation projects;
- Providing special maps for Environmental Awareness materials;
- Ensuring avoidance of cultural resources during ground-disturbing projects;
- Ensuring avoidance of rare species habitats and other areas of special concern during construction projects;
- Identifying site options for use during NEPA evaluation of alternative sites;
- Calculating drainages and water flows;
- Determining Neotropical bird habitat preferences and
- Checking natural resource contractor deliverables.

Specific Concerns

- GIS maps and shapefiles may not have appropriate metadata that identifies who, when, and for what purposes the data were collected;
- GIS files submitted may not reflect data in reports submitted and needs to be verified, both past and future projects and
- Natural resource management decisions could be misguided if there are information gaps in the natural resources database, or if the database is not kept current.

Current Management

Currently, there is no central repository for GIS data and reports, research, and other documentation. GIS data is submitted to Navy Assessment Management or the GIS IDIQ contractor. CNIC and NAVFAC guidance on metadata is being developed, but has not yet been finalized.

Management Objective and Strategy

Objective: Collect, store, develop, and maintain data about historical conditions, trends, and current status for critical indicators of ecological integrity and sustainability.

Strategies:

1. Use GIS and other natural resources data as benchmarks for developing future natural resources management goals and objectives.
2. Ensure that central database information is available to biologists, planners, contractors, and others in a quick and timely manner.
3. Annually review GIS data to advise resource managers of needs to update data sets during budget planning and programming.
4. Develop specific language that will be included in all contracts to ensure all spatial data produced are fully compatible with the installation GIS database.
5. Develop a standardized system for recording and mapping significant resource observations (e.g., plants, wildlife, erosion, damage) when incidentally encountered.
6. Provide annual funding for one person to be responsible for updating and maintaining the GIS database. This should include the necessary hardware, software, and training for the use of GIS.
7. All reports and other GIS data delivered and incorporated into the Navy GIS database.

THIS PAGE INTENTIONALLY LEFT BLANK

5. Naval Amphibious Base Coronado and Silver Strand Training Complex North

5.1 Purpose, Approach and Rationale

Natural resources management at Naval Base Coronado (NBC) strives to integrate biodiversity conservation and an ecosystem-based approach into an adaptive management framework compatible with the military mission. As a result, the natural resources program consists of multiple resource disciplines that are frequently interconnected and share similar objectives. Management projects and plans often consist of multiple program elements with several different resource experts collaborating together.

A number of items have been identified in subject areas that affect the natural resources present on and immediately adjacent to NBC. The purpose of this section is to identify goals, objectives, and strategies for natural resources management on NAB and Silver Strand Training Complex North SSTC-N.

The goal for management of natural resources at NBC **is to provide an adaptive ecosystem-based conservation program that will efficiently support the NBC mission and provide for sustainability of natural resources.**

Specific concerns, current management, and the management strategy for each natural resources area are described below. A summary of the strategies as well as the estimated time frame for completion is presented in **Appendix C, Tables C-1** and **C-3 (Project Table).**

Some of the strategies described in this section will be accomplished through interactive partnerships with other Federal, state, and local organizations. Natural resources staff at NBC will initiate partnerships based on the benefits to the regional ecosystem and the local environment.

5.2 Natural Resources Current Conditions and Management

5.2.1 Topography, Geology and Seismicity

The topography of the lands around San Diego Bay is characterized by gently sloping ground at an average elevation of about 3 meters (10 feet) above mean sea level (AMSL). Silver Strand peninsula, which lies between San Diego Bay and the Pacific Ocean, is generally level, with slopes typically between 1 and 5 percent. The average elevation of Silver Strand peninsula, including SSTC-N, is also about 3 meters (10 feet) AMSL, and the elevation rarely exceeds 4.6 meters (15 feet) AMSL (DoN WESTDIV 1989 and U.S. Navy 2010c).

SSTC-N is underlain by the Quaternary-age Bay Point Formation and surficial deposits of natural beach sands and dredge fill soils. The Bay Point Formation is composed of marine, lagoon, and nonmarine sources of poorly consolidated fine- and medium-grained, pale brown, fossiliferous sandstone (USDA 1973). Beach deposits are composed of unconsolidated sand and silt derived from many sources as a result of longshore drifts and alluvial discharges from major stream courses (U.S. Navy 2010c).

San Diego County lies almost entirely within the Peninsular Ranges geomorphic province that occupies the western portion of the Peninsular Ranges Geomorphic Province, a region noted for its intense seismic activity (Burns 1997 and U.S. Navy 2010c). The coastal plain consists of numerous marine and nonmarine terraces of sedimentary rocks dissected by stream valleys. As a result of this grinding, earthquakes and past volcanic activity, in combination with weathering processes, have largely shaped San Diego County into a geologically diverse area (U.S. Navy 2006c). Seismic structures running close

by include the Rose Canyon Fault Branch, which runs north to south along the eastern side of the Silver Strand, Elsinore Fault, runs diagonally from the northwest to southeast across the county through Lake Henshaw. The Rose Canyon Fault is considered the most potentially damaging fault in the area (U.S. Navy 2006c) and is believed to have the potential to produce a 7.5 magnitude quake. The San Jacinto Fault, further to the east and approximately paralleling the Elsinore Fault, has been the most active of San Diego County's fault zones in recent times.

There are multiple faults that either border or run through NBC area. The NAB Coronado and SSTC-N fault zones extend from offshore of Coronado and the Silver Strand toward downtown San Diego. The Silver Strand runs through the northern end of the NAB SSTC, while the Coronado fault occurs just north of the training complex (**Figure 5-1**). Both fault zones begin offshore over 3,000 meters (9,843 feet) from the city of Coronado. There are two faults are offshore and over 3,000 meters (9,843 feet) from Silver Strand Training Complex South (SSTC-S) (**Figure 5-1**).

5.2.2 Watershed Management

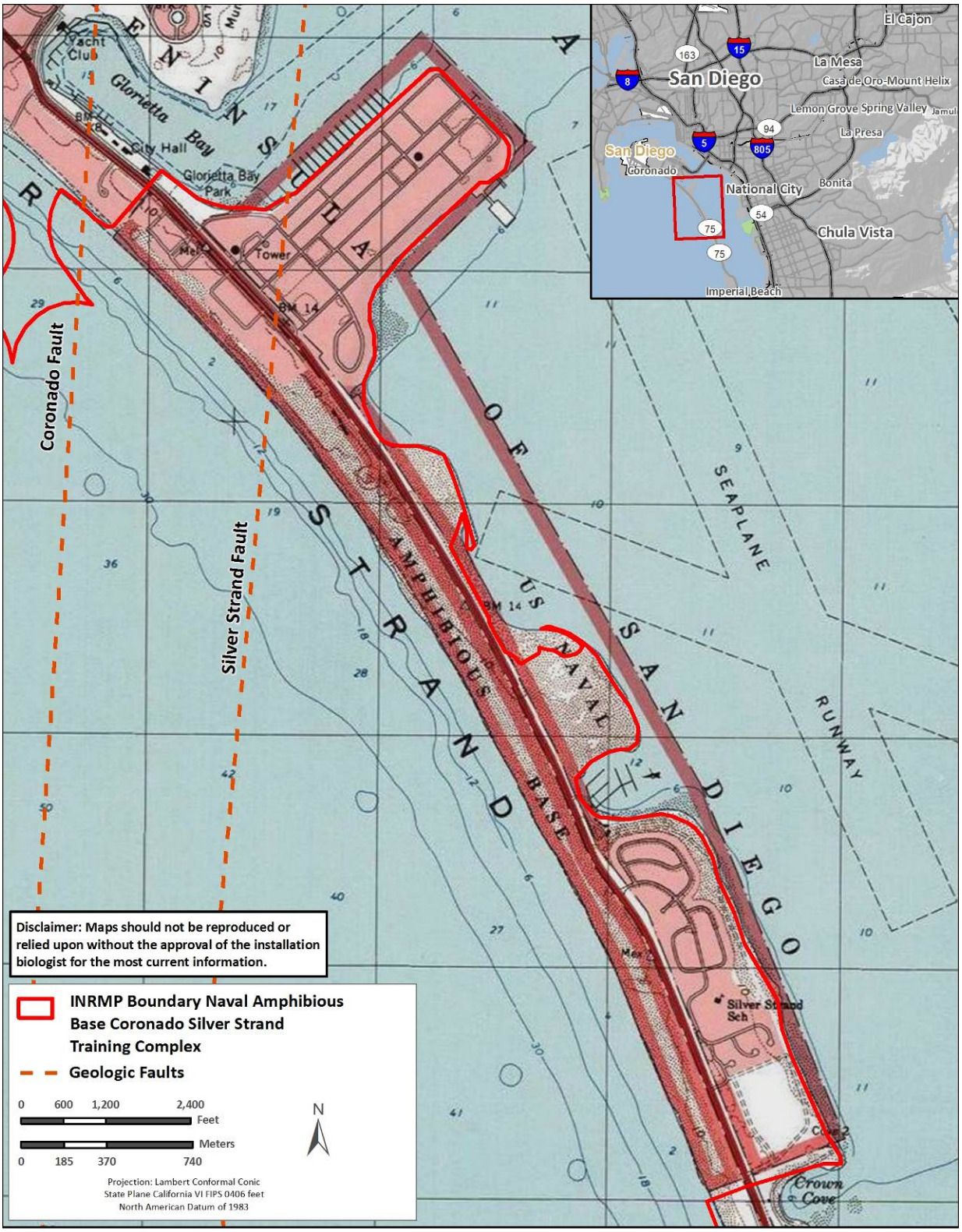
Watershed management is important to natural resources management because it directly affects both surface water and groundwater quality and is critical to maintain valuable aquatic habitats.

Healthy, stable soils are the foundation of a healthy ecosystem. As soils lose their structure and begin to erode, other systems also begin to fail. Vegetation and wildlife decline in numbers and diversity, and the quality of surface water declines as it becomes loaded with eroded sediments. Some soil types, such as those found at SSTC-N, took centuries to develop and are not easily replaced or repaired if lost or damaged. Inherent in the clay and sandy nature of Naval Amphibious Base (NAB) Coronado and SSTC-N's soils is a risk of significant erosion when vegetation is removed or, soil structures are disturbed. The fragile nature of these soils make the protection of NAB Coronado and SSTC-N's soils vital for maintaining many of the functional systems that make up a healthy ecosystem.

5.2.2.1 Soils

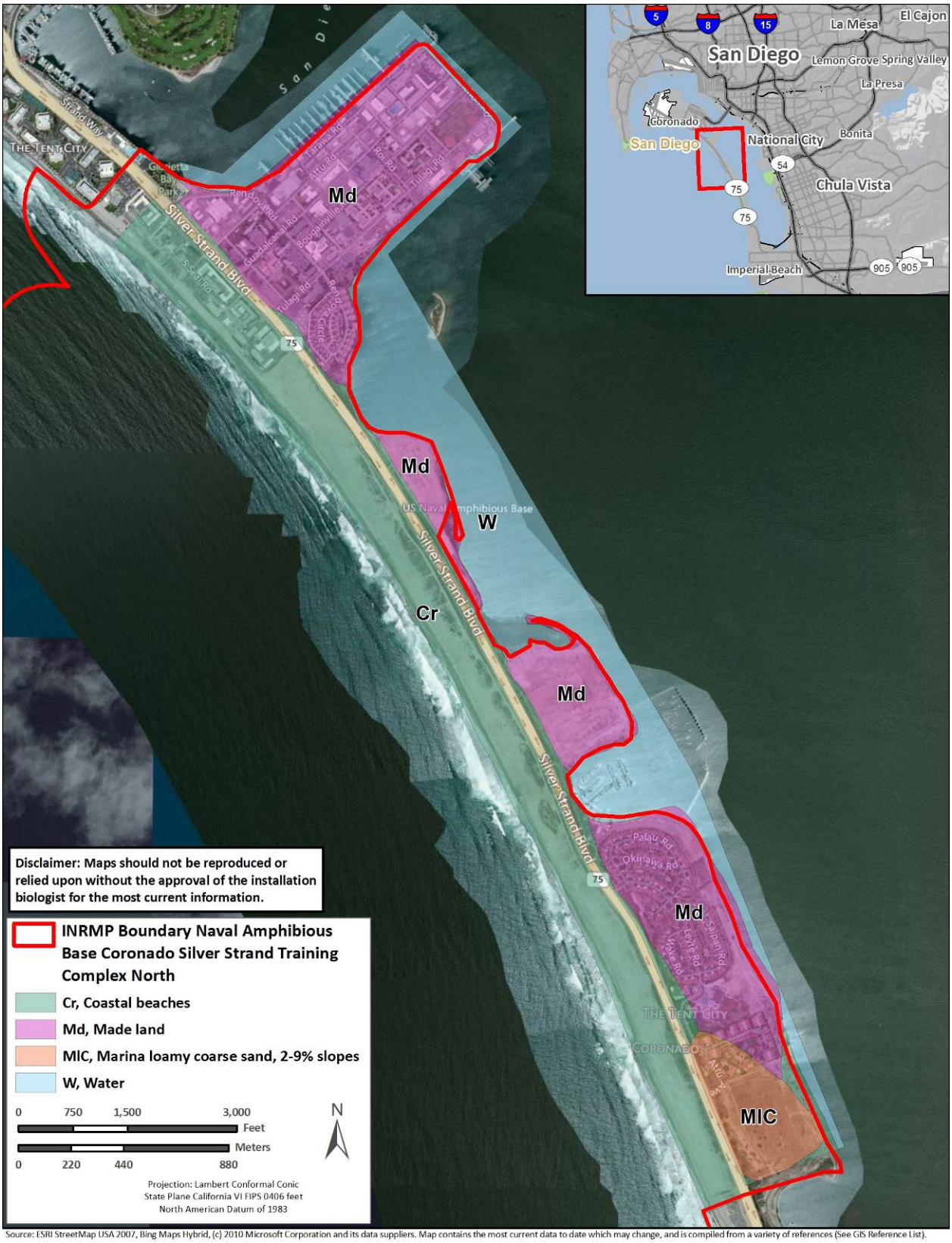
NAB Coronado soils are comprised of fill material dredged from San Diego Bay. The NRCS mapped three soil types on NAB Coronado and SSTC-N (NRCS 2011). Soils on NAB Coronado and SSTC-N are shown in **Figure 5-2**. These soil types include (U.S. Navy 2010c and NRCS 2011):

- ***Marina loamy coarse sand (MIC).*** Approximately 8 percent of NAB Coronado and SSTC-N is composed of Marina loamy coarse sands, with 2 to 9 percent slopes. Marina soils are situated on short rolling dune-like slopes at elevations of 30.5 to 213 meters (100 to 700 feet). They formed in old sand dunes near the coast. Marina soils are somewhat excessively drained, have slow to rapid runoff, and have moderate permeability. Marina loamy coarse sands are predominantly located within the southeastern portion of SSTC-N.
- ***Made land (Md).*** Approximately 37 percent of NAB Coronado and SSTC-N is composed of made land. Made land consists of smooth, level areas that have been filled with excavated and transported soil material, paving material, and soil material dredged from lagoons, bays, and harbors. Made land is primarily on the eastern side of the SSTC within the developed portions of NAB Coronado and SSTC-N.
- ***Coastal Beaches (Cr).*** The western coastline on NAB Coronado and SSTC-N, comprising approximately 50 percent of the total acreage of NAB Coronado and SSTC-N, are composed of coastal beaches with 1 to 5 percent slopes.



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 5-1: Naval Amphibious Base Coronado and Silver Strand Training Complex North Topography and Faults



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 5-2: Naval Amphibious Base Coronado and Silver Strand Training Complex North Soils

- ***Tidal Flats (Tf).*** Level, barren, saline soils inundated daily by tidal waters. Higher elevations may support sparse salt-tolerant vegetation. Texture ranges from very fine sand to clay. High shrink-swell potential, severe erodability potential.

Soils on the bayside portion of SSTC-N are mostly hydraulic fill. These soils are composed of loose to moderately dense, silty, fine- to medium-grained sand with gravel and shell, and become saturated at a depth of about 8 meters (26 feet) below grade (U.S. Navy 1992b). This fill is underlain by Bay Point Formation deposits (U.S. Navy 2010c).

Soils on the southern bayside portion of SSTC-N consist of Marina Loamy Coarse Sand. These soils are very deep, excessively drained, loamy coarse sands to loamy sands that occur on beach ridges. These soils have a high infiltration rate, a slow to medium runoff rate, and a severe erosion potential. The topsoil is loamy coarse sand to loamy sand, ranging from 15 to 36 centimeters (6 to 14 inches) thick. The subsoil is loamy coarse sand to loamy sand 69 to 119 centimeters (27 to 47 inches) thick (USDA 1973 and U.S. Navy 2010c).

The ocean side portion of SSTC-N is mapped as coastal beaches, sandy and gravelly areas along the open shoreline of the Pacific Ocean. Beach soils sampled on Silver Strand by the U.S. Army Corps of Engineers (USACE) are a mixture of fine-grained silty sands and well-graded to poorly graded medium-grained sands, with a fine grains content of 1 to 5 percent (USACE 2003). Beach soils have a high infiltration rate. The rate of water transmission is also high, resulting in low runoff potential. These soils are highly erodible. The beaches are exposed to constant sea-action and coastal winds and are, therefore, subject to further erosion. The dunes along the ocean side of Silver Strand peninsula are also subject to erosion from prevailing coastal winds, surf, storm surge, and military training maneuvers (U.S. Navy 2010c).

Specific Concerns

- Invasive species;
- Development/anthropogenic influence;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

OPNAVINST 5090.1C CH-1 requires that installation sources of dust, runoff, silt, and erosion debris be controlled to prevent damage to land, water resources, equipment, and facilities, including adjacent properties. An erosion-and-sediment-control plan must be implemented where appropriate. Maintenance of vegetative cover is consistent with ecosystem management goals expressed earlier. Other materials can be used including bio-engineered bank stabilization techniques, gravel, fabrics, riprap, and recycled concrete and pavement that are environmentally safe and compatible with the site. Where bare ground is necessary, other measures for dust, sedimentation, and erosion control should be implemented (e.g., check dams, wind breaks, diversions). To minimize land maintenance expenditures and help ensure environmental compliance, physically intensive activities should be located on those areas least susceptible to erosion. The erosion potential of a site and adjacent water resources need to be identified and analyzed in preparing development, training, and land use plans.

Management Objective and Strategy

Objective: Minimize soil compaction and restore erosion sites.

Strategies:

1. Tailor land uses to appropriate soil types;
2. Continue to implement plans for eroded site rehabilitation;
3. Identify additional sites for land rehabilitation planning and
4. Survey areas where soil erosion and compaction might occur to ensure that best management practices (BMPs) within the erosion control plan are implemented and are effective.

5.2.2.2 Water and Sediment Quality

There are no naturally occurring drainages or other water courses on NAB Coronado and SSTC-N (U.S. Navy 2006c).

SSTC is part of the Coronado Subunit of the Otay Hydrographic Unit; Groundwater on Coronado Peninsula, because of its proximity to San Diego Bay and the Pacific Ocean, is too saline for potable uses (RWQCB 2007 and U.S. Navy 1992b). Accordingly, the *Basin Plan* exempts the Coronado Subunit from Municipal Groundwater as a beneficial use (RWQCB 2007).

All U.S. Navy facilities are subject to the statewide General Industrial Stormwater Permit. The U.S. Navy's General State Water Quality Certification was approved on November 2, 1998 (98C- 127), and it is by way of compliance with such permits that water quality is managed by the U.S. Navy. San Diego Bay is on the Clean Water Act (CWA) 303(d) list for impaired water bodies. In accordance with CWA Section 303, Total Maximum Daily Loads (TMDLs) will be established for water bodies that are listed as impaired. These are the maximum levels of pollutants that a water body can receive while continuing to maintain specific water quality criteria targets. There are five sites around San Diego Bay that are considered by the Regional Water Quality Control Board (RWQCB) to be "toxic hot spots," none of which are associated with NBC (RWQCB 2010).

Specific Concerns

- Erosion and sedimentation and
- Development/anthropogenic disturbances.

Current Management

The U.S. Navy currently manages water quality, primarily hazardous materials handling and waste disposal practices, based on requirements in OPNAVINST 5090.1. Those requirements, in turn, are developed primarily to comply with Federal environmental regulations. Efforts to preserve vegetation on the backsides of dunes along the shoreline may reduce erosion and thus reduce transport of sediments into adjacent surface waters. Collection of spent training materials at the conclusion of training activities also may incrementally reduce the amounts of contaminants transported into adjacent waters.

With respect to water use, the U.S. Navy mitigates potential effects by avoiding washing causeway pier sections in the ocean and by pumping seawater through its Offshore Petroleum Discharge System during training instead of using petroleum products. The OPNAVINST includes guidance on shipboard operations afloat (U.S. Navy 2012g).

Planning and Monitoring: Erosion of soils above NBC facilities and roadways is a factor to consider during construction planning. If natural erosion is occurring on a higher elevation terrace, the inputs of

sediment can be drastic and pose a threat to facilities or traffic on roads. If the project is planned for an area below undeveloped land, one simple assessment involves making visual scans of the surrounding habitat.

Stabilization techniques: More often than not on NBC, development yields areas that require long-term soil stabilization because of their characteristics. Cut and fill slopes, dirt roads, and drainages are examples of situations found on NBC that need a permanent erosion control strategy. Occasionally, construction projects are in areas where future erosion is not particularly a factor. Examples of this include island zones planned for landscaping in parking areas or as medians, or, relatively level areas in developed zones that are planned for landscaping only. Often, only temporary soil stabilization is required in these areas. Techniques for permanent soil stabilization in areas of high and low erosion potential and temporary erosion control include installing structures that act as a soil blockage to prevent earth movement and soil degradation (e.g., gabion-type retaining walls, soil-nail walls, crib walls, and gunite facings).

Landscape design: Construction projects will almost always include landscaping in the overall plan. Not only is it an essential part of long-term erosion control, but for aesthetics as well. Decisions about plant types (native vs. non-native) used in revegetation/restoration segments of construction projects can be affected by budget issues. There are major advantages to planting native plants in bare areas resulting from construction projects. Sensitive wildlife species have more habitats available for use, irrigation is not required for ongoing maintenance, and landscaped areas merge with undeveloped adjacent native habitat zones. If native vegetation coverage is successfully established, it can provide the best, most cost-effective, long-term erosion control because the plants have evolved to grow in this particular area of southern California. Revegetation/restoration and landscaping activities follow the Landscaping and Installation Appearance Plan Approved Plant List (see **Appendix H**).

Water control measures: Practically all forms of development require installations that will control the flow of water during storms and work related tasks. There are many different forms of water control installations made up of different materials. Wood, metal, plastic, rock, rubber, concrete, and plant material are all utilized when runoff must be controlled. On NBC, natural drainages/slopes, parking lots, and roads are the primary generators of mass amounts of runoff. In natural resource situations, measures are usually taken to simply slow the rate at which sheetflow is traveling. When construction projects result in cut and fill slopes, water flow will be heavier with lack of vegetation cover, consequently requiring an installation that will direct large amounts of water to adequate drainage systems.

Management Objective and Strategy

Erosion and Sedimentation

Objective: Protect soils by maintaining soils and reducing runoff, erosion, and gully formation.

Strategies:

1. Monitor and rehabilitate degraded soil resources. Soil resources will be monitored, evaluated, and rehabilitated. Survey results will be analyzed to assist with identification of degraded soil or eroded areas.
2. Update and include the Erosion Control Plan as a component plan to this Integrated Natural Resources Management Plan (INRMP) when it is completed.
3. Develop and disseminate informational materials and a short seminar on the erosion control BMPs and watershed protection issues.

4. Educate personnel who are likely to impact the watersheds on erosion and sedimentation BMPs and watershed protection issues.
5. Develop and use an erosion and sedimentation questionnaire designed to gauge the effectiveness of the informational materials and short seminar.
6. Periodically review erosion control BMPs to ensure that they are still adequate to control adverse erosion and sedimentation on NBC. Conduct surveys to determine whether activities on NBC are adversely impacting soil and water resources on NBC as a result of erosion and sedimentation.

Surface Water

No surface waterways occur on NAB or SSTC-N.

5.2.3 Habitat Management

Habitat management is a broad term that encompasses a whole range of management issues that affect fish and wildlife, threatened and endangered species, and ecosystem goals.

5.2.3.1 Terrestrial Habitats, Vegetation Communities, and Land Cover

SSTC-N is located on an isthmus of land with the Pacific Ocean to the west and San Diego Bay to the east. NAB Coronado is primarily composed of developed lands and coastal beaches, which are leased regularly and used for U.S. Navy training exercises. One small area of salt marsh habitat is found on the Bay side of Delta Beach, and portions of the Pacific side beach area still retain some patches of disturbed coastal dune vegetation. Disturbed and successional upland habitats occur in the upland fill areas of NAB Coronado. The acreages of the vegetation communities are summarized in **Table 5-1** (U.S. Navy 2008g). **Figure 5-3** shows the distribution of these vegetation communities on NAB Coronado and SSTC-N.

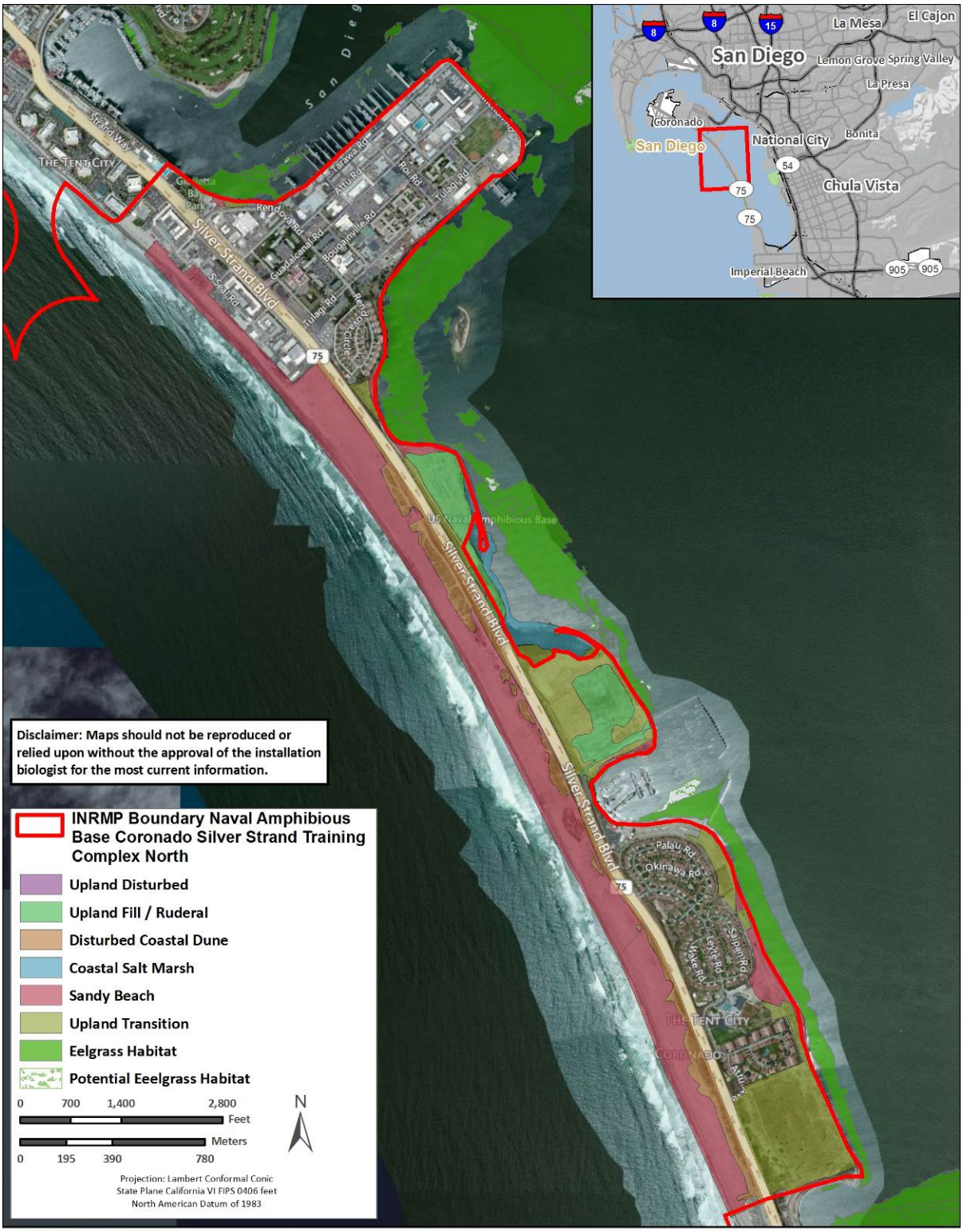
Table 5-1: Vegetation Communities and Land Cover on Naval Amphibious Base Coronado and Silver Strand Training Complex North

Vegetation Type/Land Cover	Acreage
Upland transition	90.0
Sandy beach	232.5
Disturbed coastal dune	45.0
Coastal salt marsh	13.8
Upland fill/Ruderal	34.8
Urban/developed lands	370.0
Total	**786.1**

Source: U.S. Navy 2008g

Terrestrial Flora

NAB Coronado and SSTC-N are considered to be in the south coast subdivision of the California Floristic Province. Plant surveys were conducted on NAB Coronado in December 1981 and January 1982 over 2 days by walking the entire acreage of the study area and recording observations (U.S. Navy 1982). In April 1996, a 2-day survey was conducted by walking through habitat areas, mapping vegetation units on aerial photography, and listing plants encountered (U.S. Navy 1998).



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 5-3: Naval Amphibious Base Coronado and Silver Strand Training Complex North Vegetative Communities

Plants of the coastal strand habitats, such as along the beaches and dunes of NAB Coronado's and SSTC-N's shores, are typically well-adapted to the sandy soils that occur there, with low water-holding capacity, low fertility, low humus content, and high concentrations of sea salts (Schoenherr 1992 and Holland and Keil 1995). Many have deep taproots, enabling them to reach freshwater deeper in the soils. They are also commonly prostrate, and many are succulent. Over time, windblown sand will accumulate under and around coastal strand vegetation, gradually building up distinctive sand hummocks and dunes.

Vegetation mapping was classified using Terrestrial Vegetation Communities in San Diego County Based on Holland's Descriptions (Holland 1986 as modified by Oberbauer 2005). This classification system does not meet the current standards of the National Vegetation Classification System as required by the Federal Geographic Data Committee; therefore, the NAB Coronado and SSTC-N vegetation communities differ from the NatureServe types listed on the Navy Conservation Website.

For a complete listing of terrestrial floral species observed on NAB Coronado and SSTC-N, see **Appendix F**.

The following provides a brief description of each vegetative community (U.S. Navy 2008g).

Upland Transition Marsh. The upland transition zone is not a distinct community, but represents a gradient between the upper marsh and coastal scrub community. The lower end of the transitional zone is characterized by glasswort (*Salicornia subterminalis*), saltgrass, shore grass (*Littorella uniflora*), alkali heath *(Frankenia grandifolia)*, and alkali weed (*Cressa truxillensis*), while the upper transition zone is characterized by Australian salt bush (*Atriplex semibaccata*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Rhus laurina*), lemonadeberry (*Rhus integrifolia)* and coastal sage (*Artemisia californica*).

Southern Foredune/Sandy Beach/Coastal Dune. Southern foredunes arise along the coast where sandy beaches occur and where coastal headlands are absent. Dune size and shape typically vary and are mostly dependent on wind speed and direction. For southern foredunes, wind speed is usually low enough to allow for plant development, which is dense to scattered because of the dry, warm summer days, and well-drained dune soils. Foredune plant species that occur along the shore are well adapted to open, sandy, often windy conditions. Plants found here are generally prostrate and have long taproots, with many succulents. Some foredune plant species are generally more tolerant of salty conditions and, therefore, are more apt to be found closer to the seashore. Sand verbena-beach series, analogous to the southern foredune community of Holland (1986), occurs on sandy sites adjacent to the high surf line from Naval Air Station North Island (NASNI) to SSTC-S.

Birds that nest in this habitat include the Western Snowy Plover, California Least Tern, and Horned Lark (*Eremophilia alpestris*), Killdeer, Black-bellied Plover (*Pluvialis squatarola*), Least Sandpiper (*Calidris minutilla*), American Pipit (*Anthrus rubescens*), Western Meadowlark (*Sturnella neglecta*), and House Finch. Dunes and the adjacent beaches support specialized invertebrate fauna, such as tiger beetles and the globose dune beetle, sand spiders, robber flies, kelp flies, and ants.

Developed, Landscaped, and Ruderal Areas. Developed areas do not usually support native vegetation and contain man-made structures such as buildings or paved roads. The NAB Coronado and NASNI built complexes are examples. Ruderal areas are generally dominated by non-native weeds.

Specific Concerns

- Invasive species encroaching on native habitats and federally protected species;
- Development/anthropogenic influence;

- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Overuse, or improper use, of fertilizers.

Current Management

Management of native habitats at NAB Coronado and SSTC NORTH includes their enhancement by the removal of invasive exotic plant species and planting of native species, as well as habitat restoration of sorely disturbed areas. Removing invasive exotic plants, planting native species, and restoring habitat activities are conducted through coordination with the NBC botanist.

Management Objective and Strategy

Objective: Develop and implement a program for natural land and habitat restoration and rehabilitation.

Strategies:

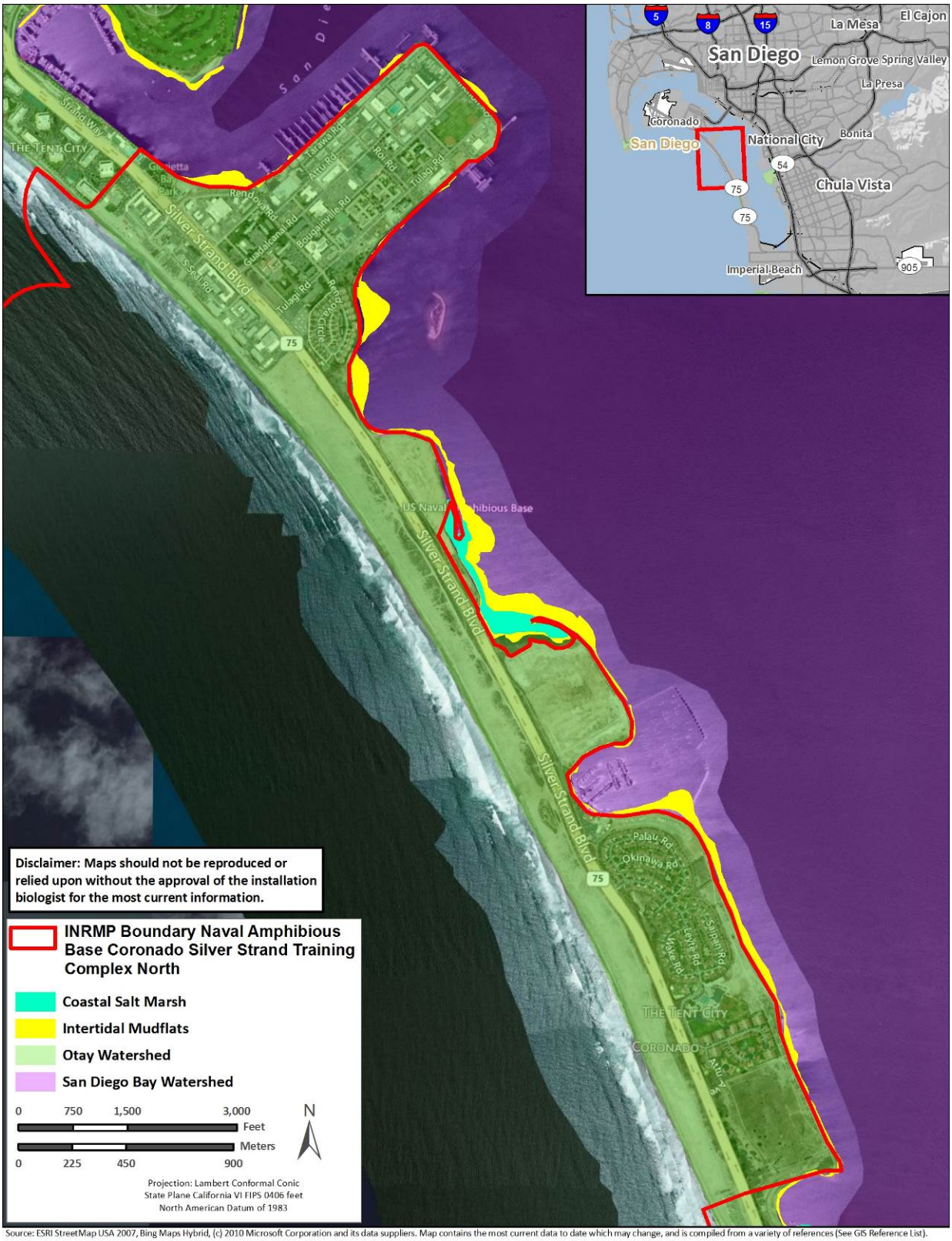
1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue invasive and noxious weed identification and control as necessary.
3. Complete evaluation and prioritization of active erosion sites.
4. Update vegetation mapping.
5. Ensure that natural resources staff responsible for plant community conservation update training regarding management of these resources on a military installation on an annual basis.
6. Develop specifications and standards for reseeding/revegetation of disturbed sites for use in contracts, maintenance, and other projects.
7. Periodically review management to ensure it still meets ecosystem management goals.

5.2.3.2 Wetlands and Floodplains

Wetlands and Other Waters of the United States

Wetlands, as defined by the U.S. Environmental Protection Agency (EPA) and the USACE, are "areas that are inundated or saturated by surface or groundwater 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" (USACE 1987). In September 2008 the USACE published the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (*Version 2.0*). The Regional Supplement was part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. The definition of a wetland was not changed (USACE 2008). In addition, the USACE regulates activities within 3 nautical miles of land, including the San Diego Bay (U.S. Navy 2008f).

A jurisdictional delineation has not been completed for NAB Coronado and SSTC-N. At NAB Coronado and SSTC-N, jurisdictional wetland boundaries are approximated based on the approximate acreage of salt marsh and from the National Wetland Inventory (see **Figure 5-4**) (U.S. Navy 2010c).



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 5-4: Naval Amphibious Base Coronado and Silver Strand Training Complex North Watersheds and Wetlands

Southern Coastal Salt Marsh. Salt marsh is the driest intertidal habitat, occurring in the upper intertidal zone above the mudflats. It is regularly wetted by tidal water and always exposed at least once every 24 hours. Since the climate is semiarid with little rainfall for much of the year, uninterrupted tidal circulation is the most important source for water, nutrients, and oxygen (Macdonald et al.1990). This contrasts with marshes from the east and south coasts. The rate of primary productivity for vascular plants is lower in Southern California, while productivity for epibenthic algae underneath the open canopy is higher. Annual productivity of dense algal mats beneath the marsh canopy could match or exceed that of vascular plants in local marshes. These differences between marshes of Southern California and elsewhere suggest that what drives and regulates marsh function and how the marsh relates to other habitats, may also differ here. On SSTC-N, the marshes between North and South Delta Beaches are southern coastal salt marsh (about 5.6 hectares [13.8 acres]).

Coastal salt marshes can be divided into more or less distinctive zones based upon vegetation patterns. These patterns are related to elevation and degree of inundation, and may be termed Lower, Middle, and Upper Marsh, and Upland Transition. The plant communities of each of these zones are described below.

Lower Marsh. The lower marsh is characterized by cordgrass (*Spartina foliosa*), grading into pickleweed. Cordgrass, which may be up to 1 meter (3 feet) tall and half submerged, spreads through the habitat with buried rhizomes, and less commonly from seed. Pickleweed occurs in areas that are inundated by only the highest tides.

Middle Marsh. The middle marsh habitat is typified by the presence of saltwort (*Batis maritima*), pickleweed, estuary seablite (*Suaeda esteroa*), and arrow grass (*Triglochin concinna*). Killifish (family *Fundulus*) and water boatmen typically inhabit pools of the middle marsh.

Upper Marsh. The upper marsh is characterized by glasswort, estuary seablite, boxthorn, salt grass, and shore grass.

Wetland management strategies vary depending primarily on the wetland type, size, location and condition. A wetland's value is decided by the quality of the functions and services it provides, including its biomass production, habitat, erosion control, stormwater storage, water quality protection, aquifer recharge potential, and low flow augmentation. Some of the factors used to measure the quality of these functions are the wetland's size, its location in the watershed, the amount of development in the watershed, vegetative structure and composition, rate of water flow through the wetland, the size of natural buffers, and surrounding land uses. Regardless of the habitat value, wetland areas are almost always poor choices for building sites or for most activities, other than providing non-consumptive enjoyment of the outdoors. Installation natural resources staff will ensure during the program/project review process that program/project managers are aware of the laws and regulations regarding the protection of wetlands. Refer to **Section 2.4.2** for additional information on regulatory compliance related to the CWA.

Floodplains

NAB Coronado and SSTC-N are susceptible to flooding from local storm runoff or seismic ocean waves due to its low-lying, flat terrain (U.S. Navy 2010c). Portions of NAB Coronado and SSTC-N are within the 100-year floodplain (see **Figure 5-4**). The 100-year flood is defined as the largest flood with a recurrence interval of 100 years or less, based on current topography, recorded precipitation, and tidal surge. The 100-year floodplain is the zone that would be subject to flooding during a 100-year storm event, combined with a very high tide or seismic ocean wave. SSTC is susceptible to flooding from local storm runoff or seismic ocean waves due to its low-lying, flat terrain (U.S. Navy 2010c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species encroaching into wetland habitat;
- Climate change (e.g., changes in temperature or sea level rise);
- Erosion and sedimentation from either anthropogenic or natural causes and
- Pollution.

Current Management

Future delineations will be conducted on a project-by-project basis.

The major goal in wetland and floodplain management is to minimize the impact that NAB Coronado and SSTC-N has on wetlands and floodplains. The natural resources staff strives to enhance healthy, functional wetlands. When possible, it is the goal to avoid impacts, direct and indirect; enhancing waters of the United States to increase functions and services provided by waters of the United States including wetlands. It is also the goal to maximize floral diversity of wetland communities, which, in turn, maximizes the faunal diversity of the ecosystem. Through achieving these goals, and through mitigating for unavoidable impacts to wetlands, NAB Coronado and SSTC-N can manage for no net loss of wetland and floodplain acreage, functions, and services.

According to OPNAVINST 5090.1C, the U.S. Navy will comply with the national goal of no net loss of wetlands, and will avoid loss of size, function and value of wetlands.

Management Objective and Strategy

Wetlands and Waters of the United States

Objective: Maintain healthy, functional waters of the United States on NAB Coronado and SSTC-N, including wetlands and non-wetland waters of the United States, and prevent indirect or unplanned encroachments.

Strategies:

1. Update the wetland delineation and inventory, including wetland distribution and categories, as necessary.
2. Conduct Environmental Review for activities that could affect directly and indirectly, waters of the United States, including wetlands.
3. Plan development and training activities to avoid wetland impacts to the maximum extent possible and minimize unavoidable impacts on waters of the United States, including wetlands.
4. Maintain water quality to protect surface waters and wetlands from excessive sediment-laden runoff. Prevent erosion, scour to maintain water quality.
5. Remain in compliance with the Clean Water Act (CWA), River and Harbors Act (RHA), etc. and implement procedures to manage for a no net loss of wetland and floodplain acreage, functions, and services.
6. Reduce habitat fragmentation and control the spread of invasive species.
7. Periodically review the natural resources management program to ensure that management actions do not adversely impact directly and indirectly, waters of the United States, including wetlands.

8. Implement erosion control BMPs to ensure adverse environmental impacts to waters of the United States, including wetlands do not occur.

Stream Stability

No streams have been identified on NAB Coronado or SSTC-N.

5.2.3.3 Marine Habitats

As discussed in **Chapter 1**, this INRMP only focuses on the 274 meters (899 feet) extending seaward (beyond the mean lower low water [MLLW] line) of the NBC facilities and the seaward training lanes and anchorages. The San Diego Bay INRMP footprint includes the marine portions of NBC within the bay. A more specific description and management of the marine habitat in the San Diego Bay are discussed in the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*), , which was developed in cooperation between the U.S. Navy and San Diego Unified Port District (SDUPD) along with their government and non-government partners.

The habitat categories adhere to the Coastal and Marine Ecological Classification Standard (*http://www.fgdc.gov/standards/projects/FGDC-standards-projects/cmecs-folder*).

The nearshore area is primarily soft bottom, and spans from exposed sandy beaches to the water column above the inner shelf. The coastal nearshore areas are classified as surf zone and coastal pelagic zone up to 160 kilometers (100 miles) westward. The high-energy surf zone and shallow (<30 meters [98 feet] MLLW) areas dominated by sand and low-lying (<2 meters [7 feet] MLLW) rocky reef and cobble are typical of much of the southern California coastline. Utilizing the habitat classification system developed for the San Diego Association of Governments (SANDAG) and California Coastal Conservancy, the majority of the area described as a Subtidal/Soft Bottom/Sand ecotype, with a low to moderate energy ecotype modifier, due to seasonal variability with respect to wave energy.

Bayside

Habitats within the San Diego Bay are categorized by depth with respect to the tides, then by substrate, water clarity, and other factors. Habitat types within the San Diego Bay at NAB Coronado and SSTC-N include deep subtidal, moderately deep subtidal, shallow subtidal, intertidal, and nearshore artificial shoreline structure habitats; the following is a summary of these habitats as described in the San Diego Bay INRMP and the SSTC EIS (U.S. Navy 2011a U.S. Navy 2010e).

Deep Subtidal

Deep subtidal (deeper than 6 meters [–20 feet] MLLW) describes the surface water, water column, and sediments for areas greater than 6 meters in depth. The MLLW number is the level at which coastal flooding commonly occurs. There are approximately 1,797 hectares (4,440 acres) of deep subtidal zone in the Bay that is associated with maintained navigational channels. Except for a few areas in north bay that have no dredging record, all deep subtidal habitat has been dredged since the 1940s; most was dredged in the 1960s or more recently (U.S. Navy 2011a).

Moderately Deep Subtidal

Moderately deep subtidal (-4 to -6 meters [-12 to -20 feet] MLLW) describes habitat that extends from the approximate lower depth of most eelgrass to approximate edge of the shipping channel. There are approximately 898 hectares (2,219 acres) of this habitat and it occurs primarily in the south-central bay of the coast of NAB Coronado and in inlets of the north bay. It represents areas that generally have been

dredged in the past but are not maintained as navigational channels. The most recent dredging records for these depths are from 1941-1945 (U.S. Navy 2011a).

Shallow Subtidal

Continually submerged, these shallow habitats extend from the low tide zone (-0.6 to -3.7 meters [-2.2 to -12 feet] MLLW) and can either be vegetated or unvegetated. Shallow soft-bottom areas, with their associated fauna and flora, were the primary subtidal habitat in San Diego Bay prior to its development. The shallow subtidal habitat can be found in narrow strips along the shoreline of north and north-central San Diego Bay. This habitat makes up about half of the in-water bayside training areas of SSTC-N. The abundance and biomass of organisms is much higher in shallow waters, including invertebrates, fish, and birds. Shallow waters support many thousands of resident and migratory birds every year for foraging and resting. The bird groups that appear to use these areas preferentially are bottom-feeding divers such as Surf Scoter and Scaup (*Aythya affinis* and *A. marila nearctica*), Dabbling Brant (*Branta bernicla*), plunge divers such as Terns, and the surface-foraging Black Skimmer (*Branta bernicla*) (U.S. Navy 2010e).

Shallows. Soft bottoms of unconsolidated sediment are unstable and shift in response to tides, wind, waves, currents, human activity, or biological activity such as bottom fish feeding, or bat rays (*Myliobatis californica*) excavating pits to reach buried clams. Few plants and animals have adapted to this instability—eelgrass is one of the few. Because animals and plants lack attachment sites in this environment, they must burrow into the substrate to prevent from being washed away by currents, and so are called "infauna." Competition for space is ameliorated partly by organisms occupying various depths within the substrate. Invertebrates such as sponges, gastropod mollusks, and some larger crustaceans and tunicates live on the surface (U.S. Navy 2010e).

An important structural component of unvegetated shallows is the presence of extensive masses or mats of living algal material interspersed with areas of exposed sediment that may extend into the intertidal zone (Ford 1968, Ford and Chambers 1974). The dense, heavily branched red alga (*Gracilaria verrucosa*) forms the bulk of this mat, which also includes other red algae (i.e., *Hypnea valentiae* and *Griffithsia pacifica*). Some of these mats are loosely anchored in the sediment, while others drift just above the bottom. These algal mats provide cover for many species of motile invertebrates and fish. The algae also appear to serve as a food source for some invertebrates. The living plant material and detritus constitute a primary food source for California Killifish and other fish, crabs, isopods, gastropod mollusks, and some aquatic birds (U.S. Navy 2010e).

Vegetated Shallows. Eelgrass, a native marine angiosperm, provides a key benthic habitat in San Diego Bay. Eelgrass habitats rank among the most productive habitats in the ocean. Eelgrass beds in San Diego Bay have suffered substantial loss due to their location in sheltered waters where human activity is concentrated. Approximately 100.3 hectares (248 acres) of eelgrass beds are currently located in patches along the bayside shore of SSTC-N (see **Figure 5-3**). In central San Diego Bay, these beds extend from 0 to -3 meters (0 to -10 feet) MLLW.

Intertidal Zone

The intertidal (+2.4 to -0.7 meters [+7.8 to -2.2 feet] MLLW) habitat encompasses the area between high and low tides and is subject to varying degrees of tidal submergence. There are approximately 395 hectares (976 acres) of intertidal areas making up approximately 7 percent of the bay (U.S. Navy 2011a).

Intertidal Flats. Intertidal flats of San Diego Bay include mudflats, sand flats, and salt flats. They occur 6 between the highest-high and lowest-low tide zones, or otherwise between the lowest cordgrass 7 (beginning of the salt marsh) and highest eelgrass, approximately 0.7 to 0 meters (+2.3 to 0 feet) MLLW in San Diego Bay. This zone normally lacks vegetation (U.S. Navy 2011a).

Artificial Shoreline Structures

Unprotected shoreline sites will erode when exposed to tidal fluctuation, storm waves, storm surges, and surface runoff. Hard structures are used to protect developed sites along the bay. Pier pilings, bulkheads, rock riprap, floating docks, sea walls, mooring systems, and derelict ships/ship parts that form extensive artificial habitat in the northern and central portions of the bay and to lesser extent in the southern bay. Currently there is 73.1 kilometers (45.4 miles) of armored shoreline with the San Diego Bay (U.S. Navy 2011a)

Ocean Side

Habitats of the nearshore ocean and surf zone includes the area offshore, or the ocean side of SSTC-N, and includes the marine waters off of the sandy beaches of SSTC-N (the yellow through orange boat lanes). Also included are the ocean anchorages that partially overlap the SSTC-N ocean boat lanes.

Habitats on the ocean side of the SSTC can be described by a combination of depth, substrate, and wave energy. The nearshore area is primarily soft bottom, and spans from exposed sandy beaches to the water column above the inner shelf. The coastal nearshore areas are classified as surf zone and coastal pelagic zone up to 161 kilometers (100 miles) westward. The high-energy surf zone and shallow (<30 meters [98 feet] MLLW) areas dominated by sand and low-lying (<2 meters [7 feet] MLLW) rocky reef and cobble are typical of much of the southern California coastline. Utilizing the habitat classification system developed for SANDAG and California Coastal Conservancy, the majority of the area described as a Subtidal/Soft Bottom/Sand ecotype, with a low to moderate energy ecotype modifier, due to seasonal variability with respect to wave energy.

The offshore area also includes portions classified as Subtidal/Hard Bottom/Cobble/Understory algae and adjacent habitat within the region of influence as Subtidal/Hard Bottom/ Boulder/Rock Reef/kelp Bed ecotypes (see **Table 5-2**). The algal communities such as kelp beds add structure in shallow water, fostering a richer species assemblage. The basic habitat data for nearshore ocean area provided by the San Diego Nearshore Program, as reported from surveys in 2002. This program uses a habitat classification system that integrates elements from a number of previously created classification systems, including the Marine and Estuarine and Habitat Classification developed by NMFS. The Nearshore Program is a cooperative effort of the National Oceanic and Atmospheric Administration-National Marine Fisheries Service (NOAA-NMFS), California Department of Fish and Wildlife (CDFW), and the USACE, among others (U.S. Navy 2010e).

Table 5-2: Substrate Type Contained within Ocean Side SSTC Boat Lanes and Anchorages

Training Area	Substrate Type	Acres
SSTC-N Ocean Side Lanes	Sand	3,956
	Cobble	424
	Boulder	0
Total		**4,379**

Source: U.S. Navy 2010e

Moderately Deep Subtidal

Moderately deep subtidal habitat, defined as water depth ranging from -3.7 to -6 meters (-12 to -20 feet) MLLW, occurs primarily off the coast of SSTC-N. Moderately deep subtidal habitat extends from the approximate lower depth of most eelgrass beds to the approximate edge of the shipping channel. It represents areas that generally have been dredged in the past, but are not maintained as navigational channels. The most recent dredging record at these depths off SSTC-N occurred from 1941 to 1945 (U.S. Navy 2010e).

Moderately deep water is used in higher numbers, compared to other San Diego Bay locations, for resting by bottom feeding diving birds, especially rafting Surf Scoter, Scaup, Bufflehead (*Bucephala albeola*), and plunge divers, such as Terns and Brown Pelicans (Ogden 1995 and USFWS 1995). The federally endangered California Least Tern also forages in these areas. While these depths generally do not support eelgrass in this part of San Diego Bay, the substrate may be covered with turf algae or marine invertebrates such as sea pens. Sea pens are colonial marine cnidarians belonging to the order Pennatulacea (U.S. Navy 2010e).

Shallow Subtidal

The shallow subtidal zone (–2.2 to –12 feet [–7 to –4 meters] MLLW) is separated into unvegetated and vegetated shallow soft bottom habitats approximately 0.8 to 4.8 hectares (2 to 12 feet) below the intertidal zone.

Unvegetated Shallows. The unvegetated soft bottom habitats consist of unstable and shifting unconsolidated sediments disturbed by bottom feeding animals, currents, wind, and other abiotic factors (U.S. Navy 2011a).

Intertidal

The intertidal (+2.4 to -0.7 meters [+7.8 to -2.2 feet] MLLW) habitat encompasses the area between high and low tides and is subject to varying degrees of tidal submergence.

Sandy Beach. The sandy beach habitats consist of sandy soils that are have low water-holding capacity, low fertility, low humus content, and high concentrations of sea-salts (U.S. Navy 2011a).

Specific Concerns

- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Water pollution (e.g., decrease in light transmission);
- Training;
- Facilities projects (e.g., construction and maintenance);
- Non- Navy Development/anthropogenic influence;
- Erosion and sedimentation and
- Navy Training and Operations.

Current Management

The U.S. Navy conducts presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted Disturbing Activity out in *Caulerpa*-Free Systems. In the event that *Caulerpa* is detected, best management practices are implemented to isolate and prevent the spread of this species.

In addition, eelgrass is managed in compliance with the California Eelgrass Mitigation Policy, created jointly in 1991 by the USFWS, NMFS, and CDFW, which established protocols for mitigating adverse impacts to eelgrass (U.S. Navy 2011a). A draft revision of the California Eelgrass Mitigation Policy was published in December 2011. The U.S. Navy has established several Navy Eelgrass Mitigation Sites (NEMS) to compensate for past impacts and to mitigate future impacts on eelgrass habitat within the San Diego Bay. Eelgrass that has been planted and not used to compensate for previous losses has been banked for future use in accordance with the California Eelgrass Mitigation Policy. Five eelgrass mitigation sites contributing to the bank have already been constructed and met the 5-year performance standards required by NMFS. A Mitigation Technical Team, a multiagency team, provides technical expertise in and support for implementing the Bank. Besides the NEMS, the U.S. Navy maintains permanent eelgrass monitoring transects in San Diego Bay that are monitored every year and bay wide mapping of eelgrass density classes is conducted every 3 to 5 years (U.S. Navy 2011a). Detailed information on eelgrass mitigation can be found in the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*).

Management Objective and Strategy

Marine Habitats

Objective: Develop and implement a program for marine habitat restoration and rehabilitation.

Strategies:

1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue marine non-native species identification and monitoring as necessary.
3. Ensure that natural resources staff responsible for marine community conservation update training regarding management of these resources on a military installation on an annual basis.
4. Develop database to integrate current and historical nearshore habitat monitoring data.
5. Conduct nearshore benthic habitat mapping as needed.
6. Avoid shoreline construction that results in a loss of coastal strand habitat.

5.2.3.4 Wildland Fire

Not applicable to NAB Coronado and SSTC-N.

5.2.4 Fish and Wildlife Management

For the purposes of this INRMP, wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. The primary goal of wildlife management at NAB Coronado and SSTC-N is to maintain wildlife populations at levels compatible with land use objectives while promoting the existence, importance, and benefits of nongame species.

The basis of managing a rich assemblage of nongame wildlife is to provide a mosaic of habitats that are structurally and biologically diverse. In managing for a diversity of habitats and diversity within those habitats, the potential exists for numerous species to be found. NAB Coronado and SSTC-N should employ these basic techniques for managing wildlife.

- ***Monitoring Wildlife.*** Creating, monitoring, and updating GIS data on wildlife species will allow NAB Coronado and SSTC-N to store, retrieve, present, and analyze the data to make informed management decisions.
- ***Managing for Migratory Birds.*** The Migratory Bird Treaty Act (MBTA) provides for a year-round closed season for nongame birds and prohibits the taking of migratory birds, nests, and eggs, except as permitted by the USFWS. Impacts on birds protected under the MBTA will be avoided through surveying for nesting birds in areas proposed for disturbance and, if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends that conducting activities outside of nesting areas or outside of the general migratory bird-nesting season can help avoid direct impacts.
- ***Protecting Sensitive Areas.*** NAB Coronado and SSTC-N should maintain biological diversity by protecting, to the extent practical, sensitive areas that provide unique habitat niches. Protection measures might include restricting vehicle movement, and protecting habitats of exceptional biological value by establishing protective buffers and maintaining healthy and diverse ecosystems.

5.2.4.1 Invertebrates

For a complete listing of invertebrate species observed on NAB Coronado and SSTC-N, see **Appendix F**.

Terrestrial Invertebrates

Surveys on some terrestrial portions of SSTC-N detected common invertebrates such as various kelp flies (Families *Coelopidae* and *Anthomyidae*), dune silverfish (Family *Lepismatidae*), leaf beetles (Family *Chrysomelidae*), and snout beetles (Family *Curculionidae*) (U.S. Navy 2010e). The spider fauna of the dunes was found to be diverse and includes at least one endemic species. Funnel web weavers (Family *Agelenidae*), wolf spiders (Family *Lycosidae*), trapdoor spiders (Family *Ctenizidae*), and the endemic sand spiders of the genus *Lutica* (Family *Zodariidae*) were found.

The nocturnal Sand Spiders are restricted to southern California coastal dunes and are adapted for burrowing in fine sand. Tarantula hawks (*Pepsis* sp.) can be seen flying around the dunes hunting for spiders. A few special status species have been recorded including the globose dune beetle, sandy beach tiger beetle (*Cicindella hirticollis gravida*), mudflat tiger beetle (*C. trifasciata sigmoidea*), a third tiger beetle (*C. latesignata latesignata*), and wandering skipper (*Panoquina errans*), as well as the federally endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*). Invertebrates are the primary prey item for many types of wildlife and are important as pollinators for many plant species (U.S. Navy 2010e).

Marine Invertebrates

Marine invertebrates are extremely abundant, especially in San Diego Bay. The major intertidal and subtidal habitats adjacent to NAB Coronado and SSTC-N together support more than 650 documented species of marine, estuarine, and salt marsh invertebrate. These include marine representatives of all the major invertebrate phyla (as well as insects and spiders important as components of the salt marsh community). In addition to the large number of invertebrate species and their taxonomic and functional diversity, many invertebrate populations are represented in the nearshore ocean environment, and are abundant in San Diego Bay. All of these characteristics make them important ecological components of AB Coronado and SSTC-N habitats and essential food sources for marine fish, birds, and other invertebrate animals in those habitats (U.S. Navy 2010e).

Bayside

Marine invertebrate habitat on the bay side of NAB Coronado and SSTC-N consists primarily of sandy beach areas with a few riprap and marsh areas. Common marine invertebrate species observed within these types of habitats include tube-dwelling anemone (*Pachycerianthus fimbriatus*), sea pen (*Stylatula elongata*), sponges (*Aplysina fistularis, Tetilla mutabilis*), bryozoans (*Thalamoporella californica*), barnacle (*Balanus* spp.), native oyster (*Ostrea lurida*), mussel (*Mytilus* spp.), pacific jewel box (*Pseudochama exogyra*), tunicate (*Styela* spp.), and red invasive bryozoans (*Watersipora* spp.) (U.S. Navy 2011a).

Ocean Side

Common marine invertebrates that occur in the benthic sediments in the offshore ocean side areas adjacent to SSTC-N were sampled in 2003, the results are summarized by major taxonomic groups detailed in **Table 5-3**.

Table 5-3: Infaunal Invertebrate Abundance Sampled during 2003

Sampling Station	Infaunal Abundance				
	Crustaceans	Mollusks	Polychaetes	Other	Total
Offshore SSTC-N	47	5	107	7	166

Source: U.S. Navy 2010e

Specific Concerns

- Pollution and oil spills;
- Improper pesticide use;
- Introduction and spread of invasive species and
- Habitat modification.

Current Management

The U.S. Navy currently manages marine invertebrates on the bayside through the participation in the national water quality monitoring program called Mussel Watch. NMFS's National Status and Trends Program Mussel Watch Project (1986-present) monitors bioaccumulation in mussels, plus other parameters offshore in south San Diego Bay and intertidal in the north San Diego Bay. NMFS also conducts the National Benthic Surveillance Program (1984-present) to examine physical, chemical, and biological (diseases and bioaccumulation in fish) parameters in offshore areas of central and north San Diego Bay (U.S. Navy 2010e). Ocean side marine invertebrates are managed by recording and monitoring all incidental observations at NAB Coronado and SSTC-N. Spill prevention plans are implemented as necessary to avoid and minimize impacts from pollution and oil spills.

Management Objective and Strategy

Objective: Maintain biodiversity of the invertebrate community at NAB Coronado and SSTC-N.

Strategies:

1. Develop and implement a strategy for pollution management.

2. Conduct regular surveys for invertebrates that may be present within NAB Coronado and SSTC-N boundaries.
3. Develop and distribute outreach and education materials on invertebrates to personnel, operators and visitors on NAB Coronado and SSTC-N.

5.2.4.2 Pollinators

A pollinator is an animal or insect that transfers pollen grains from flower to flower (DoD Legacy 2010a). Pollinators are responsible for pollinating 80 percent of the crops we consume, as well as the majority of plants and fruits consumed by wildlife. Examples of pollinators in the San Diego region include bees, butterflies, moths, beetles, flies, and birds. One example of an invertebrate pollinator species, wandering skipper (*Panoquina errans*), has been documented at NAB and SSTC-N. In addition, two examples of avian species that are known pollinators on NAB and SSTC-N include Anna's Hummingbird (*Calypte anna*) and Costa's Hummingbird (*Calypte costae*).

The relationship between the fate of pollinators and the ability of installations to meet readiness and stewardship obligations has been a focus of the Department of Defense (DoD) Legacy Resources Management Program (DoD Legacy) for the past several years.

Pollinators ensure that native landscapes on installations do not become barren, or overrun with invasive species. The DoD acknowledges that habitat restoration and invasive species removal go hand in hand. Through enhancing and restoring pollinator habitat by restoring native plant communities and removing and controlling invasive species, DoD installations can save money, protect threatened and endangered species, and contribute to biodiversity (DoD Legacy 2010a).

For more information on DoD's work to support pollinators, visit *http://www.DoDpollinators.org*. Another good source for information on enhancing pollinator populations can be found within The Pollinator Partnership™/ NAPPC publication *Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners in the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast* available online at:

http://www.pollinator.org/PDFs/Calif.Coastal.Chaparral.rx2.pdf

Specific Concerns

- Improper use of pesticides;
- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

NAB Coronado and SSTC-N are currently managing for pollinator species through implementation of many programs; such as landscaping, invasive species control, and restoration efforts that indirectly benefit pollinators.

Management Objective and Strategy

Objectives: Maintain and enhance pollinator populations and their habitat when not in conflict with health and safety, or the military mission.

Strategies:

1. Inventory and monitor populations and habitat composition of pollinators.
2. Develop BMPs to ensure that pollinator species are not adversely impacted by NASNI activities.
3. Identify and develop pollinator friendly landscapes.
4. Develop and distribute outreach and education materials on pollinators to personnel, operators and visitors on NAB Coronado and SSTC-N.
5. Revegetate and restore land with plants that attract pollinators, and include pollinator-friendly plants with native species contained on the NAVFAC SW recommended plant list.
6. Control the spread of invasive species.
7. Review existing literature on pollinators.
8. Work with San Diego County Agricultural Department to explore feasibility of developing and implementing a management program that supports bee relocation as opposed to bee eradication.
9. Provide connectivity between vegetation areas by creating corridors of perennials, shrubs, and trees that provide pollinators shelter and food as they move through the landscape.
10. Provide windbreaks and nesting areas, such as bat boxes or sites without high vegetation for bee nests.
11. Inventory and become knowledgeable of local pollinators.
12. Maintain a minimum of lawn areas that support recreational needs.
13. Restrict the use of pesticides, including herbicides and insecticides when possible.
14. Provide water sources in large open areas.
15. Maintain openings that provide habitats for sun-loving wildflowers.

5.2.4.3 Fish and Essential Fish Habitat

Fish Bayside

For a complete listing of fish species observed on NAB Coronado and SSTC-N, see **Appendix F**.

The San Diego Bay supports an abundant population of coastal marine, and juvenile fish species, and a large number of fish nurseries (U.S. Navy 2011a). Since 1994 the Navy and Port have collaborated to conduct regular (every 3-5 years) in the San Diego Bay in order to identify, determine and quantify the seasonal utilization of the fishery populations, identify habitats that support juvenile fish species, and determine geographic and/or habitat areas that support significant populations of fish species utilized by federally listed avian species for forage. During these surveys 58 species of fish were collected. Topsmelt (*Atherinops affinis*) was the most abundant species followed by deepbody anchovy (*Anchoa compressa*), slough anchovy (*Anchoa delicatissima*), northern anchovy (*Engriaulis mordax*), and shiner perch (*Cymatogaster aggregata*) (Allen 1999; Pondella et al. 2006, U.S. Navy 2009d).

Fish Ocean Side

The habitats and associated fish species of the nearshore coastal areas are classified as surf zone and coastal pelagic zone (U.S. Navy 2010f). Coastal pelagic species inhabit the open water environment over the inner shelf, but they usually occur within a few kilometers of shore. In addition, fish species associated with rocky reefs and kelp beds overlap other nearshore habitat types (U.S. Navy 2010e). Common southern California surf zone fish species and common reef fish species are presented in **Table 5-4**.

Additionally, beach areas on NAB Coronado and SSTC-N are known to be or have the potential to be grunion spawning habitat. California Grunion are known to spawn on nearby Imperial Beach and the Coronado Strand. California Grunion spawn at night as the highest tides recede; after approximately two weeks the recently hatched fish larvae are swept out to sea during high tides. California Grunion use the upper intertidal habitat on beaches for spawning from late February to early September; Grunion activity is expected to be concentrated from late March to early June (U.S. Navy 2010e).

Essential Fish Habitat

In September 2010, the U.S. Navy finalized a study of essential fish habitat (EFH) throughout San Diego Bay (Merkel 2010). The purpose of this study was to facilitate the valuation of habitats in the context of the EFH designation with special focus on the habitat types most likely to be impacted by U.S. Navy activities or to be used in the mitigation for potential U.S. Navy project impacts. The completion of this project resulted in two products: (1) a broad scale, qualitative assessment of the dominant habitat classifications within San Diego Bay with a map and description of those habitats; and (2) a detailed and quantitative description of a smaller set of habitats determined to be of greatest concern to the U.S. Navy. The habitat characterization is intended not only to provide information on the use of habitat by managed fish species, but also to provide information on ecosystem function and productivity within the dominant habitats present in the bay. The study helped to better describe and identify EFH locations in order to minimize, to the extent practicable, adverse effects on this habitat and to identify actions that may encourage the conservation and enhancement of EFH (U.S. Navy 2010f).

Specific Concerns

- Overharvesting;
- Pollution from oil spills and other hazardous wastes into the San Diego Bay;
- Improper use of pesticides;
- Habitat loss;
- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predators.

Current Management

The U.S. Navy is also in the process studying EFH throughout the San Diego Bay. This study will facilitate the valuation of EFH with special focus on the habitat types most likely to be impacted by U.S. Navy activities or be used to mitigate for potential U.S. Navy project impacts. The San Diego Bay resources are managed through the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*), the health and presence of fish species in the San Diego Bay are intermittently evaluated through the regular fish inventories and EFH studies.

Table 5-4: Common Southern California Surf Zone and Reef Fish Species

Common Name	Scientific Name
Barred surfperch	*Amphistichus argenteus*
Sargo	*Anisotremus davidsonnii*
Deepbody anchovy	*Anchoa compressa*
Jacksmelt	*Atherinopsis californicensis*
White seabass	*Atractoscion nobilis*
Kelp surfperch	*Brachyistius frenatus*
Ocean whitefish	*Caulolatilus princeps*
Swell shark	*Cephalosyllium ventriosum*
Black croaker	*Cheilotrema saturum*
Blacksmith	*Chromis punctipinnis*
Blackeye goby	*Coryphopterus nicholsii*
Pile perch	*Damalichthys vacca*
California moray	*Gymnothorax mordax*
Rock wrasse	*Halichoeres semicintus*
California hornshark	*Heterodontus francisci*
Walleye surfperch	*Hyperprosopon argenteum*
Rainbow perch	*Hypsurus caryi*
Garabaldi	*Hypsypops rubicundus*
Black surfperch	*Embiotoca jacksoni*
California corbina	*Menticurrhus undulates*
Halfmoon	*Medialuna californienses*
Gray smoothhound	*Mustelus californicus*
Senorita	*Oxyjulis californica*
Kelp bass	*Paralabrax clathratus*
Barred sand bass	*Paralabrax nebulifer*
CO turbot	*Pleuronichthys coenosus*
Rubberlip surfperch	*Rhacochilus toxotes*
Spotfin croaker	*Roncador stearnsii*
California scorpionfish	*Scorpaena guttata*
Kelp rockfish	*Sebastes atrovirens*
Treefish	*Sebastes serriceps*
California Sheephead	*Semicossyphus pulcher*
Queenfish	*Seriphus politus*
Giant Black seabass	*Stereolepis gigas*
Barcheek pipefish	*Syngnathus exilis*
Leopard shark	*Triakis semifasciata*
Yellowfin croaker	*Umbrina roncador*
Salema	*Xenistius californiensis*

Source: U.S. Navy 2010e

In 2011, the U.S. Navy funded a project to map the marine habitat within the ocean side beach and boat training lanes in accordance with the SSTC Essential Fish Habitat consultation with the National Marine Fisheries Service also in the process studying EFH throughout the San Diego Bay. In 2012, that study was expanded to map the marine habitat surrounding the ocean side beach and boat training lanes, including areas adjacent to NASNI. These studies will facilitate the valuation of EFH with special focus on the habitat types most likely to be impacted by U.S. Navy activities.

Additionally, as part of the SSTC EFH consultation requirements to protect grunion spawning, the U.S. Navy will conduct April to May pre-event surveys for grunion prior to SSTC training events that have the potential to disturb intertidal beach areas. Events identified for grunion pre-event surveys include Causeway Pier Insertion and Retraction training and ELCAS. These training events generally occur within only a few boat\beach lanes in 7 SSTC-N and can occur throughout the year. For events that have a requirement to occur in April and May, the U.S. Navy will use predicted grunion spawning periods obtained from the CDFW (*http://www.dfg.ca.gov/marine/grunionschedule.asp*) to anticipate times to survey 10-14 days prior to the next ELCAS or Causeway Pier Insertion and Retraction. This survey will identify if grunion spawning occurred or did not occur on the beach area scheduled for training. If grunion spawning is documented, then a determination on the spatial extent of spawn across the planned training area and magnitude of spawning (on the standard grunion 0-5 spawning scale) will be made. For cases in which a significant spawning run is observed (4 or 5 on the spawning scale) coincidental with and at the same location as a planning training event, the U.S. Navy will make every attempt possible to laterally shift the training to avoid the deposited grunion eggs to the best extent practical. If such a shift cannot be done due to schedule conflict over multiple SSTC boat and beach lanes, logistic requirements to use a specific lane or area within a lane that precludes a shift, or safety considerations (ex., weather conditions, sea state), then the U.S. Navy will inform NMFS Southwest Region that training was conducted on that site for the specified reason.

Management Objective and Strategy

Objective: Employ a systematic approach to managing fish and EFH resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for fish and EFH management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting non-native species that are observed during regular surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
4. Control the spread of invasive species.
5. Ensure compliance with CDFW regulations and NBC instructions for fishing.
6. Evaluate predator control and develop strategies to control invasive predators (e.g., bullfrogs).
7. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in marine resources management
8. Comply with EFH guidance on defining effects of military activities on habitat for any in-water projects; provide marine fishes with habitat protection and water quality improvement.

5.2.4.4 Reptiles and Amphibians

For a complete listing of herpetofauna species observed on NAB Coronado and SSTC-N, see **Appendix F.**

Terrestrial reptiles and amphibians have shown well-documented declines in recent decades. Some lizards such as the western fence lizard (*Sceloporus occidentalis*), alligator lizard (*Elgaria multicarinata webbi*), and side-blotched lizard are frequently observed around buildings. The California Species of Special Concern silvery legless lizard (*Anniella pulchra pulchra*) has been reported on SSTC-N, but was not recorded in recent surveys (U.S. Navy 2010c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring.

All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing wildlife resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting species that are incidentally observed during special status species surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals
4. Survey for and monitor herpetofauna populations using guidelines recommended by Partners in Amphibian and Reptile Conservation (PARC).
5. Once finalized, implement DoD PARC Strategic Plan.
6. Revegetate areas on base with native species using species on the recommended plant list.
7. Control the spread of invasive species.
8. Evaluate predator control and develop strategies to control invasive predators (e.g., bullfrogs).

9. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

5.2.4.5 Birds and Migratory Bird Management

For a complete listing of avian species observed on NAB Coronado and SSTC-N, see **Appendix F**. Several special status bird species are known to occur on NAB Coronado and SSTC-N and are discussed in **Section 5.2.5**.

The SSTC is a part of the Pacific Flyway used by millions of birds traveling between northern breeding grounds and southern wintering sites. It is one of a number of stopover sites used by migrants to replenish their energy during their long journey. San Diego Bay and nearshore Pacific Ocean waters support large populations of migratory birds that depend on local resources for food, shelter, resting, and staging before and during migration. Resident species that nest locally are in the salt marsh and upland habitats. Seabirds come northward from Mexico and Central America to nest on beaches and levees of the salt ponds (U.S. Navy 2010c).

The ocean beaches and nearshore waters provide a variety of areas for seabirds to roost and forage. Sandy/cobblestone upper tidal beaches are utilized by gulls and shorebirds as roosts. Probing shorebirds will forage upon invertebrates in the damp, sandy middle and lower tidal zones. Kelp and surfgrass that have washed ashore are good foraging areas for gulls, shorebirds, and even some passerines (perching birds), as they harbor and are fed upon by invertebrates. The nearshore ocean accommodates birds such as gulls, pelicans, terns, and cormorants, which prey upon the schooling fish and other marine organisms (U.S. Navy 2010c). San Diego Bay is part of a network of southern California bays that provide haven for a large diversity of birds due to their sheltered and nutrient-rich waters. The shallow water and shoreline provide roosting, foraging, and nesting areas for ducks, terns, shorebirds, pelicans, cormorants, gulls, herons, raptors (such as Ospreys [*Pandion haliaetus*] and Northern Harriers [*Circus cyaneus*]), and various passerines in the surrounding vegetation (U.S. Navy 2010c).

The landscaped areas in the developed areas of NAB Coronado/SSTC-N support several species of wildlife. Many ornamental trees in landscaped areas of NAB Coronado are used for nesting by several species of birds, including Herons and raptors. Mammal burrows at NAB Coronado are occasionally used by the Western Burrowing Owl (*Athene cunicularia hypugea*) during winter migration (U.S. Navy 2010c).

The sandy beaches and disturbed dunes on SSTC-N provide nesting habitat for species including the Western Snowy Plover, California Least Tern, Horned Lark, and Killdeer. In addition, Black-bellied Plover, Least Sandpiper, American Pipit, Western Meadowlark, House Finch, other shorebirds, gulls, and terns loaf and forage on the sandy beaches and dunes of SSTC-N. Dunes and the adjacent beaches support specialized invertebrate fauna, such as tiger beetles, sand spiders, robber flies, kelp flies, and ants, which provide a food source for several shorebird species (U.S. Navy 2010c).

The mudflats on the Bay side of NAB Coronado/SSTC-N provide valuable habitat to several species of shorebirds, particularly at low tide. In San Diego Bay, an observer at low tide may see Spotted Sandpipers, Willets, Ruddy Turnstones (*Arenaria interpres*), Short-billed Dowitchers, Long-billed Dowitchers (*Limnodromus scolopaceus*), Red Knots (*Calidris canutus*), Sanderlings, Western Sandpipers, Least Sandpipers, Dunlins (*Calidris alpina*), Black-bellied Plovers, Semipalmated Plovers (*Charadrius semipalmatus*), Killdeers, Black-necked Stilts (*Himantopus mexicanus*), or American Avocets (*Recurvirostra americana*). Birds using the mudflats include the threatened Western Snowy Plover, and the Western Sandpiper (*Calidris mauri*), which forage on the mudflats during low tide. The endangered California Least Tern, other Terns, and Black Skimmer forage in the waters over submerged mudflats

during high tide (USFWS 1995). Shorebirds congregate sometimes by the thousands in San Diego Bay 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 niches of mud-dwelling species (USFWS 1995).

Birds that are increasing in number in the region include the more generalist species and those tolerant of human disturbance such as the Western Gull (*Larus occidentalis*), Common Raven (*Corvus corax clarionensis)*, and American Crow (*Corvus brachyrhynchos hesperis*). Shrinking habitat locally, regionally, and along the entire Pacific Flyway is probably the most important issue to survival of many birds dependent on San Diego Bay. (U.S. Navy 2010c).

Specific Concerns

MBTA

- Development/anthropogenic disturbances;
- Habitat loss/or changes;
- Erosion and sedimentation;
- Invasive species (flora and fauna);
- Climate change (e.g., changes in temperature or sea level rise);
- Predators;
- Predation and
- Domoic acid toxicity

Herons and Egrets

- Increased bird populations leading to elevated Bird/Wildlife Aircraft Strike Hazard (BASH) risks;
- Predation by Herons/Egrets on Western Snowy Plover and California Least Terns;
- Removal of nesting trees and impacts from tree trimming;
- Disease (steatitis) and
- Domoic acid toxicity

Current Management

MBTA

The MBTA (16 U.S.C. 703-712) protects all migratory birds and prohibits the taking of birds covered by the act, their young, nests, and eggs, except as permitted by the USFWS. The USFWS recommends that NAB Coronado and SSTC-N avoid impacting birds protected under the MBTA by surveying for nesting birds in areas proposed for disturbance and if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends conducting activities outside of nesting areas or outside of the general migratory bird-nesting season that extends from mid-February through the end of August, to help avoid direct impacts.

Prohibited Acts: Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not.

On March 15, 2005, the USFWS published in the Federal Register (FR 70(49):12710-12716) a final list of the bird species to which the MBTA does not apply. The list is required by the Migratory Bird Treaty

Reform Act of 2004. The actual list of migratory birds protected by the MBTA is published in the Code of Federal Register (CFR) (Title 50, Part 10.13). When it became law in 2004, the Reform Act excluded any species not specifically included on the Title 50, Part 10 list from protection.

The 2003 National Defense Authorization 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.
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 February 28, 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.

In addition, DoD and the USFWS entered into a Memorandum of Understanding (MOU) in July 2006, to Promote the Conservation of Migratory Birds, in accordance with Executive Order (EO) 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (DoD 2007). This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations other than military readiness activities are consistent with the MBTA. The MOU also describes how the USFWS and DoD will work together cooperatively to achieve these ends. The MOU does not authorize the take of migratory birds; the USFWS, however, may develop incidental take authorization for Federal agencies that complete an EO MOU.

Current management of migratory birds also includes habitat restoration, implementation of the DoD Coordinated Bird Monitoring (CBM), San Diego waterbird surveys, general bird surveys approximately every 5 years (during natural resource inventory surveys), annual Western Burrowing Owl surveys, and a Heron and Egret Management Plan.

Herons and Egrets

NAB Coronado and SSTC-N's mission does not directly conflict with the presence of Herons; however, a strategy for mitigation has been developed for those projects with the potential to impact Herons or their nests. Mitigation includes planting Torrey pine trees, and not planting Eucalyptus trees at Heron nest sites. Once planted, these sites are analyzed to determine their feasibility and appropriateness for supporting Torrey pines (e.g., soil, slope aspect).

Management guidelines set forth in the draft 2012 Heron and Egret Management Plan include (1) restriction of non-essential activity adjacent to active Heron nests; (2) conservation of nesting habitat; (3) continued monitoring of nesting locations, phrenology (timing) of nesting, reproductive effort, and

success; and (4) construction of parking covers or shelters to lessen impact of Heron droppings**.** Herons and egrets have not nested at NAB in recent years; however, if they re-establish nesting here, the nesting sites will be managed in accordance with the latest NBC policies.

Management Objective and Strategy

MBTA

Objective: Maintain and enhance populations, and nesting and foraging habitats of migratory birds on NAB Coronado and SSTC-N.

Strategies:

1. Assess the effects of all projects on migratory birds during the NEPA process. Ensure compliance with the MOU between the USFWS/DoD on the Conservation of Migratory Birds and the "Migratory Bird Rule."
2. Identify any actions that require an MBTA permit and, if necessary, obtain appropriate permit for intentional take of migratory birds.
3. Develop effective management for minimizing the unintentional take of migratory birds.
4. Conduct regular surveys to determine what species of migratory birds may have potential to be on NAB Coronado and SSTC-N.
5. Once finalized, implement monitoring protocols contained within the DoD Coordinated Bird Monitoring Plan. Contribute data to the Coordinated Bird Monitoring Database.
6. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed.
7. Develop migratory bird specific BMPs and ensure these BMPs are included in project plans (e.g., plan all tree trimming during the non-nesting season).
8. Develop and distribute outreach and education materials on migratory birds to personnel, operators and visitors on NAB Coronado and SSTC-N.
9. Revegetate with native species contained on the NAVFAC SW recommended plant list.
10. Participate in DoD Partners in Flight initiative.
11. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).
12. When feasible pick up sick and injured migratory birds and take to wildlife rehab facility.
13. Rendova Court family housing: Prior to commencing ground disturbing activities during the nesting/breeding season of birds protected under the Migratory Bird Treaty Act, a qualified biologist shall perform a survey of the disturbed area to identify active nests, eggs, or chicks of protected birds and, if present, the Lessee will establish and follow avoidance procedures to reduce or avoid the incidence of take (lethal removal) of adults, eggs, and chicks (Real Estate 2007).

Herons and Egrets

Objective: Maintain nesting for Herons and Egrets on NAB Coronado and SSTC-N while balancing and coordinating management with BASH concerns and impacts to listed species.

Strategies:

1. Finalize and implement a Heron and Egret Management Plan. Include management provisions for Herons and Egrets within the plan and INRMP.
2. Maintain a relationship with Wildlife Assist and Project Wildlife to rescue and rehabilitate injured Herons.
3. Coordinate with local and regional efforts on disease research.
4. Reduce BASH risks by encouraging herons to nest in areas of NAB Coronado and SSTC-N that are furthest away from the runways (e.g., near Heron Park).
5. Conduct heron and egret surveys of metro area bases approximately every three years.

5.2.4.6 Bird/Wildlife Aircraft Strike Hazard

Bird strikes to aircraft are a serious safety and economic problem in the United States, annually causing millions of dollars in damage to civilian and military aircraft and occasionally loss of human life. The Navy has experienced approximately 20,000 bird/aircraft strikes since 1980 resulting in two deaths, 25 aircraft destroyed and over $300 million in damage. Naval Safety Center data indicates that sixty-five percent of all bird strikes occur within the primary surface area (PSA) of the airfield which is 229 meters (750 feet) in both directions from the centerline of the runway. In addition, at NASNI, data indicates that only 30 percent of bird/aircraft strikes are actually reported, thus underestimating the number and severity of the problem. Federal Aviation Administration (FAA) PSA is 305 meters (1,000 feet) in both directions of the centerline of the runway (FAA Advisory Circular 159/5300-13). FAA Part 139.337, a wildlife assessment is triggered by one of the following: (1) multiple animal strikes; (2) substantiated damage to the aircraft; (3) engine ingestion of wildlife; or (4) when size and numbers of wildlife on or near the airport are capable of causing a damaging event (U.S. Navy 2008d).

Specific Concerns

- Invasive species (flora and fauna);
- Habitat changes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Increased presence of wildlife on or near active runways.

Current Management

A bird/wildlife aircraft strike hazard (BASH) plan was developed for NBC in 2008 and a new BASH plan was finalized in 2012, these provided guidance to minimize wildlife populations on and around the airfield that pose a threat to aviation safety. The primary goal of the BASH program is to minimize the potential for loss of aircrew life. The BASH program achieves this objective by addressing the aviation safety hazard associated with wildlife on and near airfields. The BASH program needs to manage wildlife populations and work with installation personnel to improve bird strike reporting and communication of wildlife activities within the airfield environment. An effective BASH program also strives to minimize secondary BASH impacts, such as damage to aircraft and loss of training. Aircraft

collisions with wildlife are too costly and hazardous to not be property addressed or managed (U.S. Navy 2008d). The purpose of the 2012 BASH plan included the following objectives (U.S. Navy 2011d):

1. To establish policy and procedures for implementing the Commander, Navy Installations Command BASH Program (CNIC INST3700, 7 July 2011).
2. To establish mandatory BASH event reporting and remains collection procedures in accordance with OPNAVINST 3750.6, CNIC BASH program Manual, and the FAA Advisory Circular 150/5200-32 a of 22 Dec 04.
3. To establish BASH program procedures in accordance with reference CNIC BASH program Manual and FAA Advisory Circular 150/5200-33 b of 28 Aug 07.

The BASH plan includes: 1) conduction of wildlife monitoring; 2) implementation of a habitat management program; 3) use of bird dispersal techniques when appropriate and warranted; 4) implementation of species specific population control program; 5) development of operation procedures to address bird/animal aircraft strike hazards; 6) adoption of a zero-tolerance policy for birds within the primary surface area, exceptions maybe granted by the Bird Hazard Working Group for specific birds such as threatened and endangered species or species of conservation concern; and 7) increased communications, safety and training of aviators, aircrews and operational personnel related to BASH issues (U.S. Navy 2008d).

Natural resource managers are responsible for ensuring BASH programs are addressed in this INRMP and is compliant with all applicable state and Federal natural resource laws and regulations as well as all applicable DoD, DoN, and U.S. Navy environmental policies, directives, and instructions (U.S. Navy 2012e) .

Management Objective and Strategy

Objective: Reduce hazards between wildlife and aircraft at NAB Coronado and SSTC-N.

Strategies:

1. Manage habitat near the airfield to reduce attractiveness to wildlife, particularly birds. The following guidelines are contained in the BASH plan to reduce habitat attractiveness to wildlife (U.S. Navy 2008d):
    a. Reducing “edges” between habitats that some birds, especially small passerines, use such as the edge between brush and a grassy area.
    b. When possible, replacing dirt (bare ground) with other materials such as gravel, asphalt or artificial turf to eliminate available grit sources that birds such as doves and pigeons need.
    c. Conducting surveys to determine if sensitive plant species occur in the vicinity of the airfield.
    d. Managing grass or forbs to a height that reflects the particular species of interest. At NBC it is recommended that grass next to the runway should be kept to a height of 3 to 4 inches to enable clear inspection of the area and also to ensure cutting before plants seed.
    e. Managing weeds for the entire airfield on a regular basis year round because they can provide a food source and cover for small passerine birds and rodents.

f. Reducing, clearing, and/or thinning the number of trees or bushes that produce nesting, foraging, or roosting opportunities for birds around the entire airfield.

g. Ensuring water areas within the PSA are filled, drained or covered with netting or a wire grid system. Depressions on the runways that collect water should be repaired to eliminate standing water.

2. Educate personnel at the airfield about the NAB Coronado and SSTC-N natural resources program.
3. Periodically review the BASH plan to ensure that it does not conflict with this INRMP.
4. Continue to participate in NBC Bird Hazard Working Group (BHWG) to identify and address BASH risks.
5. Coordinate natural resources projects with the BHWG including the U.S. Department of Agriculture (USDA) BASH biologist assigned to NBC to ensure natural resources management is compatible with the BASH program.

5.2.4.7 Mammals

For a complete listing of mammal species observed, or detected, at NAB Coronado and SSTC-N, see **Appendix F**.

Mammals are found year-round on all properties of the SSTC. The native habitats and developed areas harbor populations of small mammals that are a food source for raptors and other carnivores. The only sensitive mammal confirmed in the area is the San Diego black-tailed jackrabbit, which is a CDFW species of special concern. It is common at SSTC beaches, grasslands, open scrub, and ruderal areas. California ground squirrels are common. Feral cats, are controlled because they represent a threat to federally listed nesting birds. The Virginia opossum and striped skunk also occur (U.S. Navy 2010c).

Consistent with Biological Opinions throughout the SSTC, certain mammals are managed by the U.S. Navy as predators of the federally listed California Least Tern and Western Snowy Plover. These include Virginia opossum, striped skunk, and other mammals that consume eggs or young (U.S. Navy 2010c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. The NBC INRMP addresses terrestrial and shoreline resources, while the San Diego Bay INRMP covers in-water resources jointly with the Port of San Diego. The latter is considered a bay wide plan by local and regional resource agencies, which provided letters of concurrence or signatures.

These plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship.

All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing terrestrial mammals, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation, as needed.

Strategies:

1. Continue documenting mammal species during Natural Resources inventory efforts and those that are incidentally observed during special status species surveys.
2. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
3. Install bat boxes where appropriate.
4. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

5.2.4.8 Marine Mammals

Extensive natural history information for marine mammal species occurring within southern California waters has been summarized in previous works (Leatherwood et al. 1982, 1988; Reeves et al. 2002; Carretta et al. 2007; DoN 2008). Approximately 41 marine mammal species or stocks are known to occur within southern California waters based on NMFS Stock Assessment Reports (Carretta et al. 2007, DoN 2008). Of these, eight species are expected to be found within the NAB/SSTC-N project area. These include the California sea lion *(Zalophus californianus)*, Pacific harbor seal *(Phoca vitulina)*, bottlenose dolphin *(Tursiops truncatus)*, the eastern North Pacific gray whale *(Eschrichtius robustus)*, long-beaked common dolphin *(Delphinus capensis)*, short-beaked common dolphin *(D. delphis)*, Pacific white-sided dolphin *(Lagenorhynchus obliquidens)*, and Risso's dolphin *(Grampus griseus)*.

Sea lions and seals belong to the Order Carnivora, which is a group that includes true seals, sea lions, and fur seals. Species within the group Carnivora, or otherwise called pinnipeds, hunt and feed exclusively in the ocean, with certain species in southern California coming ashore to rest, molt, breed, and bear young. Whales and dolphins belong to the group Cetacea, in which all species spend their lives entirely at sea.

Specific Concerns

- Habitat loss and/or changes;
- Stranding;
- Climate change (e.g., changes in temperature or sea level rise) and
- Domoic acid toxicity.

Current Management

Marine mammal surveys are conducted on a regular basis in the San Diego Bay and along the ocean side NBC properties to determine species of marine mammals present in San Diego Bay and within the vicinity of NAB and SSTC-N. In addition to surveying for marine mammals, discrete water samples for chlorophyll analysis as well as continuous water quality data (chlorophyll, temperature, salinity, etc.) are collected. The U.S. Navy follows regional stranding and injured wildlife protocol established by the

Southwest Region Marine Mammal Stranding Network. An MOU between NMFS and the U.S. Navy, *Assist in Marine Mammal Stranding Investigations* (Agreement No. PR-055) requires the development of Regional Stranding Investigation Assistance Plans. The Regional Stranding Investigation Assistance Plan is being developed at the regional level with the Navy Stranding Response Coordinators. In addition, NBC Instruction 5090.1, Base Fishing Regulation, requires compliance with Federal and state laws concerning fish and wildlife, including marine mammals (2007).

As part of the Navy's MMPA Letter of Authorization, the following requirements are part of the Navy's monitoring and mitigation. Based on NMFS-promulgated criteria and in-water propagation of sound and underwater detonations, the buffer zones described below are derived from empirical data (very shallow water [VSW]) and modeled estimates of propagated peak-pressure and energy (within the range of hearing of marine mammal species) (U.S. Navy 2010c).

The following mitigation measures, which are situation/location dependent for underwater detonations and ELCAS training, incorporate existing range procedures at SSTC and are consistent with existing training objectives and activities, as well as established human safety procedures. In case of unanticipated conflict, human safety considerations will take precedence and such conflicts are always used to make incremental improvements in the procedures used in subsequent activities.

Mitigation measures for underwater detonations on SSTC ocean side include (U.S. Navy 2010c):

1. A buffer zone will be established around each detonation point. For detonations occurring in 0 to 7 meters (0 to 24 feet) of water depth (VSW), the buffer shall be a 366-meter (1,200-foot) radius around the detonation point. For detonations occurring in 7 to 22 meters (24 to 72 feet) of water depth, the buffer shall be 430 meters (1,410 feet).
2. Two U.S. Navy observers (one on the beach and one in a small craft for detonations in 0 to 7 meters [0 to 24 feet] and two in small craft for 7 to 22 meters [24 to 72 feet] of water depth) with binoculars will survey detonation area and the buffer zone for marine mammals from at least 30 minutes prior to commencement of the scheduled explosive event until at least 30 minutes after detonation. U.S. Navy observers will pay extra attention within the buffer zone to large amounts of floating kelp strands and other marine debris (if any), since these may provide shelter and food for marine mammal prey.
3. U.S. Navy divers placing charges on mines and dive support vessels will check the area immediately around the mine location for marine mammals.
4. If a vessel not associated with the event is sighted in the buffer zone or headed towards it, suspend activities and ensure the area is clear prior to detonation.
5. If a marine mammal is sighted within the buffer zone or moving towards it, exercises will be suspended until the animal has voluntarily left the area and the area is clear of marine mammals for at least 30 minutes for detonations in 7 to 22 meters (24 to 72 feet) and 10 minutes for 0 to 7 meters (0 to 24 feet) of water depth.
6. Any animals appearing following the detonation will be observed for signs of injury. Injured marine mammals will be reported to the Commander Navy Region Southwest (CNRSW) Environmental Director, PACFLT Environmental Office, and NMFS.
7. Sequential detonations will be conducted either less than 10 seconds apart or greater than 30 minutes apart.
8. Any marine mammal observed after a VSW underwater detonation either injured or exhibiting signs of distress will be reported to Navy environmental representatives from the regional U.S. Navy shore commander (Commander, Navy Region Southwest) and U.S. Pacific Fleet,

Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy will report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports will contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animals status.

Mitigation for ELCAS/Pile Driving Activities on SSTC ocean side includes the following (U.S. Navy 2010c):

1. The U.S. Navy will monitor a 46-meter (150-foot) buffer zone surrounding temporary pile removal activities for the presence of marine mammals before, during, and after pile removal activities. This mitigation zone is based on the predicted range to Level A harassment (180 decibel root mean squared) for cetaceans, and is being applied conservatively to both cetaceans and pinnipeds. If marine mammals are found in the area, pile removal activities will be halted until the marine mammals have voluntarily left the buffer zone.
2. Monitoring for marine mammals will take place concurrent with pile-removal activities and 30 minutes prior to pile-removal commencement. A trained observer will be placed on shore, on the ELCAS, or in a boat at the best vantage point(s) practicable to monitor for marine mammals and will implement shutdown/delay procedures when applicable by calling for shutdown to the hammer operator.
3. ELCAS pile driving includes a soft start as part of normal construction procedures. The pile driver increases impact strength as resistance goes up. At first, the pile driver piston drops a few inches. As resistance goes up, the pile driver piston will drop from a higher distance thus providing more impact due to gravity. The ELCAS soft start is not the traditional soft-start used in bigger civilian construction projects, and doesn't include a waiting period (an initial set of several strikes from the impact hammer at 40 to 60 percent energy levels, followed by a 1- minute waiting period, then two subsequent three-strike sets), but does provide additional time for marine mammals to vacate the area.

The mitigation measures outlined above will protect marine mammal populations near NAB Coronado and SSTC-N and assist in avoiding adverse effects to marine mammals from Navy activities.

Management Objective and Strategy

Objective: Protect and monitor populations of marine mammals at NAB Coronado and SSTC-N.

Strategies:

1. Conduct regular (approximately every 1 to 2 years) surveys for marine mammals that may be present within NAB Coronado and SSTC-N boundaries not covered by the San Diego INRMP.
2. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information gleaned to guide adaptive management.
3. Develop and distribute outreach and education materials on marine mammals to personnel, operators and visitors on NAB Coronado and SSTC-N.
4. Follow injured wildlife protocol.

5.2.5 Special Status Species (Federally Listed and Other Special Status Species)

Special status species include those species that are federally or state listed endangered, threatened, candidate, or California species of special concern and California fully protected species (CFP); birds on the Federal Birds of Conservation Concern list (see **Figure 5-5**); and plants identified by the California Native Plant Society (CNPS) as belonging to the Rare Plant Rank of 1B. In addition, those migratory bird species that have been determined to be of the highest "concern" to the DoD and that have been identified on the DoD Partners in Flight (PIF) Priority Species list have been included. **Table 5-5** includes species either observed on NAB Coronado and SSTC-N during the 2005 natural resources survey, or species with the potential to occur on the installation.

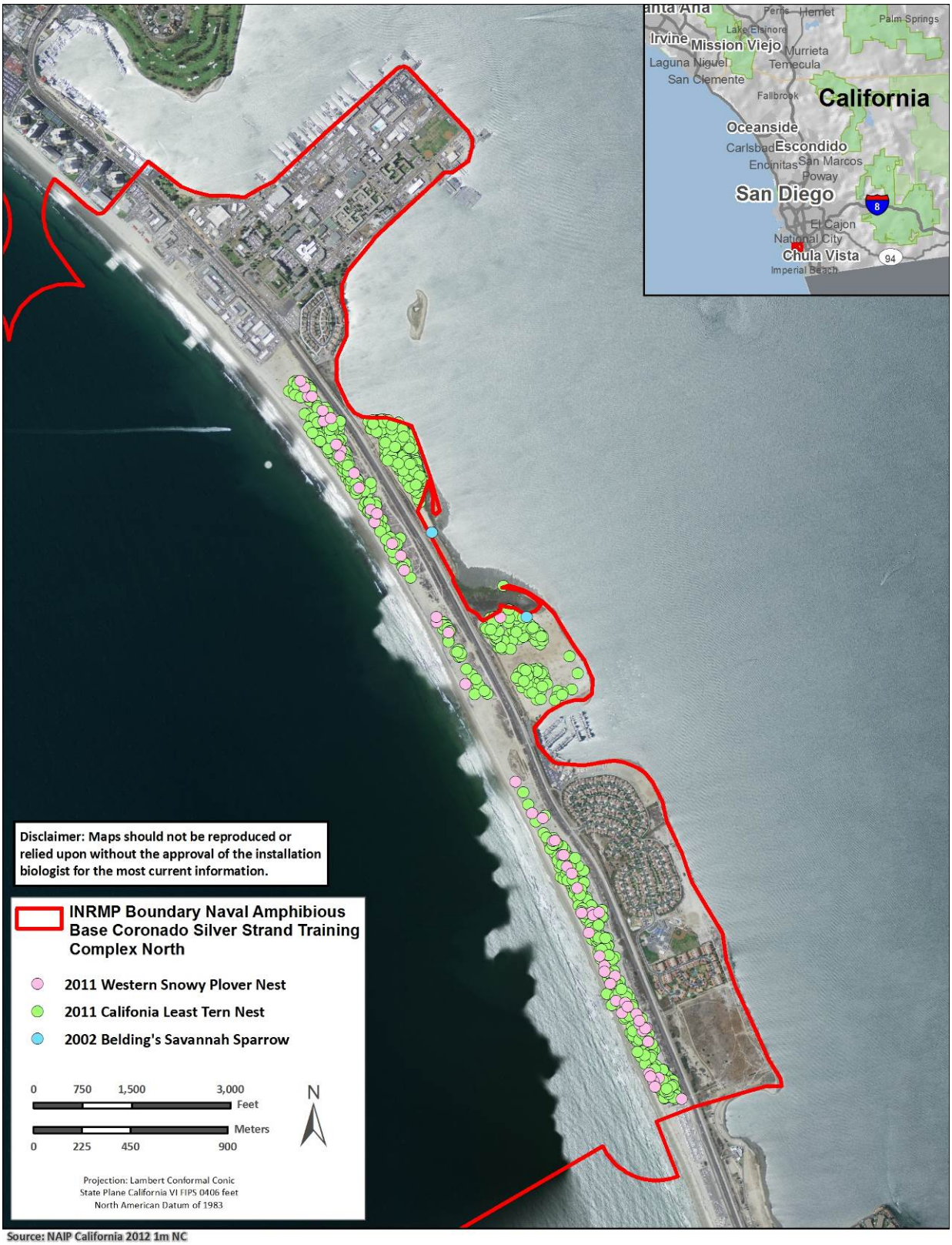
An installation's overall ecosystem management strategy must provide for protection and recovery of federally listed species. Under the ESA, an "endangered species" is defined as any species that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The USFWS has also presented an updated list of species that are regarded as candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and could warrant protection under the ESA. General management actions for listed species include the following:

- Preparation and implementation of specific management actions for listed species that include protocols for monitoring surveys and for site marking of sensitive areas;
- Maintaining GIS data on the distribution and habitat availability for listed species and sharing this information with the CNDDB;
- Implement Environmental Review requirements in accordance with OPNAVINST 5090.1C CH-1;
- Conduct Environmental Awareness briefings (e.g., natural resource training) as necessary;
- Minimization and conservation measures aimed at reducing the potential for accidental take;
- Investigating and implementing research projects to better understand ecological requirements of listed species and
- Investigation and implementation of habitat improvement and non-native species control to conserve listed species.

If threatened, endangered, or candidate species are discovered on the installation during a biotic inventory, species information and management actions should be incorporated into the INRMP.

The intent of this section is to identify objectives and strategies to manage NAB Coronado and SSTC-N using a regional ecosystem-based approach that manages special status species while protecting the operational functionality of the mission. While single-species management is not promoted as a general philosophical management approach on the installation, specific controls are used to protect special status species beyond management of the ecosystem. Other procedures in place for management of special status species are modifying the ecosystem and human interactions within this environment. The following sections include brief descriptions of those species actively managed by natural resources personnel at NAB Coronado and SSTC-N.

For a complete description, background and species account including distribution, range, habitat and biology, of the Special Status Species described below, see **Appendix G**.



Source: NAIP California 2012 1m NC

Figure 5-5: Naval Amphibious Base Coronado and Silver Strand Training Complex North Special Status Bird Species

Table 5-5: Special Status Species Observed and Listed Species with the Potential to Occur on Naval Amphibious Base Coronado and Silver Strand Training Complex North

Common Name	Scientific Name	Federal Status	State Status	Other Status
Plants				
Nuttall's lotus[1]	*Acmispon prostratus*	–	–	CNPS 1B.1
Coast woolly-heads[1]	*Nemacaulis denudata* var. *denudata*	–	–	CNPS 1B.2
Brand's phacelia[1]	*Phacelia stellaris*	FC		CNPS 1B.1
Reptiles				
Green sea turtle[1&2]	*Chelonia mydas*	FT	–	–
Birds[3]				
Tricolored Blackbird	*Agelaius tricolor*	BCC	SSC	–
Golden Eagle	*Aquila chrysaetos*	BGEPA, BCC	CFP	–
Short-eared Owl	*Asio flammeus flammeus*	–	SSC	–
Burrowing Owl	*Athene cunicularia*	BCC	SSC	DoD PIF
Ferruginous Hawk	*Buteo regalis*	BCC	–	–
Swainson's Hawk	*Buteo swainsoni*	BCC	–	–
Red Knot	*Calidris canutus roselaari*	BCC	–	–
Vaux's Swift	*Chaetura vauxi*	–	SSC	–
Western Snowy Plover[1]	*Charadrius nivosus nivosus*	FT, BCC	SSC	–
Mountain Plover	*Charadrius montanus*	BCC	SSC	–
Northern Harrier	*Circus cyaneus*	–	SSC	–
White-tailed Kite	*Elanus leucurus*	–	CFP	–
Prairie Falcon	*Falco mexicanus*	BCC	–	–
American Peregrine Falcon	*Falco peregrines anatum*	BCC	CFP	–
Common Loon	*Gavia immer*	–	SSC	–
Gull-billed Tern	*Gelochelidon nilotica*	BCC	SSC	DoD PIF
Black Oystercatcher	*Haematopus bachmani*	BCC	–	–
Bald Eagle	*Haliaeetus leucocephalus*	FD, BCC,BGEPA	CFP	–
Least Bittern	*Ixobrychus exilis*	–	SSC	–
Loggerhead Shrike	*Lanius ludovicianus*	BCC	SSC	DoD PIF
Short-billed Dowitcher	*Limnodromus griseus*	BCC	–	–
Marbled Godwit	*Limosa fedoa*	BCC	–	–
Long-billed Curlew	*Numenius americanus*	BCC	–	DoD PIF
Whimbrel	*Numenius phaeopus hudsonicus*	BCC	–	–
Black Storm-petrel	*Oceanodroma melania*	–	SSC	–

Common Name	Scientific Name	Federal Status	State Status	Other Status
Birds[3] (continued)				
Belding's Savannah Sparrow[1]	*Passerculus sandwichensis beldingi*	–	SE	–
Large-billed Savannah Sparrow	*Passerculus sandwichensis rostratus*	–	SSC	–
American White Pelican	*Pelecanus erythrorhynchos*	–	SSC	–
California Brown Pelican	*Pelecanus occidentalis californicus*	FD	CFP	–
Purple Martin	*Progne subis*	–	SSC	–
Light-footed Clapper Rail[1]	*Rallus longirostris levipes*	FE	SE, CFP	–
Black Skimmer	*Rynchops niger*	BCC	SSC	–
Lawrence's Goldfinch	*Spinus lawrencei*	BCC	–	–
California Least Tern[1]	*Sterna antillarum browni*	FE	SE, CFP	–
Elegant Tern	*Thalasseus elegans*			DoD PIF
Mammals				
San Diego black-tailed jackrabbit[1]	*Lepus californicus*	–	SSC	–

Source: U.S. Navy 2010c, CNPS 2010

Note: [1] = Special Status Species with focused management. [2] = Federally listed species with the potential to occur. [3] = Birds are named using the American Ornithologists' Union nomenclature.

Key:

BCC = USFWS Bird of Conservation Concern
SSC = California Species of Special Concern
CFP = California Fully Protected Species
FT = Federally Threatened
FD = Federally Delisted
DoD PIF = DoD Partner in Flight Priority Species
FE = Federally Endangered
FC = Federal Candidate Species
ST = State Threatened
SE = State Endangered
BGEPA = Bald and Golden Eagle Protection Act

5.2.5.1 Federally Listed and Candidate Species

Three federally listed species, the threatened Western Snowy Plover (*Charadrius nivosus nivosus*), endangered Light-footed Clapper Rail (*Rallus longirostris levipes*), and the endangered California Least Tern (*Sterna antillarum browni*), and one proposed species Brand's phacelia (*Phacelia stellaris*), are known to occur on NAB Coronado and SSTC-N. Additionally, one federally listed species the endangered green sea turtle (*Chelonia mydas*) has the potential to occur offshore of NAB Coronado and SSTC-N.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

Management needs of threatened, endangered, and candidate species and their habitats are based on results contained within surveys performed regularly on NAB Coronado and SSTC-N. Listed species that occur on NAB Coronado and SSTC-N include the Western Snowy Plover, the Light-footed Clapper Rail, the California Least Tern, and the green sea turtle. NAB Coronado and SSTC-N will continue to conduct species surveys as deemed necessary and subject to available funding. Management strategies will be developed or revised based on the recommendations of those surveys.

Other procedures in place for management of threatened, endangered, and candidate species are modifying the ecosystem and human interactions within this environment.

The Navy currently conducts management of listed species at NAB Coronado and SSTC-N in accordance with applicable Biological Opinions that are discussed in detail in the below appropriate sections. Examples of management strategies include annual surveys and assessment of species status on the installation, minimization of disturbances, and site preparation where necessary.

There is no critical habitat for any of the listed species in NBC. This is, in part, due to U.S. Navy environmental planning through INRMPs. ***Appendix D*** *identifies within the INRMP all management and conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.*

Management Objective and Strategy

Objective: Maximize effectiveness and efficiency of the NBC Endangered Species Program to achieve the best conservation possible while maintaining and improving training activities at the desired level.

Strategies:

1. Investigate the need for implementing research projects to better understand ecological requirements of listed species.
2. Continue use of the established Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists to reflect presence of threatened, endangered, and other sensitive species.
5. Conduct regular surveys for threatened, endangered, and candidate species that may be present on NBC.
6. Continue monitoring sensitive species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
8. Establish an education program for military personnel who might have contact with sensitive species or their habitats.
    a. Develop a demonstration garden and

b. Maintain updated educational materials.

9. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats. Reduce habitat fragmentation.
10. Implement erosion control BMPs to ensure adverse environmental impacts to threatened, endangered, and candidate species habitat do not occur.
11. Revegetate with native species included on the NBC recommended plant list. Include sensitive plant species in the recommended plant list.
12. Periodically review the natural resources management program to ensure that management actions do not adversely impact special status species habitat.
13. Continue to protect existing native plant communities whenever possible.

Brand's Phacelia

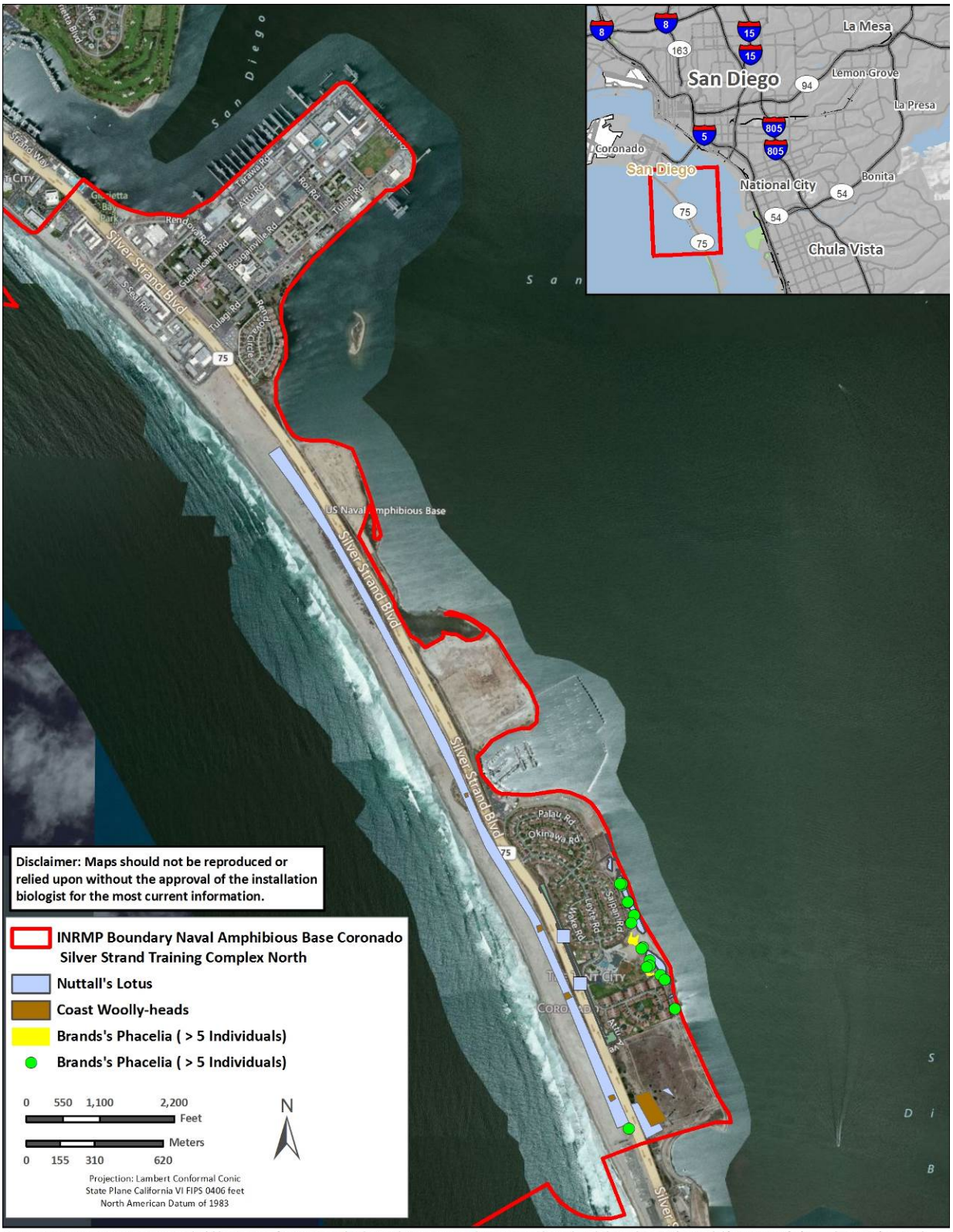
Surveys for this species began in 2010 because that is when it was first observed on SSTC-N, it can be found at Charlie and Bravo training areas on SSTC-N. Brand's phacelia also occurs on the 40-acre leased area to the state of California (CNDDB 2009) just south of the mapped locations in Charlie and Bravo training areas. It is known from wash openings in coastal sage scrub (where the preferred sandy soils can be found) as well as from coastal dunes. The total number of individuals observed in the Bravo and Charlie training areas totaled over 2,080. Species density ranges from single individuals to one aggregate of 57 individuals, and the primary aggregation of over 2,000 individuals. In 2010 and 2011 NBC conducted census counts at Bravo Beach training area for this species. In 2010 the population was estimated to equal 51,638 individuals and in 2011 the estimate of individuals decreased to 1,309 (Munson Per. Comm. 2012a) (see **Figure 5-6**). In addition, a small population (0 to 5 individuals) was discovered on the ocean side SSTC-N during invasive species control activities. Fluctuations in the population appear to be normal and tied to rainfall, based on other sites where this species has been surveyed for more years. The ocean side SSTC-N occurrences were discovered in the restoration area where iceplant was cleared. It can be expected that this population will increase and expand as more habitat is made available through planned habitat restoration of SSTC-N (Pers. Comm. Munson 2012b).

Specific Concerns

- Invasive species;
- Training Area behind housing area;
- Climate change (e.g., changes in temperature or sea level rise);
- Recreational use at SSTC (boaters, trailers for boats and jet skis, etc.);
- Silver Strand Elementary school overflow parking and maintenance yard area and
- Foot traffic for recreational use behind SSTC housing areas.

Current Management

Brand's phacelia is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the U.S. Navy as part of the project planning (U.S. Navy 2010c).



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 5-6: Naval Amphibious Base Coronado and Silver Strand Training Complex North Special Status Plants Species

Management Objective and Strategy

Objective: Maintain existing populations and distribution of Brand's phacelia at NAB Coronado and SSTC-N.

Strategies:

1. Brand's phacelia may benefit from disturbances, including human caused disturbances. Activities that disturb phacelia should be performed in a way to minimize negative impacts to the species. For example, it may be beneficial to the species to perform mowing after the plant has set seed.
2. Continue the annual monitoring program.
3. Improve coordination between NBC botanist and operators to minimize impacts associated with military training
4. Develop a candidate conservation agreement with the USFWS if the species is proposed for listing.
5. Create a seed bank to increase plant stock in future years and ensure viable populations following drought or flood years.
6. Perform a vulnerability assessment to assess threats to existing populations.
7. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).
8. Conduct vegetation management, including invasive species control, to keep cover down.
9. Remove biomass offsite after activities to keep from impacting ecosystem (soils, plant cover, etc.).
10. Implement habitat restoration at SSTC-N (including ice plant removal), and incorporate Brand's phacelia into revegetation projects, as appropriate.
11. Perform an investigation into good seeding practices.
12. Coordinate with Silver Strand Elementary School to reduce impacts. Review the lease with the city of Coronado for Silver Strand Elementary School.
13. Incorporate into revegetation projects, as appropriate.

Green Sea Turtle

Potential habitat for green sea turtles within San Diego Bay and adjacent sandy beaches near Silver Strand and Imperial Beach maybe utilized during foraging but are not considered suitable for nesting. Foraging by green sea turtles is likely concentrated to eelgrass beds and to lesser extent invertebrate communities in South and South Central Bay considering the concentration of the majority of such habitat is within those areas. Potential foraging areas outside the bay associated with kelp beds or eelgrass are primarily located adjacent to the mouth of San Diego Bay (Zuniga Jetty) and north towards Coronado. Silver Strand and Imperial Beach to the south contain ephemeral low-density macroalgae communities but are exposed to the dominant western wave action and long shore sand transport. Because very little is known about foraging patterns of resident green sea turtles within San Diego Bay and the majority of sightings have been concentrated in the South Bay power plant channel inferences about movement patterns remain conjecture (U.S. Navy 2010c). Management of the San Diego Bay population of green sea turtles is addressed in the San Diego Bay INRMP.

Green sea turtles have the potential to occur offshore of NAB Coronado and SSTC-N while in transit in and out the San Diego Bay, and within the eelgrass beds on the ocean and bay side's of NAB Coronado and SSTC-N.

Specific Concerns

- Small boat collisions with green sea turtles;
- Development on and adjacent to beach and
- Stranding.

Current Management

The measures implemented by the U.S. Navy to reduce impacts to marine mammals also serve to mitigate potential impacts on the green sea turtle. Current mitigation measures as defined in the SSTC Environmental Impact Statement for management of the green sea turtle include (U.S. Navy 2010c):

Current procedures for monitoring sea turtles before and after underwater detonations are designed to prevent harm to these animals.

1. A buffer zone will be established around each detonation point. For detonations occurring in 0 to 7 meters (0 to 24 feet) of water depth (VSW), the buffer shall be a 366-meter (1,200-foot) radius around the detonation point. For detonations occurring in 7 to 22 meters (24 to 72 feet) of water depth, the buffer shall be 430 meters (1,410 feet).

   Two observers (one on the beach and one in a small craft for detonations in zero to 7 meters (24 feet) and two in small craft for 7 to 22 meters (24 to 72 feet) of water depth) with binoculars will survey detonation area and the buffer zone for sea turtles from at least 30 minutes prior to commencement of the scheduled explosive event until at least 30 minutes after detonation. Observers will pay extra attention within the buffer zone to large amounts of floating kelp strands and other marine flotsam (if any), since these may provide shelter and prey used by sea turtles.

2. Divers placing charges on mines and dive support vessels will check the area immediately around the mine location for sea turtles.
3. If a vessel not associated with the event is sighted in the buffer zone or headed towards it, activities are suspended and the area is ensured clear prior to detonation.
4. If a sea turtle is sighted within the buffer zone or moving towards it, exercises will be suspended until the animal has voluntarily left the area and the area is clear of sea turtles for at least 30 minutes for detonations in 7 to 22 meters (24 to 72 feet) and 10 minutes for zero to 7 meters (24 feet) of water depth.
5. Immediately following the detonation, visual monitoring for sea turtles within the buffer zone will continue for 30 minutes. Any sea turtle observed after an underwater detonation either injured or exhibiting signs of distress will be reported to U.S. Navy environmental representatives from the regional U.S. Navy shore commander (Commander, Navy Region Southwest) and U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the U.S. Navy will report these events to the NMFS Southwest Regional Office. These voice or email reports will contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animals status. These reports will also be made for any vessel collisions during training activities.

6. Sequential detonations will be conducted either less than 10 seconds apart or greater than 30 minutes apart to minimize the potential for harm to animals that may arrive to feed on potential fish kill.

The following mitigation measures for the ELCAS and all projects proposing pile-driving activities incorporated the existing range procedures at SSTC and were consistent with existing training objectives and activities as well as established human safety procedures. In case of unanticipated conflict, human safety considerations take precedence and such conflicts are always used to make incremental improvements in the procedures used in subsequent activities. For the ELCAS activities at the locations described:

1. The U.S. Navy will monitor a 46-meter (150-foot) buffer zone surrounding temporary pile removal activities for the presence of sea turtles before, during, and after pile removal activities. If sea turtles are found in the area, pile removal activities will be halted until the sea turtles have voluntarily left. The buffer zone is based off of a zone calculated for marine mammals and is expected to be larger than that required for sea turtles.
2. Monitoring for sea turtles will take place concurrent with pile removal activities and 30 minutes prior to pile removal commencement. A trained observer will be placed on shore, on the ELCAS, or in a boat at the best vantage point(s) practicable to monitor for sea turtles and will implement shutdown/delay procedures when applicable by calling for shutdown to the hammer operator.
3. ELCAS pile driving includes a soft start as part of normal construction procedures. The pile driver increases impact strength as resistance goes up. At first, the pile driver piston drops a few inches. As resistance goes up, the pile driver piston will drop from a higher distance thus providing more impact due to gravity. The ELCAS soft start is not the traditional soft-start used in bigger civilian construction projects, and doesn't include a waiting period (an initial set of several strikes from the impact hammer at 40 to 60 percent energy levels, followed by a 1-minute waiting period, then two subsequent three-strike sets), but does provide additional time for sea turtles to vacate the area.

Management Objective and Strategy

Objective: Maintain and enhance populations of green sea turtle on NAB Coronado and SSTC-N.

Strategies:

1. Conduct regular (approximately every 1 to 2 years) surveys for the green sea turtle that may be present within NAB Coronado and SSTC-N boundaries not covered by the San Diego Bay INRMP.
2. Develop and distribute outreach and education materials on the green sea turtle to personnel, operators and visitors on NAB Coronado and SSTC-N.
3. Follow injured wildlife protocol.

Western Snowy Plover

Western Snowy Plover nest on the SSTC-N training lanes and Delta Beaches. Surveys of the nesting activity of the Western Snowy Plover ocean side are conducted throughout the year (January through December) to document both nesting and non-nesting populations and distribution to determine the species' abundance, distribution, and nesting success (U.S. Navy 2008f). In 2011, 62 nests were documented at NAB (61 on the ocean side and 1 on the Delta Beach South). Of those 62 nests, an

estimated 16 chicks fledged (see **Figure 5-5**). Restriction of the beaches to primarily training use (rather than recreational access), predator control efforts, as well as nest buffers and training lane restrictions help to maintain these numbers (U.S. Navy 2010c). Snowy Plovers are observed yearly during migration and winter at NAB. Winter roosting flocks are observed regularly at NAB with the largest flocks found on the Red and Orange training lanes.

Specific Concerns

- Dogs on beaches;
- Recreational beach users;
- Development on and adjacent to beach;
- Other natural resources management objectives (e.g., invasive species removal during the nesting season);
- Facilities maintenance;
- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Military training on beach;
- Predation;
- Invasive species on beaches;
- Increased cover of native species and
- Potential domoic acid toxicity.

Current Management

Snowy Plovers are currently managed at NAB Coronado and SSTC-N under a single programmatic BO, the 2010 BO on the U.S. Navy's Silver Strand Training Complex Operations (FWS-SDG-08B0503-09F0517). Among other conditions, the BO requires: (1) predator control of mammalian and avian predators of the Snowy Plover; (2) enhancement of nesting substrate; (3) no removal of kelp or other natural marine vegetation that is commonly used by beach insects; and (4) nest monitoring. For a complete list of Terms and Conditions and Conservation Measures see **Appendix I**.

The Navy will continue to submit Migratory Bird Depredation Permit requests to address management of the Gull-billed Tern, a significant predator on Least Tern and Snowy Plover eggs and chicks. To date, the Navy has not received authorization to capture, relocate, or take this sensitive species although documented predation on least tern chicks has been significant, predation of plover chicks is regularly observed, and permit applications have been submitted since 2005.

Management Objective and Strategy

Objective: Enhance productivity to maintain the Western Snowy Plover population and meet goals outlined within current NBC Biological Opinions and 2007 USFWS Recovery Plan. This includes maintenance of 5-year average (2005-2009) baseline population levels. Increase plover population where it is compatible with the military mission (e.g., Delta Beaches).

Strategies:

1. Annually review and ensure continued compliance with the USFWS BO for management of plovers at SSTC.
2. Continue to manage dogs and educate owners to eliminate dog/plover interactions.
3. Educate the workforce and beach users on sensitive wildlife species, including breeding season restrictions.
4. Implement a site approval process and NEPA to avoid and minimize impacts to beach (e.g., direct development away from beach, direct lighting away from beach, and minimize predator perches).
5. Coordinate with all stakeholders and contribute to regional vulnerability assessments.
6. Maintain a program for Western Snowy Plover predator management. Encourage the USFWS to develop a strategy to manage predation by Gull-billed Terns.
7. Educate the NAB Coronado and SSTC-N workforce and visitors about sensitive species and habitat.
8. Develop and implement a Long-term Habitat Enhancement Plan for SSTC-N and SSTC- S.
9. Control invasive species to provide sufficient open areas for nesting.
10. Enhance Western Snowy Plover habitat through revegetation projects. Continue to coordinate with regional organizations and conduct sand replenishment projects.
11. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
12. Work to establish a natural resources law enforcement program on the installation.
13. Complete nest monitoring on an annual basis and band birds when it is determined to be appropriate to meet management goals.

Light-footed Clapper Rail

Narrow intertidal flats occur along the margins of tidal channels of the salt marshes of south San Diego Bay such as at the Delta beaches, which may be used for feeding areas by the Light-footed Clapper Rail. Light-footed Clapper Rails were observed on the Delta Beach marsh on SSTC-N in the past. No nesting activity by Light-footed Clapper Rails has been documented at NAB Coronado or SSTC-N (U.S. Navy 2010e).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Invasive species within marshes and
- Other natural resources management objectives (e.g., opening mudflats for plover foraging).

Current Management

The U.S. Navy currently does not conduct management for this species due to the lack of nesting opportunities on NAB Coronado and SSTC-N.

Management Objective and Strategy

Objective: Maintain marsh habitat for Light-footed Clapper Rail on NAB Coronado and SSTC-N.

Strategies:

1. Monitor for occurrence in conjunction with California Least Tern and Western Snowy Plover monitoring.
2. Implement site approval process and NEPA to avoid and minimize impacts to marsh habitat (e.g., direct development away, direct lighting away, and minimize predator perches).
3. Control invasive species.
4. Enhance habitat through revegetation projects.
5. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
6. Contribute to regional vulnerability assessments.

California Least Tern

In 1994 California Least Terns began nesting on ocean side beaches where military training takes place. Protection had to be established to protect the terns, and this began the development and evolution of a series of adaptive set of measures, with each year bringing ever-increasing tern numbers and a new set of circumstances. As nesting on ocean side training beaches continued to increase, the U.S. Navy adapted and improved their approach as a result of information gained from monitoring and experimentation.

Oceanside surveys of the nesting activity of the California Least Tern were conducted from April to mid-September 2011 at NAB Coronado and SSTC-N including the Delta Beaches to determine the species' nesting success at these sites. A total of 1,063 nests were found at these sites in 2011. An estimated 973 pairs of California Least Terns nested at these sites. Within the 1,063 nests, at total of 1,865 eggs were documented. Of those eggs, an estimated 122 chicks fledged. Of the 122 estimated fledglings, an estimated 95 fledglings survived and left the site (see **Figure 5-5**) (U.S. Navy 2011e).

Specific Concerns

- Dogs on beaches;
- Recreational beach users;
- Development on and adjacent to beaches;
- Other natural resources management objectives;
- Facilities maintenance;
- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Military training on beaches;
- Predation;
- Invasive species on beaches;
- Increased cover of native species and

- Domoic acid toxicity.

Current Management

Least Terns are currently managed at NAB Coronado and SSTC-N under a single programmatic BO, the 2010 BO on the U.S. Navy's Silver Strand Training Complex Operations (FWS-SDG-08B0503-09F0517). Among other conditions, the BO requires: (1) predator control of mammalian and avian predators of the Least Tern; (2) enhancement of nesting substrate; and (3) nest monitoring during the breeding season. For a complete list of Terms and Conditions and Conservation Measures see **Appendix I**.

The Navy will continue to submit Migratory Bird Depredation Permit requests to address management of the Gull-billed Tern, a significant predator on Least Tern and Snowy Plover eggs and chicks. To date, the Navy has not received authorization to capture, relocate, or take this sensitive species although documented predation on least tern chicks has been significant, and permit applications have been submitted since 2005.

Management Objective and Strategy

Objectives:

1. Maintain an average baseline (2005-2009) on SSTC-N ocean side.
2. Enhance baseline numbers on Delta Beaches North and South.
3. Enhance productivity.

Strategies:

1. Continue to manage dogs and educate owners to reduce dog/California Least Tern interactions
2. Exclude recreational beach users and eliminate recreational dog use on NAB Coronado and SSTC-N beaches.
3. Implement a site approval process and NEPA to avoid and minimize impacts.
4. Maintain a program for California Least Tern predator management. Encourage the USFWS to develop a strategy to manage predation by Gull-billed Terns.
5. Educate the NAB Coronado and SSTC-N workforce and visitors about sensitive species and habitat.
6. Complete nest monitoring on an annual basis and band birds when it is determined to be appropriate to meet management goals.
7. Coordinate with all stakeholders and contribute to regional vulnerability assessment.
8. Develop and implement a Long-term Habitat Enhancement Plan for SSTC-N and SSTC-S.
9. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
10. Work to establish a natural resources law enforcement program on the installation.
11. Control invasive species near California Least Tern habitat.
12. Annually review and ensure continued compliance with USFWS BO regarding military dog training.

5.2.5.2 Other Special Status Species

Other Special Status Species with Focused Management

In addition to federally threatened and endangered species, NAB Coronado and SSTC-N recognizes species that occur at a level of rarity that currently does not warrant Federal listing. **Table 5-5** lists other special status species and their corresponding CDFW or other Federal status. No focused management or surveys currently take place on NAB Coronado and SSTC-N for most of the other special status species.

Three rare plants, as listed by the CNPS, were documented on NAB Coronado and SSTC-N during periodic natural resources surveys (see **Figure 5-6**). These species are listed on the CNPS Lists 1B. List 1B includes plants that are rare, threatened, or endangered in California and elsewhere. The plants of List 1B are rare throughout their range with the majority of them endemic to California. Most of the plants of List 1B have declined significantly over the last century. List 1B plants constitute the majority of the plants in CNPS' Inventory with more than 1,000 plants assigned to this category of rarity. All of the plants constituting List 1B meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Wildlife Code, and are eligible for state listing (CNPS 2010).

Nuttall's Lotus

Nuttall's lotus is prevalent on NAB Coronado and SSTC-N and is commonly found in the sand verbena-beach bursage habitat, ruderal areas, and even in the cracks of the pavement near the developed areas. This plant has the potential to occur on any surface of the station that is not completely developed (i.e., without paving or landscaping). Additionally, it is likely that this species occurs on both Delta Beaches. Although easy to map, it is nearly impossible to count individuals due to its sprawling, mat-like growth form. Therefore, as was done for the red sand verbena, when mapping Nuttall's lotus populations, a visual density estimate was made in lieu of counting or estimating numbers of individuals.

Specific Concerns

- Invasive species;
- Training;
- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- Other natural resources management (e.g., Least Tern site preparation).

Current Management

Nuttall's lotus is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the U.S. Navy as part of the project planning (U.S. Navy 2010c).

Management Objective and Strategy

Objective: Maintain populations of Nuttall's lotus on NAB Coronado and SSTC-N.

Strategies:

1. Perform invasive species control in areas where Nuttall's lotus is known to exist.
2. Conduct periodic monitoring (at least every 3 years) to determine existing population health.
3. Perform a vulnerability assessment to assess threats to the existing population.
4. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).
5. Create a seed bank to increase plant stock in future years and ensure viable populations following drought or flood years.
6. Incorporate use of Nuttall's lotus into revegetation projects, where appropriate.
7. Coordinate with natural resource program to ensure that no threat exists to listed bird species (e.g., California Least Tern).

Coast Woolly-heads

Coast woolly-heads are known to occur on Delta Beach North and South of NAB Coronado (see **Figure 5-6**). This species sprawls aggressively along the sand and is usually fairly abundant where it occurs. Each population was mapped, and an estimation of the number of individuals was made for each. Where it was possible to view the entire population, a visual estimate was made. Where the population was too large to visually assess the entire population from one vantage point, a 1 x 1 m-quadrat was placed and a direct count was obtained.

Specific Concerns

- Invasive species;
- Training;
- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- Other natural resources management (e.g., Least Tern site preparation).

Current Management

Coast woolly-heads is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the U.S. Navy as part of the project planning (U.S. Navy 2010c).

Management Objective and Strategy

Objective: Maintain populations of coast woolly-heads on NAB Coronado and SSTC-N.

Strategies:

1. Conduct invasive species control in areas where coast woolly-heads is known to exist.
2. Perform periodic monitoring (recommend at least every 3 years) to evaluate the health of existing populations.

3. Complete a vulnerability assessment to determine threats to existing populations.
4. Complete NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).

Belding's Savannah Sparrow

The Belding's Savannah Sparrow has been observed on several installations of NBC, including NAB Coronado and SSTC-N. Narrow intertidal flats occur along the margins of tidal channels of the salt marshes of south San Diego Bay such as at the Delta beaches, which may be used for feeding areas by the Belding's Savannah Sparrow (CDFG 2010a). The Belding's Savannah Sparrow is a nonmigratory species that inhabits NBC year-round.

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Other natural resources management objectives (e.g., opening mudflat for plover foraging);
- Facilities maintenance;
- Stormwater management;
- Predation and
- Invasive species within marshes.

Current Management

All species groups are managed including, at a minimum, baseline inventory and regular monitoring. The NBC addresses terrestrial, sea side and shoreline resources, while the San Diego Bay INRMP covers in-water resources jointly with the Port of San Diego (*Port of San Diego | Port of San Diego*). The latter is considered a baywide plan by local and regional resource agencies, which provided letters of concurrence or signatures.

These plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship.

Management Objective and Strategy

Objective: Maintain marsh habitat for Belding's Savannah Sparrow on NAB Coronado and SSTC-N.

Strategies:

1. Implement site approval processes and NEPA to avoid and minimize impacts to marsh habitat (e.g., direct development away, direct lighting away, and minimize predator perches).
2. Perform predator control in conjunction with California Least Tern and Western Snowy Plover management.
3. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.

4. Amend stormwater management plans to recognize nesting seasons of Belding's Savannah Sparrow and ensure clearing of outfalls adjacent to marsh areas occurs during the non-breeding season. Follow stormwater management plans regarding monitoring Storm Water Treatment Areas (SWTAs). Coordinate all marsh impacts with NAVFAC SW natural resources personnel.
5. Perform invasive species control in areas where Belding's Savannah Sparrow habitat is known to exist.
6. Enhance habitat through revegetation projects, where appropriate.
7. Contribute to regional vulnerability assessments.

San Diego Black-tailed Jackrabbit

The San Diego black-tailed jackrabbit has been observed at SSTC-N, being managed on Delta North and South and sometimes occurring on the ocean side of SSTC-N.

Specific Concerns

- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- Running jackrabbits trampling California Least Tern and Western Snowy Plover nests.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring.

Management Objective and Strategy

Objective: Maintain populations of black-tailed jackrabbit on NAB Coronado and SSTC-N while maintaining threatened and endangered bird populations.

Strategies:

1. While conducting predator control, continue to release trapped jackrabbits in areas where conflict with nesting is reduced.
2. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.

Other Special Status Species with General Management

Several other special status bird species that are considered USFWS, BCC, California SSC, and/or California CFP have been observed and are known to occur on NAB Coronado and SSTC-N (see **Table 5-5** for a complete list). No focused management or surveys currently take place on NAB Coronado and SSTC-N for these other special status bird species.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;

- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. Plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship.

All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Minimize the potential for adverse effects on special status species and their associated ecosystems while protecting the operational functionality of the installation mission by using an ecosystem-based management approach.

Strategies:

1. Investigate the need for implementing research projects to understand ecological requirements of special status species.
2. Continue use of the established NBC Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists and constraints maps to reflect presence of threatened, endangered, and other special status species.
5. Conduct regular surveys for threatened, endangered, and candidate species that may be present on NAB Coronado and SSTC-N.
6. Continue monitoring special status species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
8. Augment education program currently conducted at NAB Coronado and SSTC-N for military personnel who might have contact with sensitive species or their habitats.
9. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats.
10. Implement erosion control BMPs to ensure adverse environmental impacts to sensitive habitat do not occur.

11. Revegetate with native species included on the NBC recommended plant list. Include sensitive plant species in the NBC recommended plant list.
12. Periodically review the natural resources management program to ensure that management actions do not adversely impact habitat for special status species.
13. Maintain accurate, usable, and informative GIS data for ease in management planning and documentation.
14. Continue to protect existing native plant communities whenever possible.

5.2.6 Invasive Species Management

In 2006 the California Invasive Plant Council (Cal-IPC) updated the 1999 *Exotic Pest Plants of Greatest Ecological Concern in California* inventory list (Cal-IPC 2006). The updated California Invasive Plant Council (Cal-IPC) inventory ranks invasive species using a *High*, *Moderate*, *Limited*, or *Evaluated but not listed* scale based on ecological impact of the species. Invasive species were ranked based on four criteria that included (1) ecological impact of the species on native California ecosystems, (2) potential for species to either be or become invasive, (3) species distribution, and (4) documented levels of the species within a region or ecosystem. A description of each ranking level based on these four criteria as defined by Cal-IPC, is presented below (Cal-IPC 2006):

High: These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. These species are usually widely distributed ecologically, both among and within ecosystems.

Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology is conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited: The ecological impacts of these species are minor or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasion. Ecological amplitude and distribution are generally limited (these species may be locally persistent and problematic).

Evaluated but not listed: In general, this designation is for plant species that did not have enough information to warrant a rating or the information available indicated that the plant species does not currently have significant impacts within California.

Alert: This is an additional designation for some species in either the high or moderate category, but whose evaluation is limited. The designation alerts managers to species that are capable of rapidly invading unexploited ecosystems, based on initial localized observations and on observed ecological behavior in similar ecosystems elsewhere.

Invasive species that are the most prevalent and problematic within NBC include acacia (*Acacia* sp.), eucalyptus, and iceplant. While Cal-IPC is a valuable resource, new infestations appear frequently, and the sheer number of invasive species in the state of California can make it difficult for one agency to track in a timely manner. Installation staff may be required to do independent research to ensure that a potentially invasive species are not introduced to an area. Additionally, some species that have not previously appeared to be invasive may quickly become invasive due to climatic or other factors (Pers. Comm. Munson 2012).

Invasive species management is a large part of pest management activities. The Federal Noxious Weed Act and EO 13112 require Federal agencies to control noxious and invasive species on Federal lands. The Federal Noxious Weed Act, enacted January 3, 1975, established a Federal program to control the introduction and spread of foreign noxious weeds into the United States. Amendments in 1990 established management programs for undesirable plants (including noxious weeds) on Federal lands. There are several plant species that are considered noxious and control is mandatory for those found on the Federal list. EO 13112 requires that Federal agencies prevent the introduction of invasive species, detect and control populations of invasive species, and restore native species and habitat conditions in ecosystems that have been invaded. Invasive species are alien species (not native to the ecosystem) whose introduction does, or is likely to, cause economic or environmental harm, or harm to human health. All of the invasive weeds listed on the Federal list are not necessarily found at NAB Coronado and SSTC-N.

The California Wildlife Action Plan has identified the growth and spread of floral and faunal invasive species in the state as a major concern to maintaining biodiversity in the state (CDFG 2007). As a result, natural resources personnel on NAB Coronado and SSTC-N and NAVFAC SW ensure that invasive species are not introduced on the installation, and have developed a program to control the spread of and the eradication of existing infestations of invasive species.

Problems associated with invasive non-native plants and animals are currently being addressed at many different levels in California, within the constraints of budgets and staffing resources. Examples include the Cal-IPC which is a volunteer NGO which supports noxious weed coordination center for activities addressing noxious weeds within the state. The NRCS also has a lead role in coordinating an aggressive state/Federal/private effort to eradicate, or at least stop, the spread of invasive species.

Aquatic invasive species disrupt the balance of natural ecosystems by consuming or competing with native plants and animals, altering biogeochemical cycles, and reducing native biodiversity. Invasive marine species have arrived in the ROI from all over the world through direct and indirect means, and for intentional and unintentional purposes. Invasion risks stem from hull fouling, ballast water exchanges, and from aquarium, pet nursery, aquaculture, and seafood industry trade. The following vectors could pertain to the ROI (as identified by CDFG 2006): ships and boats; dry docks, navigation buoys and marine floats; floating marine debris; such as floating nets and plastic detritus; recreational boats and equipment such as small recreational crafts, snorkeling and self-contained underwater breathing apparatus (SCUBA) gear, fins, wetsuits, jet skis, and similar materials; restoration projects due to the movement of marsh, dune, or seagrasses as well as associated organisms; intracoastal spread by unknown and natural migrants to new areas.

USACE permit projects involving disturbing activities in bay substrates require for *Caulerpa taxifolia*, an invasive aquatic alga. The U.S. Navy conducts project related surveys within the bay concurrently with routine inventories in San Diego Bay, such as monitoring eelgrass transects to evaluate eelgrass habitat and confirm the absence of *Caulerpa* spp. Native to the Indian Ocean and believed to be an accidental introduction of the aquarium trade into southern California waters, the alga produces large amounts of a single chemical that is toxic to fish and other would-be predators. In areas of the world where the species has become well established, it has caused ecological and economic devastation by overgrowing and eliminating native seaweeds, seagrasses, reefs, and other communities. This alga is considered a substantial threat to marine ecosystems in southern California, particularly to the extensive eelgrass meadows that make coastal waters a more productive environment for fish and birds.

Several marine invasive plant and animal species are known to occur in the San Diego Bay. These include red algae (*Caulacanthus ustulatus*, *Lomentaria hakodatensis*), seaweed (*Sargassum muticum*, *S.*

horneri), brown kelp (*Undaria pinnatifida*), (*Polyandrocarpa zorritensis*), and sea squirts (*Styela clava, Styela plicata, Polyandrocarpa zorritensis, Symplegma reptans*).

All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide/herbicides authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager. Chemical and manual exotic and invasive species treatments are required to be entered in the NAVFAC Online Pesticide Reporting System.

Specific Concerns

- Anthropogenic disturbances (e.g., vessel, vehicle, and aircraft movement within the ocean) can be a potential source of invasive species;
- Intake and discharge of ocean water for training purposes;
- Landscaping on and off the installation;
- Rapid spread of invasive non-native plants that displace native species and degrade habitat for native floral and faunal species;
- Plants, algae, and marine invertebrates and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

NAB Coronado and SSTC-N have developed a program to monitor and control the spread of existing infestations of invasive species, and to determine if new species populations have become established. Assessments of invasive species populations are conducted annually during the rainy season to determine extent of invasive species populations on NAB Coronado and SSTC-N. Once assessed, species are prioritized for treatment based on the extent of the infestation, and where the populations are located (e.g., next to listed species habitat).

NAB Coronado and SSTC-N is actively monitoring for and controlling invasive species; however, there is no formal plan in place to ensure that control activities employed by NAB Coronado and SSTC-N are consistent and effective. Additionally, the U.S. Navy conducts presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted Disturbing Activity can be carried out in *Caulerpa*-Free Systems. In the event that *Caulerpa* is detected, BMPs are implemented to isolate and prevent the spread of this species.

Management Objective and Strategy

Introduction and Spread of Invasive Species

Objective: Minimize non-native species encroachment in areas where severe to moderate encroachment occurs, and in new areas of encroachment where infestation might be spreading but is not yet severe.

Strategies:

1. Annually review and update the NBC recommended plant list.

2. Develop and implement an Invasive Species Management Plan to control the spread of invasive species on NAB Coronado and SSTC-N. The plan should include specific prescriptions to evaluate individual invasive species, to identify targeted species, to control further spread of targeted species, and to develop and implement a program to monitor species abundance.
3. Conduct annual surveys to determine whether controls on existing infestations of species have been effective, and whether new populations have become established.
4. Develop and implement a review process for all projects that include a landscaping component to ensure invasive species are not introduced.
5. Coordinate with the Natural History Museum to identify unknown species that may be invasive.
6. Develop outreach and education materials for distribution within the NAB Coronado and SSTC-N community.
7. Continue to conduct presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted disturbing activity.

Early Detection and Rapid Response

Objective: Enhance current early detection and rapid response management capabilities.

Strategies:

1. Ensure the bio-security plan establishes early detection protocol and rapid response options, to include the following:
    a. Establish adequate monitoring locations to detect invasive species introduction and spread.
    b. Develop a communication network as a rapid response tool to quarantine specific invaders and identify the pathway.
    c. Support rapid response by determining funding sources, contract vehicles, and cooperative mechanisms that can be accessed quickly.
    d. Prepare instructions that include measures to prevent the introduction of invasive non-native species, detect early and respond rapidly to new introductions, and control and monitor established populations.
2. Prepare educational materials for NAB Coronado and SSTC-N military and civilian employees, contractors, and other visitors as a tool in early detection of non-native species.

Project Planning

Objective: Ensure control and management of invasive species is included in project planning and maintenance projects.

Strategies:

1. Address non-native species in NEPA and other ground disturbing project plans.
    a. Ensure funding is secured for non-native removal during all phases (including post-project), if applicable.

   b. Monitor projects to ensure personnel are following BMPs, conservation measures, and other guidelines and requirements.

2. Manage roads, access routes, and new construction sites to minimize the spread of invasive non-native species and ensure that road or access routes are not created without authorization and project review approval.
   a. Require that maintenance or repair of existing roads stay within established footprints where feasible.
   b. Clean roadside mowing equipment of adhering dirt and vegetation between mowing cycles.
   c. Schedule roadside mowing to minimize weedy species seed distribution.
3. If applicable, project proponents must include invasive species treatments and revegetation of temporarily disturbed areas in the project description.
4. Wash vehicles and personnel boots, bags, and clothes before coming onsite; before moving to a different site on the installation, as applicable; and before leaving the installation, as applicable.
5. Implement standard operating procedures to ensure personnel are following guidelines.

Coordination with Regional Agencies

Objective: Promote cooperative interagency efforts to collect and analyze comprehensive monitoring data, including shared funding and staffing.

Strategies:

1. Coordinate with regional and local agencies on efforts undertaken by NAB Coronado and SSTC-N to control the spread of invasive and exotic species.

5.2.7 Grounds and Landscape Maintenance

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat. Planting windbreaks around buildings and parking areas, establishing wildflower areas, and reducing mowing are all ways to spend dollars more wisely, educate the public about the benefits of reduced maintenance, and become better stewards of the environment. In managing natural resources in the cantonment area, NAB Coronado and SSTC-N acknowledges its responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (1994). The memorandum's requirements include the following:

- Using regionally native plants for landscaping from the NBC approved Plant List (U.S. Navy 2011f);
- Using construction practices that minimize adverse effects on the natural habitat;
- Reduce pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- Implementing water-efficient practices;
- Creating demonstrations of these practices to promote their use elsewhere and
- Landscaping opportunities exist throughout NBC in association with administration buildings, training facilities, recreational areas, and housing. Normal grounds maintenance operations focus

on lawn care, drainage ditch maintenance, road maintenance, landscaping maintenance, and pest management.

Specific Concerns

- Water use conservation requirements.

Current Management

The installation's representative botanist and wildlife biologist and NAVFAC SW landscape architect monitor landscaping and grounds projects to ensure that all projects follow the guidance contained in the NAVFAC SW recommended plant list (see **Appendix I**). This guidance includes:

1. Landscape designs and plant lists shall be reviewed and approved by the Installation Botanist, Installation Wildlife Biologist, and NAVFAC Landscape Architect in the planning stages of project design.
2. Ensuring that projects comply with the most recent version of the landscaping plant list.
3. It is vital that coordination with the U.S. Navy points of contact listed above occur early in the planning process to determine site-specific needs and constraints. Please note that not all species on this list are appropriate for all settings. For example, in some areas trees may not be approved due to the presence of federally listed species.
4. Additional species may be included in the landscape design contingent upon the approval of the Navy points of contact listed above. All plants shall be verified for availability in size and quantities needed for each project prior to specifying on plans or scopes of work.
5. The list is updated periodically. Prior to initiating a project, please obtain the most recent list from either of the U.S. Navy points of contact listed above.

Management Objective and Strategy

Objectives: Maintain an aesthetically pleasing landscape on NAB Coronado and SSTC-N that preserves natural ecosystem functions, conserves water in landscaped areas, and promotes pollinator species.

Strategies:

1. Provide professional advice to assist the grounds landscaping and maintenance program in the use of native species as identified in the NAVFAC SW recommended plant list.
2. Maintain and annually update the list of recommended plants that can be used in landscaping.
3. Develop and implement BMPs for grounds maintenance at NAB Coronado and SSTC-N (e.g., water conservation). Periodically review the Landscape Management Plan to ensure plan BMPs still meet installation needs.
4. Restore native plant communities and collect seeds of native species for propagation and proper storage.
5. Develop monitoring metrics, and set targets to ensure management strategies are meeting goals and objectives.

5.2.8 Pest Management

Authority for pest management activities on NAB Coronado and SSTC-N is directed under the Federal Insecticide, Fungicide and Rodenticide Act as amended (7 U.S.C. 136r-1), DoD Instruction 4150.07, SDMAI IPMP, December 2009, and OPNAVINST 6250.4C, Pest Management Programs, OPNAVINST 5090.1C, Chapter 17. IPM is a sustainable approach that incorporates the use of multiple techniques to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control might be an option used in conjunction with other methods. IPM strategies depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts. DoD Instruction 4150.07 establishes annual goals, or measures of merit, for IPM that include the following goals:

- All DoD installations will have current pest management plans;
- Maintain the 55 percent pesticide use reduction achieved from 1993-2003 (in pounds of active ingredient) and
- All installation DoD and contract pesticide applicators will be appropriately certified or licensed.

In addition, OPNAVINST 6250.4C directs the U.S. Navy and Marine Corps to (DoN 2012):

a. Prevent pests from adversely affecting military operations and missions.

b. Safeguard human health and morale by controlling pests that transmit diseases, annoy personnel, or represent a hazard to public health or safety.

c. Maintain and extend the service life of facilities, structures, and materiel by preventing economic pest damage.

d. Enhance the natural environment through the careful protection and management of ecosystems, endangered and threatened species, wildlife, watersheds and water quality in order to maintain optimal biodiversity.

e. Ensure pesticide use is safe and consistent with label directions.

f. Use the principles of IPM to avoid and minimize the use of pesticides when nonchemical alternatives are available and cost effective.

g. Comply with quarantine laws and regulations as related to protecting plants, animals and human health.

h. Comply with laws and regulations concerning pesticide storage, application, disposal of hazardous wastes, and transport of hazardous materials and substances.

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations. The NBC Instruction 5100.2G (10 Jan 2006) regarding Animal Control on board Naval Base Coronado Installations and Dog Beach and Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

1. Installation residents should keep and feed pet animals indoors and under close supervision;
2. Support programs to neuter or spay animals before they reach reproductive age;
3. Require routine vaccinations for rabies and other diseases;
4. Require microchipping registration of all pets brought onto installations;

5. Prohibit the feeding of feral animals on the installation;
6. Provide educational materials to pet owners regarding installation regulations and general pet management;
7. Never abandon animals;
8. Comply with all humane and animal control regulations at the Federal, state, and local level;
9. Except for guide and military working dogs, animals are not allowed in the barracks, work spaces, or recreational facilities at any time, and those in duty status are not permitted to bring animals on board;
10. All dogs must be properly vaccinated, on leash at all times, must not become a nuisance due to noise/odor, and must be picked up after and
11. No animals shall be left unattended or in a poorly ventilated vehicle.

Specific Concerns

- Water use conservation requirements and
- Overuse of fertilizers.

Current Management

The 2009 IPMP for SDMAI, which includes NAB Coronado and SSTC-N, describes pest management requirements, identifies pests for SDMAI, outlines roles and responsibility for IPM at each SDMAI, outlines procedures for pest control at each facility, and describes the administrative, safety, and environmental requirements of the program. Specific aspects of the program include pest identification, pesticide management (includes storage, transportation, and use and disposal), environmental health and safety, emergency pest management, and available program resources (U.S. Navy 2009a). All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager.

Threatened, endangered, or candidate species can be directly or indirectly affected by pest control activities. The following pest management operations require natural resource manager review:

- Weed and outdoor pest control in endangered/threatened species habitats and natural areas;
- Outdoor large area insecticide fogging;
- Pesticide applications to, over or adjacent to water bodies, waterways, or wetlands;
- Installation of bird barriers, exclusion devices, or repelling devices;
- Wildlife and feral animal control and
- Invasive species control.

Natural resources managers will obtain any necessary approvals, consultations, or permits. No pest management activities will violate the practices described for threatened, endangered, or candidate species by the California Department of Pesticide Regulation. NAB Coronado and SSTC-N will use the California Department of Pesticide Regulation Endangered Species Project website (*http://www.cdpr.ca.gov/docs/es/index.htm*) to determine the best chemicals to control pest species and their use limitation.

In addition, management of feral animals is a component of pest management at NAB Coronado and SSTC-N. Feral animals, especially feral cats and dogs, pose a potential threat to public health and safety. They also pose a threat to wildlife, especially federally listed species and migratory birds. Existing U.S. Navy policy included in SECNAVINST 6401.1A of August 16, 1994 regarding veterinary health services prohibits dogs, cats, and other privately owned or stray animals from running free on military installations. The CNO issued a policy letter on January 10, 2002 that clarifies the application of SECNAVINST 6401-1A. An objective of the existing policy is to control feral animals in a humane manner to prevent injury or disease to U.S. Navy personnel and eliminate adverse impacts on native wildlife. The instruction requires Navy commands to institute proactive pet management procedures in order to prevent establishment of free-roaming cat and dog populations.

The 2009 SDMAI IPMP identifies a number of strategies to conduct pest management at U.S. Navy installations in the San Diego Metro area.

Management Objective and Strategy

Implementation of the Pest Management Plan

Objective: Ensure compliance with environmental legislation, regulations, and guidelines.

Strategies:

1. Update the SDMAI as necessary to ensure that the plan reflects changes in pest populations and current management issues. Incremental updates to the plan will be conducted annually.
2. Implement pest management controls from the SDMAI and other pest-related guidance and plans.
3. Conduct surveys of pests that pose a potential health risk to humans or natural resources.
4. Implement the control of wildlife and the effective elimination of concentrated and diseased populations.
5. Monitor pest and invasive species populations. Track usage of pesticide active ingredients and man-hours spent controlling pest and invasive species during implementation to ensure that the management strategies are sufficient.

Management of Feral Animals

Objective:

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations. The Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

Strategies:

1. Develop and implement a program to control feral animals on NAB Coronado and SSTC-N. Control populations of feral animals on NAB Coronado and SSTC-N.
2. Conduct surveys when appropriate to determine impact of feral animals on native species on NAB Coronado and SSTC-N.
3. Installation residents should keep and feed pet animals indoors and under close supervision.

4. Support programs to neuter or spay animals before they reach reproductive age.
5. Require routine vaccinations for rabies and other diseases.
6. Require microchipping registration of all pets brought onto installations.
7. Prohibit the feeding of feral animals on the installation.
8. Provide educational materials to pet owners regarding installation regulations and general pet management.
9. Comply with all humane and animal control regulations at the Federal, state, and local level.

5.2.9 Outdoor Recreation and Public Access

NAB Coronado and SSTC-N provide some outdoor recreation opportunities for military personnel and their families, and DoD civilian employees. Recreational use of natural resources is an integral part of ecosystem management. The outdoor recreation program is based on providing quality experiences while sustaining ecosystem integrity. Among the outdoor recreation activities provided are a few recreational fields, tennis courts, picnic areas, swimming pools, hiking, jogging, cycling, wildlife viewing, and recreational fishing.

Unfortunately, high levels of recreational use may have negative impacts on the environment so constant monitoring of recreational use is necessary to ensure permanent damage to the natural and cultural resources does not occur.

Specific Concerns

- Overuse of recreational areas on NAB Coronado and SSTC-N and
- Erosion and sedimentation.

Current Management

The outdoor recreation activities provided at NAB Coronado and SSTC-N include picnic areas, oceanfront beaches, beach cabanas, fishing, camping sites, jogging, cycling, walking and wildlife viewing trails. In addition, recreational access should be compliant with the requirements associated with the provisions of the American with Disabilities Act of 1990 as amended and the Disabled Sportsman Access Act as amended.

Management Objective and Strategy

Objective: Provide quality outdoor recreation experiences while sustaining ecosystem integrity, and not conflicting with mission priorities.

Strategies:

1. Continue to limit public access and outdoor recreation for reasons that include general security and liability issues, the presence of federally endangered and threatened species, and fire safety.
2. Develop an outdoor recreation plan for NAB Coronado and SSTC-N. Identify and evaluate suitable outdoor recreation opportunities for installation personnel in undeveloped areas that do not contain or have the potential to impact sensitive species.

3. Develop and distribute outreach and education materials for recreational users of NAB Coronado and SSTC-N.

5.2.10 Law Enforcement of Natural Resources Laws and Regulations

Specific Concerns

- Unauthorized access or activities in natural areas, or areas used by nesting birds or marine mammals, may disrupt and limit the viability of native populations or habitats and
- Gaps in communication between NBC Environmental Division and NBC Force Protection, related to enforcement of closure areas or other areas requiring special protection, could result in mismanagement of natural resources, or non-compliance with Federal environmental regulations.

Current Management

NAB Coronado and SSTC-N has established the following objectives for enforcement: (1) Enforce laws and regulations pertaining to the implementation of the natural resources program; (2) Integrate natural resources enforcement into the overall natural resources program; and (3) Use enforcement personnel to enhance the natural resources program at NAB Coronado and SSTC-N.

There are no game wardens permanently stationed at NAB Coronado and SSTC-N. In 2011, NBC established a new partnership with CDFW Law Enforcement in which CDFW provided a specified number of weekend patrols focused primarily during the Least Tern and Snowy Plover nesting season. The game warden patrols are aimed at reducing recreational impacts on the nesting terns and plovers. NBC plans to continue this partnership as funding is available. The DoD police have the authority of the Commander (exclusive jurisdiction) and of the Sikes Act to enforce all Federal laws relating to the management of natural resources at NAB Coronado and SSTC-N, including the ESA, CWA and MBTA.

Management Objective and Strategy

Objective: Ensure compliance with state and Federal natural resources laws and regulations.

Strategies:

1. Provide training to personnel responsible for enforcement of applicable laws and regulations.
2. Continue to protect special status species and the natural communities.
3. Cooperate with other agencies, particularly the USFWS and CDFW, to ensure that natural resources laws are adequately enforced.
4. Periodically review Federal and state laws and regulations to ensure natural resources laws and regulations are adequately enforced.

5.2.11 Environmental Awareness and Outreach

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The NBC approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about the unique and valuable natural resources on the installation, the more responsibly they act toward using them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Activities such as fish stocking, land rehabilitation, and wildfire suppression can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public support these easily understood efforts. However, such issues as protection of sensitive areas for little known plant and wildlife species, prescribed burning, and permit fees and their uses require effective conservation communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

At NAB Coronado and SSTC-N a monthly bird walk was initiated in 2008 aimed at NBC military and civilian personnel. This bird walk has been a valuable tool for promoting awareness and increasing interaction between natural resources personnel and the public. In addition, a Least Tern and Snowy Plover interpretive panel was installed at South Delta Beach in 2010 to educate the public, and a natural resources educational DVD was produced in 2011.

Specific Concerns

- Communication about the natural resources of NBC, environmental regulations, and protocols for situations where wildlife is trapped or injured, or birds are nesting or roosting in unwanted areas, may not be effectively conveyed due to staff turnover.

Current Management

The Sikes Act requires each military service to support environmental education for personnel and for the public where and when it is compatible with military safety and security needs. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program. The conservation effort on site will continue to expand as this INRMP and subsequent natural resource management programs are undertaken to ensure efficient and thorough management of the natural resources on base. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program.

Management Objective and Strategy

Objective: Provide people on the installation and in the surrounding community with an understanding of the NAB Coronado and SSTC-N natural resources program. Promote environmental stewardship through training and awareness.

Strategies:

1. Provide decision makers with the information they need to make educated decisions about installation natural resources.
2. Provide general conservation education to the NAB Coronado and SSTC-N community, including the means to attend training.
3. Periodically review outreach and education materials to ensure that each is still current and meeting the goals of the outreach and education program.
4. Reach out to local community groups for volunteers.
5. Establish a watchable wildlife program.

6. Educate the local community, as well as installation personnel and tenants, about the installation natural resources program. Develop and distribute educational materials about the NAB Coronado and SSTC-N natural resources program to stakeholders near NAB Coronado and SSTC-N (e.g., neighborhoods, county, etc.).

5.2.12 Geographic Information Systems Management, Data Integration, Access and Reporting

GIS is a computer system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface. GIS is used to create information layers used to develop and manipulate maps. GIS data are represented as different layers each containing data on a particular kind of feature (e.g., soils, wetlands, roads) from surveys, inventories, and other projects with spatial information. Each feature is linked to a position on the graphical image of a map. The data layers are organized to create maps and to perform statistical analysis.

GIS will also provide support for the entire environmental program and the training community. NBC will use GIS for complex analyses such as project siting, data interpolations, and risk assessments.

GIS software enables installation staff to capture, store, update, manipulate, analyze, and display all forms of geographically referenced data and tabular information about NBC. The management of reports in one central database enables users to quickly respond to data calls and identify gaps in natural resources management. The training of the NBC Environmental, Facilities Management, and Training staff and the allocation of their time to data entry, mapmaking, analysis of data, and interpretation of the results will determine the success of the installation GIS.

Once fully developed, the installation central databases can be used for the following:

- Providing maps;
- Selecting suitable areas for construction activities;
- Planning land rehabilitation projects;
- Providing special maps for Environmental Awareness materials;
- Ensuring avoidance of cultural resources during ground-disturbing projects;
- Ensuring avoidance of rare species habitats and other areas of special concern during construction projects;
- Identifying site options for use during NEPA evaluation of alternative sites;
- Calculating drainages and water flows;
- Determining Neotropical bird habitat preferences and
- Reviewing contract deliverables.

Specific Concerns

- GIS maps and shapefiles may not have appropriate metadata that identifies who, when, and for what purposes the data were collected and
- Natural resource management decisions could be misguided if there are information gaps in the natural resources database, or if the database is not kept current.

Current Management

Currently, there is no central repository for GIS data and reports, research, and other documentation. GIS data is submitted to Navy Assessment Management or the GIS IDIQ contractor. CNIC and NAVFAC guidance on metadata is being developed, but has not yet been finalized.

Management Objective and Strategy

Objective: Collect, store, develop, and maintain data about historical conditions, trends, and current status for critical indicators of ecological integrity and sustainability.

Strategies:

1. Use GIS and other natural resources data as benchmarks for developing future natural resources management goals and objectives.
2. Ensure that central database information is available to biologists, planners, contractors, and others in a quick and timely manner.
3. Annually review GIS data to advise resource managers of needs to update data sets during budget planning and programming.
4. Develop specific language that will be included in all contracts to ensure all spatial data produced are fully compatible with the installation GIS database.
5. Develop a standardized system for recording and mapping significant resource observations (e.g., plants, wildlife, erosion, damage) when incidentally encountered.
6. Provide annual funding for one person to be responsible for updating and maintaining the GIS database. This should include the necessary hardware, software, and training for the use of GIS.
7. All reports and other GIS data delivered and incorporated into the Navy GIS database.

6. Silver Strand Training Complex South

6.1 Purpose, Approach and Rationale

Natural resources management at Naval Base Coronado (NBC) strives to integrate biodiversity conservation and an ecosystem-based approach into an adaptive management framework compatible with the military mission. As a result, the natural resources program consists of multiple resource disciplines that are frequently interconnected and share similar objectives. Management projects and plans often consist of multiple program elements with several different resource experts collaborating together.

A number of items have been identified in subject areas that affect the natural resources present on and immediately adjacent to NBC. The purpose of this section is to identify goals, objectives, and strategies for natural resources management on Silver Strand Training Complex South (SSTC-S).

The goal for management of natural resources at NBC **is to provide an adaptive ecosystem-based conservation program that will efficiently support the NBC mission and provide for sustainability of natural resources.**

Specific concerns, current management, and the management strategy for each natural resources area are described below. A summary of the strategies as well as the estimated time frame for completion is presented in **Appendix C, Tables C-1** and **C-4 (Project Table).**

Some of the strategies described in this section will be accomplished through interactive partnerships with other Federal, state, and local organizations. Natural resources staff at NBC will initiate partnerships based on the benefits to the regional ecosystem and the local environment.

6.2 Natural Resources Current Conditions and Management

6.2.1 Topography, Geology and Seismicity

SSTC-S is located on an isthmus of land with the Pacific Ocean to the west and San Diego Bay to the east. The Silver Strand is relatively flat, with an elevation rarely exceeding 4.5 meters (15 feet) above sea level (U.S. Navy 2010c).

The topography of the lands around San Diego Bay is characterized by gently sloping ground at an average elevation of about 3 meters (10 feet) above mean sea level (AMSL). Silver Strand peninsula, which lies between San Diego Bay and the Pacific Ocean, is generally level, with slopes typically between 1 and 5 percent. SSTC-S slopes gently from about 11 meters (35 feet) AMSL at its northern end to about 3 meters (10 feet) AMSL at its southern end. Most of SSTC-S lies on a plateau at an elevation of about 9 meters (30 feet) AMSL, from which the terrain slopes gradually down toward the Pacific Ocean to the west and toward the tidelands of San Diego Bay to the east. A few small depressions on SSTC-S form seasonal pools and waterfowl habitats during the winter (U.S. Navy 2010c).

SSTC-S is underlain by the Quaternary-age Bay Point Formation and surficial deposits of natural beach sands and dredge fill soils. The Bay Point Formation is composed of marine, lagoonal, and nonmarine sources of poorly consolidated fine- and medium-grained, pale brown, fossiliferous sandstone (USDA 1973). Beach deposits are composed of unconsolidated sand and silt derived from many sources as a result of longshore drifts and alluvial discharges from major stream courses (U.S. Navy 2010c).

San Diego County lies almost entirely within the Peninsular Ranges geomorphic province that occupies the western portion of the Peninsular Ranges Geomorphic Province, a region noted for its intense seismic activity (Burns 1997 and U.S. Navy 2010c). The coastal plain consists of numerous marine and nonmarine terraces of sedimentary rocks dissected by stream valleys. As a result of this grinding, earthquakes and past volcanic activity, in combination with weathering processes, have largely shaped San Diego County into a geologically diverse area (U.S. Navy 2006c). Seismic structures running close by include the Rose Canyon Fault Branch, which runs north to south along the eastern side of the Silver Strand, Elsinore Fault, runs diagonally from the northwest to southeast across the county through Lake Henshaw. The Rose Canyon Fault is considered the most potentially damaging fault in the area (U.S. Navy 2006c) and is believed to have the potential to produce a 7.5 magnitude quake (U.S. Navy 2010c). The San Jacinto Fault, further to the east and approximately paralleling the Elsinore Fault, has been the most active of San Diego County's fault zones in recent times (U.S. Navy 2010c).

The SSTC-S fault zones extend from offshore of Coronado and the Silver Strand toward downtown San Diego. The Silver Strand runs through the northern end of the Naval Amphibious Base Coronado Silver Strand Training Complex, while the Coronado fault occurs just north of the training complex (see **Figure 6-1**). Both fault zones begin offshore over 3,000 meters from the city of Coronado. There are two faults are offshore and over 3,000 meters from the SSTC-S (see **Figure 6-1**).

6.2.2 Watershed Management

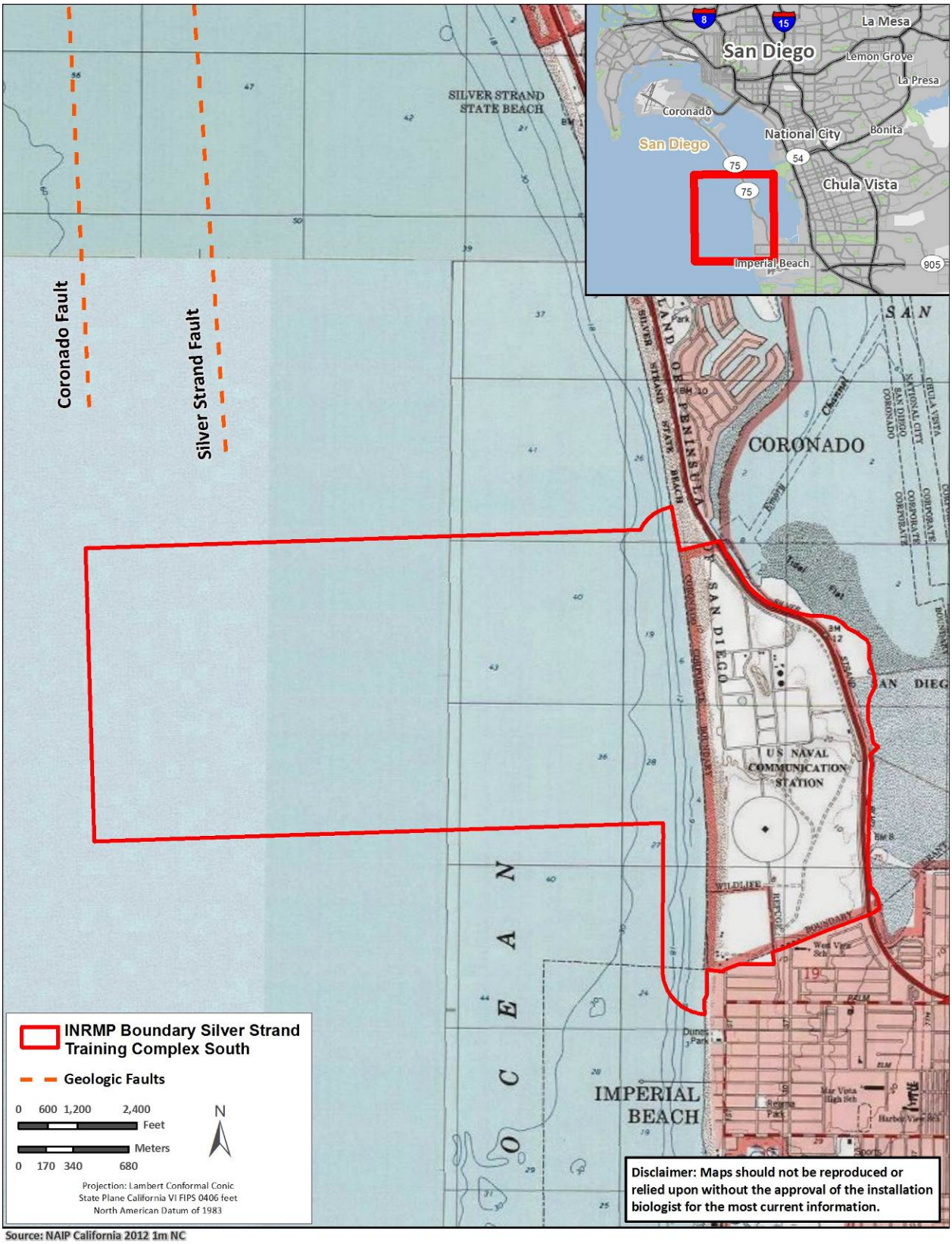
Watershed management is important to natural resources management because it directly affects both surface water and groundwater quality and is critical to maintain valuable aquatic habitats.

Healthy, stable soils are the foundation of a healthy ecosystem. As soils lose their structure and begin to erode, other systems also begin to fail. Vegetation and wildlife decline in numbers and diversity, and the quality of surface water declines as it becomes loaded with eroded sediments. Some soil types, such as those found at SSTC-S, took centuries to develop and are not easily replaced or repaired if lost or damaged. Inherent in the clay and sandy nature of SSTC-S's soils is a risk of significant erosion when vegetation is removed or, soil structures are disturbed. The fragile nature of these soils make the protection of SSTC-S's soils vital for maintaining many of the functional systems that make up a healthy ecosystem.

6.2.2.1 Soils

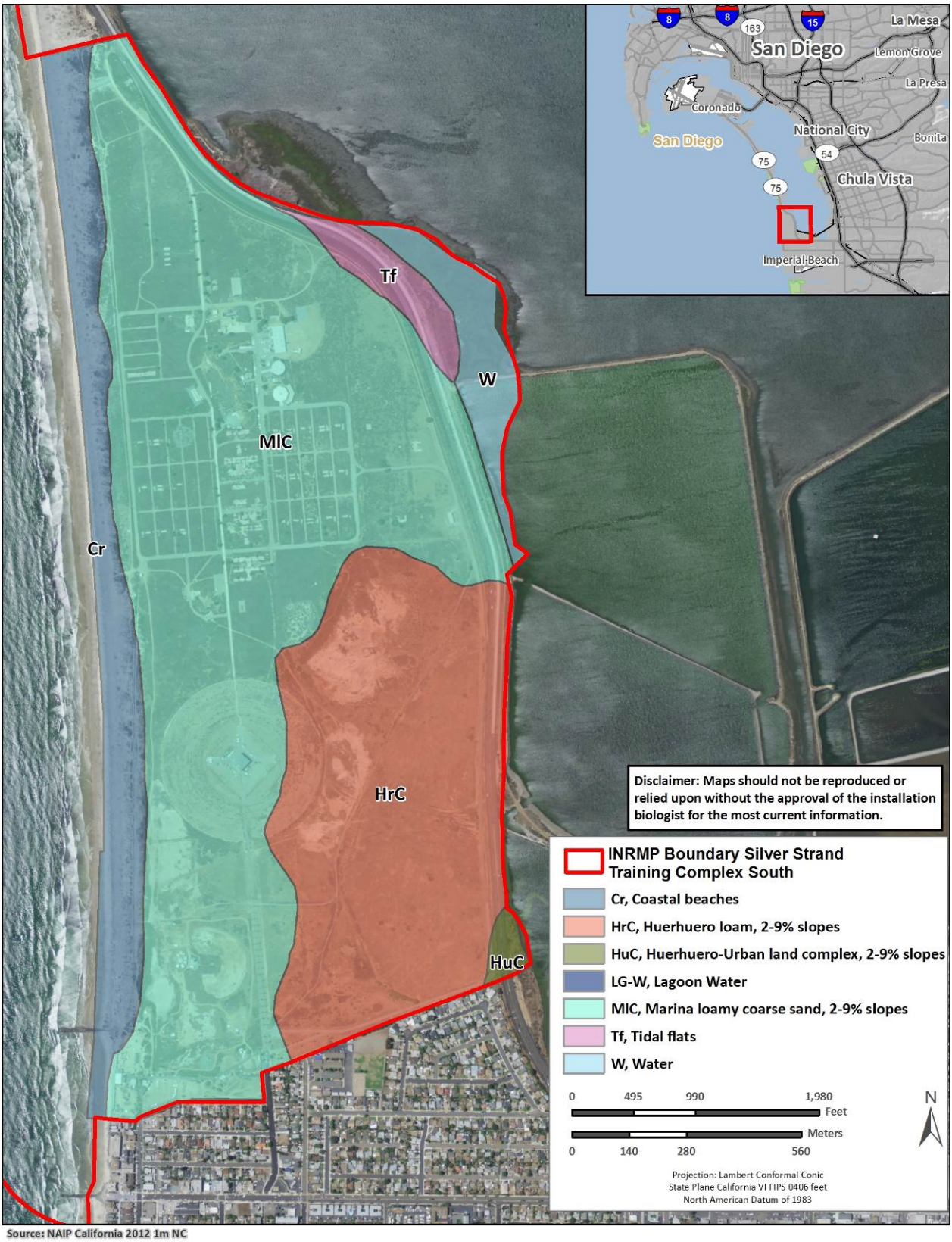
The mapped soil types, which cover approximately 80 percent of the facility, are characterized as being moderately well-drained with clay subsoil developed in sandy marine sediments, to somewhat excessively drain and derived from weakly consolidated to non-coherent eolian sand (NRCS 2011). The NRCS mapped four soil types on SSTC-S (NRSC 2011). Soils on SSTC-S are shown in **Figure 6-2**. These soil types include (NRCS 2011):

- ***Marina loamy coarse sand (MIC).*** Approximately 60 percent of SSTC-S is composed of Marina loamy coarse sands, with two to nine percent slopes. Marina soils are situated on short rolling dune-like slopes at elevations of 30.5 to 213 meters (100 to 700 feet). They formed in old sand dunes near the coast. Marina soils are somewhat excessively drained, have slow to rapid runoff, and have moderate permeability. Marina loamy coarse sands are predominantly located within the entire length of the central portion of SSTC-S.
- ***Huerhuero loam (HrC).*** Approximately 25 percent of SSTC-S is composed of Huerhuero loams, with two to nine percent slopes. Huerhuero soils occur on marine terraces. Their parent material is composed of calcareous alluvium derived from sedimentary rock. Huerhuero soils are moderately well drained. Huerhuero soils occur in the southeastern portion of SSTC-S.



Source: NAIP California 2012 1m NC

Figure 6-1: Silver Strand Training Complex South Topography and Faults in the Vicinity



Source: NAIP California 2012 1m NC

Figure 6-2: Silver Strand Training Complex South Soils Map

- ***Coastal Beaches (Cr).*** The western coastline on SSTC-S, comprising approximately 12 percent of the total acreage of SSTC-S, is composed of coastal beaches with one to five percent slopes. Coastal beaches are composed of course sand, sand, and fine sand.
- ***Tidal flats (Tf).*** Approximately three percent of SSTC-S is composed of tidal flats. Tidal flats soils occur on zero to two percent slopes. These soils are very poorly drained and experience frequent flooding. Tidal flats occur on the northeastern edge of SSTC-S.

Soils on the bayside portion of SSTC-S include Marina Loamy Coarse Sand and Huerhuero Loam. These soils have low to medium fertility, a slow permeability rate, a slow to medium runoff rate, and a severe erodability potential. The topsoil is sandy loam to loam 12.7 to 76 centimeters (5 to 30 inches) thick. The subsoil is clay, to clay loam, to sandy loam, 1.1 to 1.7 meters (45 to 67 inches) thick (USDA 1973).

The ocean side portion of SSTC-S is mapped as Coastal Beaches, sandy and gravelly areas along the open shoreline of the Pacific Ocean. Beach soils sampled on Silver Strand by the USACE are a mixture of fine-grained silty sands and well-graded to poorly graded medium-grained sands, with a fine grains content of 1 to 5 percent (USACE 2003). Beach soils have a high infiltration rate. The rate of water transmission is also high, resulting in low runoff potential. These soils are highly erodible. The beaches are exposed to constant sea-action and coastal winds and are, therefore, subject to further erosion. The dunes along the ocean side of Silver Strand peninsula are also subject to erosion from prevailing coastal winds, surf, storm surge, and military training maneuvers (U.S. Navy 2010c).

Specific Concerns

- Invasive species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

OPNAVINST 5090.1C requires that installation sources of dust, runoff, silt, and erosion debris be controlled to prevent damage to land, water resources, equipment, and facilities, including adjacent properties. An erosion-and-sediment-control plan must be implemented where appropriate. Maintenance of vegetative cover is consistent with ecosystem management goals expressed earlier. Other materials can be used including bio-engineered bank stabilization techniques, gravel, fabrics, riprap, and recycled concrete and pavement that are environmentally safe and compatible with the site. Where bare ground is necessary, other measures for dust, sedimentation, and erosion control should be implemented (e.g., check dams, wind breaks, diversions). To minimize land maintenance expenditures and help ensure environmental compliance, physically intensive activities should be located on those areas least susceptible to erosion. The erosion potential of a site and adjacent water resources need to be identified and analyzed in preparing development, training, and land use plans.

Management Objective and Strategy

Objective: Minimize soil compaction and restore erosion sites.

Strategies:

1. Tailor land uses to appropriate soil types.

2. Continue to implement plans for eroded site rehabilitation.
3. Identify additional sites for land rehabilitation planning.
4. Survey areas where soil erosion and compaction might occur to ensure that BMPs within the erosion control plan are implemented and are effective.

6.2.2.2 Water and Sediment Quality

On SSTC-S, a combination of low, sloping terrain, poor drainage, and a high water table create seasonal pools of storm water runoff in several depressions in the east-central and southern portions of the installation. Runoff from an area of about 24.3 hectares (60 acres) in the city of Imperial Beach and seawater infiltration during high winter tides contribute to the seasonal formation of these pools. Ditches connecting low-lying areas on the eastern portions of SSTC-S to culverts under State Route-75 drain to San Diego Bay, and drainage channels carry storm water runoff from the central portions of SSTC-S to a sump pump at the YMCA Camp Surf that drains to the ocean. A seasonal freshwater pond of about 0.28 hectares (0.7 acre), fed by storm water runoff from Imperial Beach, occupies the central portion of YMCA Camp Surf in the southwestern corner of SSTC-S. A USACE wetlands delineation in 2002 identified 24.1 hectares (59.6 acres) of jurisdictional wetlands, mostly non-tidal pickleweed, and 4.5 hectares (11.3 acres) of non-wetland "waters of the United States" on the site (U.S. Navy 2010c).

All U.S. Navy facilities are subject to the statewide General Industrial Stormwater Permit. The U.S. Navy's General State Water Quality Certification was approved on November 2, 1998 (98C-127), and it is by way of compliance with such permits that water quality is managed by the U.S. Navy. Portions of San Diego Bay are on the CWA 303(d) list for impaired water bodies. In accordance with CWA Section 303, TMDLs will be established for water bodies that are listed as impaired. These are the maximum levels of pollutants that a water body can receive while continuing to maintain specific water quality criteria targets. There are five sites around San Diego Bay that are considered by the RWQCB to be "toxic hot spots," none of which are associated with NBC. The benthic quality of the coastal salt marsh on the bayside (eastern) edge of NAB Coronado was shown to be undergraded in a 1996 benthic quality investigation (RWQCB 2010).

SSTC-S has wetlands, vernal pools, and natural and manmade drainage channels. Groundwater on Coronado Peninsula, because of its proximity to San Diego Bay and the Pacific Ocean, is too saline for potable uses (RWQCB 2007 and U.S. Navy 1992b). The water quality of ephemeral pools, vernal pools, seasonal wetlands, and permanent pools on SSTC-S is unknown because the qualities of these waters have not been studied. No potable surface water or groundwater exists on the Silver Strand peninsula (U.S. Navy 2010c).

Specific Concerns

- Erosion and sedimentation and
- Development/anthropogenic disturbances.

Current Management

The Navy currently manages water quality, primarily hazardous materials handling and waste disposal practices, based on requirements in OPNAVINST 5090.1. Those requirements, in turn, are developed primarily to comply with Federal environmental regulations. Efforts to preserve vegetation on the backsides of dunes along the shoreline may reduce erosion and thus reduce transport of sediments into adjacent surface waters. Collection of spent training materials at the conclusion of training activities also may incrementally reduce the amounts of contaminants transported into adjacent waters.

Planning and Monitoring: Erosion of soils above NBC facilities and roadways is a factor to consider during construction planning. If natural erosion is occurring on a higher elevation terrace, the inputs of sediment can be drastic and pose a threat to facilities or traffic on roads. If the project is planned for an area below undeveloped land, one simple assessment involves making visual scans of the surrounding habitat.

Stabilization techniques: More often than not on NBC, development yields areas that require long-term soil stabilization because of their characteristics. Cut and fill slopes, dirt roads, and drainages are examples of situations found on NBC that need a permanent erosion control strategy. Occasionally, construction projects are in areas where future erosion is not particularly a factor. Examples of this include island zones planned for landscaping in parking areas or as medians, or, relatively level areas in developed zones that are planned for landscaping only. Often, only temporary soil stabilization is required in these areas. Techniques for permanent soil stabilization in areas of high and low erosion potential and temporary erosion control include installing structures that act as a soil blockage to prevent earth movement and soil degradation (e.g., gabion-type retaining walls, soil-nail walls, crib walls, and gunite facings).

Landscape design: Construction projects will almost always include landscaping in the overall plan. Not only is it an essential part of long-term erosion control, but for aesthetics as well. Decisions about plant types (native vs. non-native) used in revegetation/restoration segments of construction projects can be affected by budget issues. There are major advantages to planting native plants in bare areas resulting from construction projects. Sensitive wildlife species have more habitats available for use, irrigation is not required for ongoing maintenance, and landscaped areas merge with undeveloped adjacent native habitat zones. If native vegetation coverage is successfully established, it can provide the best, most cost-effective, long-term erosion control because the plants have evolved to grow in this particular area of southern California. Revegetation/restoration and landscaping activities follow the Landscaping and Installation Appearance Plan Approved Plant List (see **Appendix H**).

Water control measures: Practically all forms of development require installations that will control the flow of water during storms and work related tasks. There are many different forms of water control installations made up of different materials. Wood, metal, plastic, rock, rubber, concrete, and plant material are all utilized when runoff must be controlled. On NBC, natural drainages/slopes, parking lots, and roads are the primary generators of mass amounts of runoff. In natural resource situations, measures are usually taken to simply slow the rate at which sheetflow is traveling. When construction projects result in cut and fill slopes, water flow will be heavier with lack of vegetation cover, consequently requiring an installation that will direct large amounts of water to adequate drainage systems.

Management Objective and Strategy

Erosion and Sedimentation

Objective: Protect soils by maintaining soils and reducing runoff, erosion, and gully formation.

Strategies:

1. Monitor and rehabilitate degraded soil resources. Soil resources will be monitored, evaluated, and rehabilitated. Survey results will be analyzed to assist with identification of degraded soil or eroded areas.
2. Update and include the Erosion Control Plan as a component plan to this INRMP when it is completed.

3. Develop and disseminate informational materials and a short seminar on the erosion control BMPs and watershed protection issues.
4. Educate personnel who are likely to impact the watersheds on erosion and sedimentation BMPs and watershed protection issues.
5. Develop and use an erosion and sedimentation questionnaire designed to gauge the effectiveness of the informational materials and short seminar.
6. Periodically review erosion control BMPs to ensure that they are still adequate to control adverse erosion and sedimentation on NBC. Conduct surveys to determine whether activities on NBC are adversely impacting soil and water resources on NBC as a result of erosion and sedimentation.

Surface Water

Objective: Protect waterways from adverse effects of storm water runoff from development sites to the maximum extent feasible.

Strategies:

1. Conduct surveys of all streams within the installation to identify erosion, sediment accumulations, or other threats to stream stability.
2. Develop actions specific to each unstable stream reach that can be undertaken to assist with stream recovery.
3. As funding allows, undertake natural channel design principles to restore stream reaches with highly unstable conditions.
4. Periodically evaluate streams to ensure that streams are not adversely impacted by installation activities.

6.2.3 Habitat Management

Habitat management is a broad term that encompasses a whole range of management issues that affect fish and wildlife, threatened and endangered species, and ecosystem goals.

6.2.3.1 Terrestrial Habitats, Vegetation Communities, and Land Cover

Terrestrial Flora

See a detailed discussion of vegetation communities in **Section 5.2.3.1** above. For a complete listing of terrestrial floral species observed on SSTC-S, see **Appendix F**.

Vegetation Communities

SSTC is located on an isthmus of land with the Pacific Ocean to the west and San Diego Bay to the east. The vegetation communities of SSTC-S have been significantly altered by clearing and invasion of nonnative species; however, portions of the installation still support native communities. Eleven native vegetation communities are present on SSTC-S: pickleweed series, pickleweed/saltgrass series, spikerush series, bulrush-cattail series, California sagebrush series, California buckwheat series, coyote brush series, coast prickly-pear series, sand verbena-beach bursage series, freshwater pond, and San Diego Mesa vernal pools. The most abundant plant communities on SSTC-S are non-native and include California annual grassland series and iceplant series. Other land cover types include coastal beaches, ruderal habitat, open

water, and developed (see **Table 6-1** and **Figure 6-3**) (U.S. Navy 2004c). The vegetation communities are based on the 1995 A Manual of California Vegetation which does not meet standards of the National Vegetation Classification System as required by the Federal Geographic Data Committee; therefore, they will not match the NatureServe vegetation types listed on the Navy Conservation Website.

Table 6-1: Plant Communities on Silver Strand Training Complex South

Plant Community/Land Cover	Acres
Iceplant series	165.1
California annual grassland series	125.5
Pickleweed series	55.4
Urban/Developed	75.5
Beach	43.5
Sand verbena-beach bursage series	34.4
Open water	8.2
California sagebrush series	7.7
Coyote brush series	4.7
Maritime succulent scrub	7.3
San Diego Mesa vernal pools	3.2
California buckwheat series	2.7
Spikerush series	2.4
Pickleweed-saltgrass series	1.3
Freshwater pond	0.8
Bulrush-cattail series	0.9
Ruderal habitat	42.7
Total	**581.3**

Source: U.S. Navy 2004c

Pickleweed Series (Southern Coastal Saltmarsh). Pickleweed series habitat is found along the inland margins of bays, lagoons, and estuaries, which are subject to tidal inundation and are characterized by hydric soils and by salt-tolerant plant species that form a moderate to dense cover and can grow up to one meter in height. Salt marshes can be segregated into distinctive zones based on vegetation patterns. Commons species such as cordgrass and pickleweed generally occur in the lower marsh areas subject to moderate tidal inundation closest to the waterline. Annual pickleweed (*Salicornia bigelovii*), saltwort, and estuary seablite generally occur at middle marsh elevations. Upper marsh levels are generally characterized by golden bush (*Isocoma* sp.), shore grass (*Monanthochloe littoralis*), and box thorn (*Lycium californicum*).

Well-functioning salt marsh habitats provide feeding, nesting, and high-tide refuge areas for bird species such as the Light-footed Clapper Rail and Belding's Savannah Sparrow; and a food and cover source for fish species and invertebrates. This plant community is considered to be endangered in southern California (U.S. Navy 2004c). Pickleweed series vegetation occurs in the following areas on SSTC-S: (1) within the well-developed southern coastal salt marsh community located along the northeastern boundary of SSTC-S, east of Highway 75 within San Diego Bay; (2) near the center of the installation east of the antenna; and (3) within Camp Surf in the southwestern corner of SSTC-S, immediately behind the dunes that border the beach (U.S. Navy 2004c).

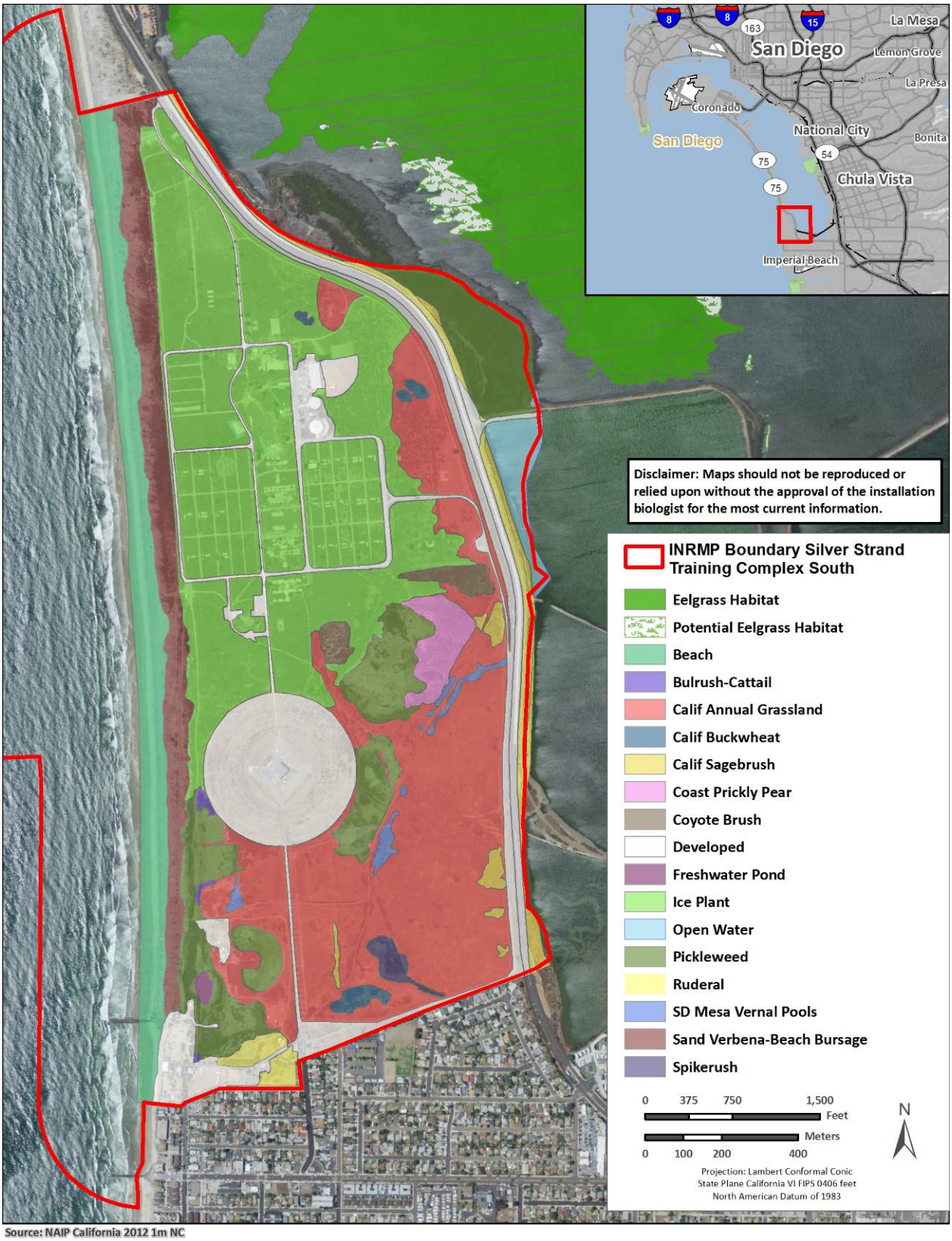


Figure 6-3: Silver Strand Training Complex South Vegetative Communities

Sand Verbena-Beach Bursage Series (Southern Foredunes): The sand verbena-beach bursage series occurs on sand sites in the immediate proximity of the high surf line. Degraded sand verbena-beach bursage series vegetation occurs along almost the entire length of SSTC-S, just east of the dunes. The southern foredunes have been greatly reduced by urban and other development between Point Conception and the Mexican border. Prior to urban development in coastal southern California, this habitat types acted as a buffer to high storm-driven tides. These dynamic dune systems are inhabited by plant species that are tolerant of an unstable environment, strong winds, and shifting sands. Plant species composition is determined by exposure to these elements. Exposed sites contain red sand verbena, bursage, and sea rocket. Less exposed areas contain species such as beach sand verbena, primrose, and morning glory (U.S. Navy 2004c).

California Sagebrush Series (Diegan Coastal Sage Scrub): California sagebrush series vegetation is a plant community comprised of low-growing, aromatic shrubs that are drought-deciduous. This association is typically found on dry sites such as steep, south-facing slopes or clay-rich soils that are slow to release stored water. California sagebrush series vegetation is found in coastal areas from Los Angeles County south into Baja California, Mexico. Coastal sage scrub provides habitat for a variety of sensitive species in California, including the coastal California Gnatcatcher (*Polioptila californica californica*), a federally threatened species (U.S. Navy 2004c). The Gnatcatcher is not currently found on SSTC-S.

Isolated patches of California sagebrush series are present in the upland areas along the eastern boundaries of SSTC-S. These areas are dominated by California sagebrush (*Artemisia californica*), and also support other shrub species such as California broom (*Acmispon glaber*) and California Buckwheat. Shrub cover is sparse, approximately 10 to 20 percent, and where absent, shrubs are replaced by iceplant and open areas supporting various introduced annual grasses (U.S. Navy 2004c).

Coyote Brush Series: Coyote brush series vegetation, formerly classified as Diegan coastal sage scrub, is dominated by coyote bush (*Baccharis pilularis*), and occurs along the eastern boundary of SSTC-S and also in a patch northeast of the antennal (scheduled for removal). This area represents extensively disturbed coastal sage scrub habitat that has been heavily invaded by iceplant, especially in the easternmost mapped location. The centrally mapped location (i.e., northeast of the antenna) exhibits a higher percentage of open ground where small herbaceous species, such as pineapple weed (*Acmispon pusillus*), tread-lightly (*Cardionema ramosissimum*), and Bishop's lotus (*Lotus strigosus*), occur regularly (U.S. Navy 2004c).

California Buckwheat Series: California buckwheat series vegetation is present in two small areas on SSTC-S: one patch in the south-central portion of the installation; and a few small patches in the northeastern portion of the installation. This vegetation type primarily contains a monoculture of California buckwheat, with an understory of bare ground occasionally interspersed with iceplant. Iceplant forms an understory mat in the northernmost mapped area. These areas represent remnants of the larger sage scrub community that existed in the region prior to development and the invasion of iceplant (U.S. Navy 2004c).

Maritime Succulent Scrub. Maritime succulent scrub reaches its northern distribution limits in San Diego County on the mainland and offshore on the California Channel Islands. It is confined to thin, rocky or sandy soils on dry, south facing slopes along the coastal areas, from Torrey Pines State Park south to El Rosario in northern Baja California. Maritime succulent scrub is a low, open vegetation type with a poorly developed understory (Holland 1986). This community occurs on SSTC-S in close association with coastal sage scrub. The dominant shrub species overlap somewhat with those of the coastal sage scrub and salt marsh, but with the addition of cacti and other succulents. Characteristic species include California boxthorn (*Lycium californicum*), variegated dudleya (*Dudleya variegata*), San

Diego barrel cactus (*Ferocactus viridescens*), and cholla (*Opuntia prolifera*). Pickleweed (*Salicornia subterminalis*) is a common associate due to the proximity of nearby salt marsh.

San Diego Mesa Vernal Pools: San Diego mesa vernal pools are characterized by a low, amphibious, herbaceous plant community dominated by annual herbs and grasses situated in small depressions in flat-topped marine terraces. A hardpan prevents downward drainage of rainwater; therefore, plants germinate and grow when the depressions fill during winter rains. Rising temperatures in the spring evaporate water from the pools, leaving behind bands of vegetation. San Diego mesa vernal pools support a number of animal species, including federally listed endangered San Diego fairy shrimp (U.S. Navy 2004c).

Vernal pools at SSTC-S do not support a plant community typical of well-developed vernal pool complexes found on Otay Mesa or Kearny Mesa. The SSTC-S pools are dominated by an ephemeral aquatic plant association composed of dwarf woolly-heads (*Psilocarphus tenellus* ssp. *tenellus*) and water star-wort (*Callitriche marginata*), which are vernal pool indicator species, and grass poly (*Lythrum hyssopijolia*), alkali weed, and alkali-mallow (*Malvella leprosa*). Weedy species present include doveweed (*Eremocarpus setigerus*), pin clover (*Erodium botrys*), and scarlet pimpernel (*Anagallis arvensis*). Herbaceous cover is approximately 10 to 20 percent. The pools are located in the east-central and southern areas of the site bordering the coast prickly-pear series and California annual grassland vegetation. Several larger pools are located along internal drainages (U.S. Navy 2004c).

The high salinity of the soil in the vernal pool areas at SSTC-S is due to the proximity of this site to the ocean and Bay. These soil conditions result in a plant community with a combination of typical vernal pool species and saline- or alkaline-tolerant species that is unique to the county. No sensitive vernal pool plant species were found at SSTC-S (U.S. Navy 2004c).

Spikerush Series and Bulrush-Cattail Series (Freshwater Marsh): Spikerush series vegetation is a freshwater marsh vegetation type that is dominated by perennial, emergent monocots that form completely closed canopies in permanently flooded areas. Dominant plant species include cattail and bulrush (*Scirpus* sp.). Prolonged saturation by freshwater allows for the accumulation of deep, peaty soils. Marsh vegetation at SSTC-S includes two series: spikerush and bulrush-cattail. Spikerush series vegetation occurs in a depression located along a drainage at the southern end of the installation. Pale spikerush (*Eleocharis macrostachya*) and curly dock (*Rumex crispus*) dominate the area. Other species include saltgrass, alkali weed, and alkali-mallow (U.S. Navy 2004c).

The areas mapped as bulrush-cattail series vegetation are located along ephemeral drainages where the water durations are sufficiently long to foster the growth of marsh vegetation, including southern cattail (*Typha domingensis*), prairie bulrush (*Scirpus robustus*), and mule fat (*Baccharis salicifolia*). These areas appear to be somewhat brackish due to the high salinity of the soils indicated by soil crusting at the soil surface (U.S. Navy 2004c).

Freshwater Pond: A seasonal freshwater pond is present in the central area of Camp Surf, east of the sand dunes (U.S. Navy 2004c).

Iceplant Series: Iceplant, a non-native species, forms vegetative blankets with extensive shallow roots that occupy the same depth as the root systems of native shrubs. The root systems of iceplant cause the roots of native species to be displaced downward, thereby giving the non-native iceplant a competitive advantage to absorb light rainfall and fog drip before the moisture reaches the root zone of the natives. Iceplant has a significant negative effect on native coastal shrub species through direct competition for water resources. Such competition results in a reduction in shoot size and change in the overall morphology of native species (U.S. Navy 2004c).

Iceplant covers extensive areas of SSTC-S, particularly on the uplands adjacent to abandoned roads and building pads and the beach dune community on the northern half of SSTC-S. Over time, this invasive weed species excludes most native plant species, and has displaced species characteristic of sand verbena-beach bursage and California sagebrush communities on SSTC-S. Non-native trees, such as Monterey cypress (*Cupressus macrocarpa*) and eucalyptus, are scattered throughout the areas supporting iceplant. The Monterey cypresses were planted as part of the Coronado Heights development (U.S. Navy 2004c).

California Annual Grassland Series (Non-Native Grassland): California annual grassland habitat is composed of several introduced annual grasses, with various native wildflowers. Germination occurs with the onset of fall rains; growth, flowering, and seed-set occur from winter through spring. The forbs are dead throughout the dry season, persisting as seeds until the rains begin again. Annual grasslands are often located on fine-textured soils, usually clay soils, which are often moist or waterlogged during the wet season and very dry during summer and fall. California annual grasslands occur throughout southern California (U.S. Navy 2004c).

Dominant grass species in the annual grassland series on SSTC-S are foxtail chess (*Bromus madritensis rubens*), soft chess (*B. hordeaceus*), ripgut grass (*B. diandrus*), and wild oat (*Avena fatua*). Common forbs and other plants include the exotic ice plant, Australian saltbush, white-stemmed filaree (*Erodium cicutarium*), and native coast locoweed (*Astragalus trichopodus* ssp. *lonchus*). Areas of increased soil salinity support alkali weed, saltgrass, and glasswort where grassland intergrades into upper salt marsh vegetation (U.S. Navy 2004c).

Ruderal and Developed: Ruderal habitat and developed areas are also mapped on SSTC-S. Ruderal areas are described as disturbed areas supporting sparse weedy vegetation. All the paved areas, building, and accessory structures used by the military are mapped as developed (U.S. Navy 2004c).

Specific Concerns

- Invasive species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Overuse, or improper use, of fertilizers.

Current Management

Management of native habitats at SSTC-S includes their enhancement by the removal of invasive exotic plant species and planting of native species, as well as habitat restoration of sorely disturbed areas. Removing invasive exotic plants, planting native species, and restoring habitat activities are conducted through coordination with the NBC biologist. As long as NBC follows the management for resources as prescribed in this INRMP, and the NBC recommended plant list, soil resources will not be adversely affected by Navy activities.

Management Objective and Strategy

Objective: Develop and implement a program for natural land and habitat restoration and rehabilitation.

Strategies:

1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue invasive and noxious weed identification and control as necessary.
3. Complete evaluation and prioritization of active erosion sites.
4. Update vegetation mapping.
5. Ensure that natural resources staff responsible for plant community conservation update training regarding management of these resources on a military installation on an annual basis.
6. Develop specifications and standards for reseeding/revegetation of disturbed sites for use in contracts, maintenance, and other projects.
7. Periodically review management to ensure it still meets ecosystem management goals.

6.2.3.2 Wetlands and Floodplains

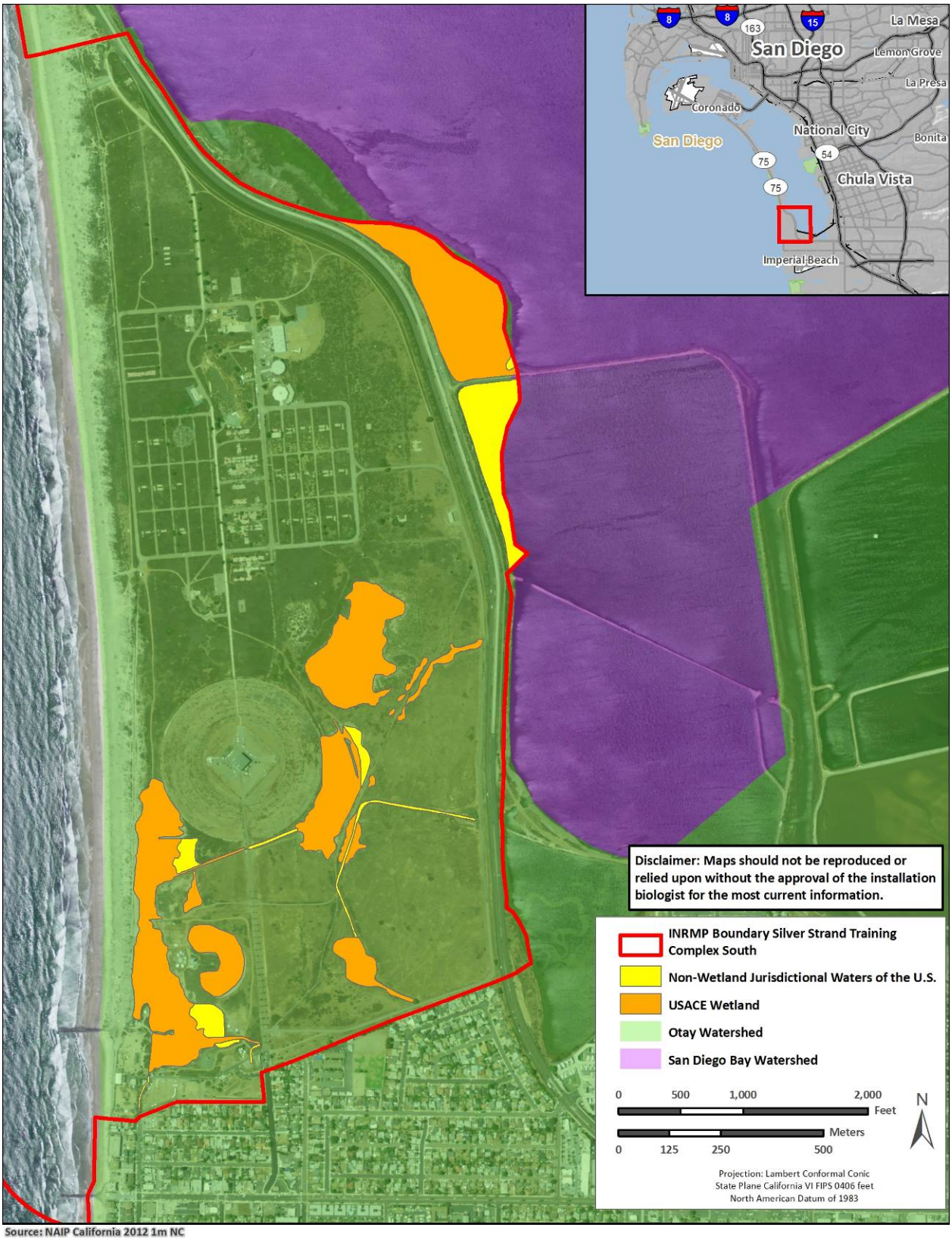
Wetlands and Other Waters of the United States

Wetlands, as defined by the EPA and USACE, are "areas that are inundated or saturated by surface or groundwater 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" (USACE 1987). In September 2008 the USACE published the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (*Version 2.0*). The Regional Supplement was part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. The definition of a wetland was not changed (USACE 2008). In addition, USACE regulates activities within three nautical miles of land, including the San Diego Bay (U.S. Navy 2008g).

A USACE wetlands delineation performed on SSTC-S in 2002 identified 24.1 hectares (59.6 acres) of jurisdictional wetlands (mostly non-tidal pickleweed) and 4.6 hectares (11.3 acres) of non-wetland waters of the United States on the installation (see **Figure 6-4**) (U.S. Navy 2010c).

SSTC-S is susceptible to flooding from local storm runoff or seismic ocean waves due to its low-lying, flat terrain (U.S. Navy 2010c).

Wetland management strategies vary depending primarily on the wetland type, size, location and condition. A wetland's value is decided by the quality of the functions and services it provides, including its biomass production, habitat, erosion control, stormwater storage, water quality protection, aquifer recharge potential, and low flow augmentation. Some of the factors used to measure the quality of these functions are the wetland's size, its location in the watershed, the amount of development in the watershed, vegetative structure and composition, rate of water flow through the wetland, the size of natural buffers, and surrounding land uses. Regardless of the habitat value, wetland areas are almost always poor choices for building sites or for most activities, other than providing non-consumptive enjoyment of the outdoors. Installation natural resources staff will ensure during the program/project review process that program/project managers are aware of the laws and regulations regarding the protection of wetlands. Refer to **Section 2.4.2** for additional information on regulatory compliance related to the CWA.



Source: NAIP California 2012 1m NC

Figure 6-4: Silver Strand Training Complex South Watersheds and Wetlands

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species encroaching into wetland habitat;
- Climate change (e.g., changes in temperature or sea level rise);
- Erosion and sedimentation from either anthropogenic or natural cause and.
- Pollution.

Current Management

The latest wetland delineation was conducted on SSTC-S in 2002. A total of 24.1 hectares (59.6 acres) of wetlands and 4.7 hectares (11.3 acres) of non-wetlands were documented on SSTC-S**.** A seasonal freshwater pond about 0.3 hectare (0.7 acre), fed by storm water runoff from Imperial Beach, occupies the central portion of the YMCA Camp Surf in the southwest corner of SSTC-S waters were delineated during the survey as shown in **Figure 6-4** (U.S. Navy 2010e). Future delineations will be conducted on a project-by-project basis. As long as delineations are conducted and associated Jurisdictional Determinations are obtained on NBC on a regular basis and information from the delineations is maintained in the GIS database, management of wetlands will not pose an issue at NBC.

The major goal in wetland and floodplain management is to minimize the impact that SSTC-S has on wetlands and floodplains. The natural resources staff strives to enhance healthy, functional wetlands. When possible, it is the goal to avoid impacts, direct and indirect; enhancing waters of the U.S. to increase functions and values provided by waters of the U.S. including wetlands. It is also the goal to maximize floral diversity of wetland communities, which, in turn, maximizes the faunal diversity of the ecosystem. Through achieving these goals, and through mitigating for unavoidable impacts to wetlands, SSTC-S can manage for no net loss of wetland and floodplain acreage, functions, and services.

According to OPNAVINST 5090.1C, the Navy will comply with the national goal of no net loss of wetlands, and will avoid loss of size, function and value of wetlands.

Management Objective and Strategy

Objective: Maintain healthy, functional waters of the U.S. on SSTC-S, including wetlands and non-wetland waters of the U.S., and prevent indirect or unplanned encroachments.

Strategies:

1. Update the wetland delineation and inventory, including wetland distribution and categories, as necessary.
2. Conduct Environmental Review for activities that could affect directly and indirectly, waters of the U.S., including wetlands.
3. Plan development and training activities to avoid wetland impacts to the maximum extent possible and minimize unavoidable impacts on waters of the U.S., including wetlands.
4. Maintain water quality to protect surface waters and wetlands from excessive sediment-laden runoff. Prevent erosion, scour to maintain water quality.
5. Remain in compliance with the CWA, RHA, etc. and implement procedures to manage for a no net loss of wetland and floodplain acreage, functions, and services.
6. Reduce habitat fragmentation and control the spread of invasive species.

7. Periodically review the natural resources management program to ensure that management actions do not adversely impact directly and indirectly, waters of the U.S., including wetlands.
8. Implement erosion control BMPs to ensure adverse environmental impacts to waters of the U.S., including wetlands do not occur.

6.2.3.3 Marine Habitats

As discussed in **Chapter 1**, this INRMP only focuses on the 274 meters extending seaward (beyond the mean lower low water line) of the NBC facilities and the training lanes. The San Diego Bay INRMP footprint includes the northeastern portion of NBC. A more specific description and management of the marine habitats in the San Diego Bay are discussed in the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*), which was developed in cooperation between the Navy and SDUPD along with their government and non-government partners.

The habitat categories adhere to the Coastal and Marine Ecological Classification Standard (*http://www.fgdc.gov/standards/projects/FGDC-standards-projects/cmecs-folder*).

Bayside

Habitats within the San Diego Bay are categorized by depth with respect to the tides, then by substrate, water clarity, and other factors. Habitat types within the San Diego Bay at SSTC-S include deep subtidal, moderately deep subtidal, shallow subtidal, intertidal, and nearshore artificial shoreline structure habitats; the following is a summary of these habitats as described in the San Diego Bay INRMP and the SSTC EIS (U.S. Navy 2011a, U.S. Navy 2010e).

Deep Subtidal

Deep subtidal (deeper than 6 meters [–20 feet] MLLW) describes the surface water, water column, and sediments for areas greater than 6 meters in depth. The MLLW number is the level at which coastal flooding commonly occurs. There are approximately 1,797 hectares (4,440 acres) of deep subtidal zone in the bay that is associated with maintained navigational channels. Except for a few areas in the north bay that have no dredging record, all deep subtidal habitat has been dredged since the 1940s; most was dredged in the 1960s or more recently (U.S. Navy 2011a).

Moderately Deep Subtidal

Moderately deep subtidal (-4 to -6 meters [-12 to -20 feet] MLLW) describes habitat that extends from the approximate lower depth of most eelgrass to approximate edge of the shipping channel. There is approximately 898 hectares (2,219 acres) of this habitat and it occurs primarily in the south-central bay and in inlets of the north bay. It represents areas that generally have been dredged in the past but are not maintained as navigational channels (U.S. Navy 2011a).

Shallow Subtidal

Continually submerged, these shallow habitats extend from the low tide zone (-0.6 to -3.7 meters [-2.2 to -12 feet] MLLW) and can either be vegetated or unvegetated. Shallow soft-bottom areas, with their associated fauna and flora, were the primary subtidal habitat in San Diego Bay prior to its development. The shallow subtidal habitat can be found in narrow strips along the shoreline of north and north-central San Diego Bay. The abundance and biomass of organisms is much higher in shallow waters, including invertebrates, fish, and birds. Shallow waters support many thousands of resident and migratory birds every year for foraging and resting. The bird groups that appear to use these areas preferentially are

bottom-feeding divers such as Surf Scoter and Scaup (*Aythya affinis* and *A. marila nearctica*), Dabbling Brant (*Branta bernicla*), plunge divers such as Terns, and the surface-foraging Black Skimmer (*Branta bernicla*) (U.S. Navy 2010e).

Shallows. Soft bottoms of unconsolidated sediment are unstable and shift in response to tides, wind, waves, currents, human activity, or biological activity such as bottom fish feeding, or bat rays (*Myliobatis californica*) excavating pits to reach buried clams. Few plants and animals have adapted to this instability—eelgrass is one of the few. Because animals and plants lack attachment sites in this environment, they must burrow into the substrate to prevent from being washed away by currents, and so are called "infauna." Competition for space is ameliorated partly by organisms occupying various depths within the substrate. Invertebrates such as sponges, gastropod mollusks, and some larger crustaceans and tunicates live on the surface (U.S. Navy 2010e).

An important structural component of unvegetated shallows is the presence of extensive masses or mats of living algal material interspersed with areas of exposed sediment that may extend into the intertidal zone (Ford 1968, Ford and Chambers 1974). The dense, heavily branched red alga (*Gracilaria verrucosa*) forms the bulk of this mat, which also includes other red algae (i.e., *Hypnea valentiae* and *Griffithsia pacifica*). Some of these mats are loosely anchored in the sediment, while others drift just above the bottom. These algal mats provide cover for many species of motile invertebrates and fish. The algae also appear to serve as a food source for some invertebrates. The living plant material and detritus constitute a primary food source for California killifish and other fish, crabs, isopods, gastropod mollusks, and some aquatic birds (U.S. Navy 2010e).

Vegetated Shallows. Eelgrass, a native marine angiosperm, provides a key benthic habitat in San Diego Bay. Eelgrass habitats rank among the most productive habitats in the ocean. Eelgrass beds in San Diego Bay have suffered substantial loss due to their location in sheltered waters where human activity is concentrated. Approximately 100.3 hectares (248 acres) of eelgrass beds are currently located in patches along the bayside shore of SSTC-N (see **Figure 5-3**). In central San Diego Bay, these beds extend from 0 to -3 meters (0 to -10 feet) MLLW.

Intertidal Zone

The intertidal (+2.4 to -0.7 meters [+7.8 to -2.2 feet] MLLW) habitat encompasses the area between high and low tides and is subject to varying degrees of tidal submergence. There are approximately 395 hectares (976 acres) of intertidal areas making up approximately 7 percent of the bay (U.S. Navy 2011a).

Intertidal Flats. Intertidal flats of San Diego Bay include mudflats, sand flats, and salt flats. They occur 6 between the highest-high and lowest-low tide zones, or otherwise between the lowest cordgrass 7 (beginning of the salt marsh) and highest eelgrass, approximately 0.7 to 0 meters (+2.3 to 0 feet) MLLW in San Diego Bay. This zone normally lacks vegetation (U.S. Navy 2011a).

Artificial Shoreline Structures

Unprotected shoreline sites will erode when exposed to tidal fluctuation, storm waves, storm surges, and surface runoff. Hard structures are used to protect developed sites along the bay. Pier pilings, bulkheads, rock riprap, floating docks, sea walls, mooring systems, and derelict ships/ship parts that form extensive artificial habitat in the northern and central portions of the bay and to lesser extent in the southern bay. Currently there is 73.1 kilometers (45.4 miles) of armored shoreline with the San Diego Bay (U.S. Navy 2011a)

Ocean Side

Habitats of the nearshore ocean and surf zone includes the area offshore, or the ocean side of SSTC-S, and includes the marine waters off of the sandy beaches of SSTC-S (boat lanes 11 through 14). Also included are the ocean anchorages that partially overlap the SSTC-S ocean boat lanes.

Habitats on the ocean side of the SSTC can be described by a combination of depth, substrate, and wave energy. The nearshore area is primarily soft bottom, and spans from exposed sandy beaches to the water column above the inner shelf. The coastal nearshore areas are classified as surf zone and coastal pelagic zone up to 161 kilometers (100 miles) westward as described by Allen et al. (2006) and others. The high-energy surf zone and shallow (<30 meters [98 feet] MLLW) areas dominated by sand and low-lying (<2 meters [7 feet] MLLW) rocky reef and cobble are typical of much of the southern California coastline. Utilizing the habitat classification system developed for SANDAG and California Coastal Conservancy, the majority of the area described as a Subtidal/Soft Bottom/Sand ecotype, with a low to moderate energy ecotype modifier, due to seasonal variability with respect to wave energy.

The offshore area also includes portions classified as Subtidal/Hard Bottom/Cobble/Understory algae and adjacent habitat within the region of influence as Subtidal/Hard Bottom/ Boulder/Rock Reef/kelp Bed ecotypes (see **Table 6-2**). The algal communities such as kelp beds add structure in shallow water, fostering a richer species assemblage. The basic habitat data for nearshore ocean area provided by the San Diego Nearshore Program, as reported from surveys in 2002. This program uses a habitat classification system that integrates elements from a number of previously created classification systems, including the Marine and Estuarine and Habitat Classification developed by NMFS. The Nearshore Program is a cooperative effort of the National Oceanic and Atmospheric Administration-National Marine Fisheries Service (NOAA-NMFS), California Department of Fish and Wildlife (CDFW), and the USACE, among others (U.S. Navy 2010e).

Table 6-2: Substrate Type Contained within Ocean Side SSTC-S Boat Lanes and Anchorages

Training Area	Substrate Type	Acres
SSTC-S Ocean Side Lanes	Sand	2,062
	Cobble	108
	Boulder	0
Total		**2,170**

Source: U.S. Navy 2010e

Moderately Deep Subtidal

Moderately deep subtidal habitat, defined as water depth ranging from -3.7 to -6 meters (-12 to -20 feet) MLLW, occurs off the coast of SSTC-S. Moderately deep subtidal habitat extends from the approximate lower depth of most eelgrass beds to the approximate edge of the shipping channel. It represents areas that generally have been dredged in the past, but are not maintained as navigational channels (U.S. Navy 2010e).

Moderately deep water is used in higher numbers, compared to other San Diego Bay locations, for resting by bottom feeding diving birds, especially rafting Surf Scoter, Scaup, Bufflehead (*Bucephala albeola*), and plunge divers, such as Terns and Brown Pelicans (Ogden 1995 and USFWS 1995). The federally endangered California Least Tern also forages in these areas. While these depths generally do not support

eelgrass, the substrate may be covered with turf algae or marine invertebrates such as sea pens. Sea pens are colonial marine cnidarians belonging to the order Pennatulacea (U.S. Navy 2010e).

Shallow Subtidal

The shallow subtidal zone (–2.2 to –12 feet [–7 to –4 meters] MLLW) is separated into unvegetated and vegetated shallow soft bottom habitats approximately 0.8 to 4.8 hectares (2 to 12 feet) below the intertidal zone.

Unvegetated Shallows. The unvegetated soft bottom habitats consist of unstable and shifting unconsolidated sediments disturbed by bottom feeding animals, currents, wind, and other abiotic factors (U.S. Navy 2011a).

Intertidal

The intertidal (+2.4 to -0.7 meters [+7.8 to -2.2 feet] MLLW) habitat encompasses the area between high and low tides and is subject to varying degrees of tidal submergence.

Sandy Beach. The sandy beach habitats consist of sandy soils that are have low water-holding capacity, low fertility, low humus content, and high concentrations of sea-salts (U.S. Navy 2011a).

Specific Concerns

- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Water pollution (e.g., decrease in light transmission);
- Training;
- Facilities projects (e.g., construction and maintenance;
- Non-Navy development/anthropogenic influence;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Navy Training and Operations.

Current Management

The U.S. Navy conducts presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted Disturbing Activity out in *Caulerpa*-Free Systems. In the event that *Caulerpa* is detected, best management practices are implemented to isolate and prevent the spread of this species.

Management Objective and Strategy

Marine Habitats

Objective: Develop and implement a program for managing marine habitat restoration and rehabilitation.

Strategies:

1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue marine non-native species identification and monitoring as necessary.

3. Ensure that natural resources staff responsible for marine community conservation update training regarding management of these resources on a military installation on an annual basis.
4. Periodically review management to ensure it still meets ecosystem management goals.
5. Develop a database to integrate current and historical nearshore habitat monitoring data.
6. Conduct nearshore benthic habitat mapping as needed.
7. Avoid shoreline construction that results in a loss of coastal strand habitat.

6.2.3.4 Wildland Fire

Not applicable to SSTC-S.

6.2.4 Fish and Wildlife Management

For the purposes of this INRMP, wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. The primary goal of wildlife management at SSTC-S is to maintain wildlife populations at levels compatible with land use objectives while promoting the existence, importance, and benefits of nongame species. There are artificial freshwater ponds on the golf course that are often used by birds, creating a BASH issue.

The basis of managing a rich assemblage of nongame wildlife is to provide a mosaic of habitats that are structurally and biologically diverse. SSTC-S should employ these basic techniques for managing wildlife.

- ***Monitoring Wildlife.*** Creating, monitoring, and updating GIS data on wildlife species will allow NASNI to store, retrieve, present, and analyze the data to make informed management decisions.
- ***Managing for Migratory Birds.*** The Migratory Bird Treaty Act (MBTA) prohibits the taking of most birds, nests, and eggs, except as permitted by the USFWS. Impacts on birds protected under the MBTA will be avoided through surveying for nesting birds in areas proposed for disturbance and, if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends that conducting activities outside of nesting areas or outside of the general migratory bird-nesting season can help avoid direct impacts.
- ***Protecting Sensitive Areas.*** SSTC-S can maintain biological diversity by protecting, to the extent practical, sensitive areas that provide unique habitat niches. Protection measures might include restricting vehicle movement, and protecting habitats of exceptional biological value by establishing protective buffers and maintaining healthy and diverse ecosystems.

6.2.4.1 Invertebrates

For a complete listing of invertebrate species observed on SSTC-S, see **Appendix F.**

Terrestrial Invertebrates

Common invertebrate species observed at SSTC-S during the 2001 to 2002 natural resources inventory include kelp flies of the families Coelopidae (genus *Coelopa)* and Anthomyidae (genus *Fucellia*), Dune silverfish (family *Lepismatidae*), leaf beetles (family *Chrysomelidae*), and snout beetles (family *Curculionidae*). The spider fauna of the dunes is rather diverse. Funnel web weavers (family *Agelenidae*), wolf spiders (family *Lycosidae*), trapdoor spiders (family *Ctenizidae*), and the endemic sand spiders of the genus *Lutica* (family *Zodariidae*) were found during surveys. The nocturnal sand spiders

are restricted to southern California coastal dunes and are adapted for burrowing in the fine sand. When placed on a sandy substrate, the spiders immediately burrow under the surface. Tarantula hawks (*Pepsis* sp.), of the spider wasp family (*Pompilidae*), can be seen flying around the dunes hunting for spiders and frequently landing on the sand. Other predatory invertebrates present on the beach include at least two species of robber flies (family *Asilidae*). A large species, approximately 2.5 centimeters in length, and a smaller species, about one centimeter in length, are commonly found around the kelp where they feed on other insects, including kelp flies and beetles (U.S. Navy 2004c). In addition, the SDNHM has collected and preserved over 980,000 invertebrate specimens (SDNHM 2010).

A total of 10 butterfly species were observed during surveys. Common butterfly species include: common white *(Pieris protodice*), painted lady (*Vanessa cardui*), common hairstreak (*Strymon melinus pudica*), marine blue (*Leptotes marina*), and fiery skipper (*Hylephila phyleus*) (U.S. Navy 2004c).

Five sensitive invertebrate species were observed at SSTC-S: San Diego fairy shrimp, globose dune beetle, two species of tiger beetle (*Cincindela latesignata latesignata* and C. *hirticollis gravida*), and wandering skipper (U.S. Navy 2004c).

Marine Invertebrates

Bayside

Marine invertebrate habitat on the bayside of SSTC-S consists primarily of marshy areas with a few riprap and sandy beach areas. Common marine invertebrate species observed within these types of habitats include tube-dwelling anemone (*Pachycerianthus fimbriatus)*, sea pen (*Stylatula elongata*), sponges (*Aplysina fistularis, Tetilla mutabilis*), bryozoans (*Thalamoporella californica*), barnacle (*Balanus* spp.), native oyster (*Ostrea lurida*), mussel (*Mytilus* spp.), pacific jewel box (Pseudochama exogyra), tunicate (*Styela* spp.), and red invasive bryozoans (*Watersipora* spp.) (U.S. Navy 2010e).

Ocean Side

Common marine invertebrates that occur in the benthic sediments in the offshore ocean side areas adjacent to SSTC-S were sampled in 2003; the results are summarized by major taxonomic groups detailed in **Table 6-3**.

Table 6-3: Infaunal Invertebrate Abundance Sampled during 2003

Sampling Station	Infaunal Abundance				
	Crustaceans	Mollusks	Polychaetes	Other	Total
Offshore SSTC NORTH	50	38	78	24	1190

Source: U.S. Navy 2010e

Specific Concerns

- Pollution and oil spills;
- Improper pesticide use;
- Introduction and spread of invasive species and
- Habitat modification.

Current Management

The Navy currently manages marine invertebrates on the bayside through the participation in the national water quality monitoring program called Mussel Watch. NMFS's National Status and Trends Program Mussel Watch Project (1986-present) monitors bioaccumulation in mussels, plus other parameters offshore in south San Diego Bay and intertidal in the north San Diego Bay. NMFS also conducts the National Benthic Surveillance Program (1984-present) to examine physical, chemical, and biological (diseases and bioaccumulation in fish) parameters in offshore areas of central and north San Diego Bay (U.S. Navy 2010e). Ocean side marine invertebrates are managed by recording and monitoring incidental observations at SSTC-S. Spill prevention plans are implemented as necessary to avoid and minimize impacts from pollution and oil spills.

Management Objective and Strategy

Objective: Maintain biodiversity of the invertebrate community at SSTC-S.

Strategies:

1. Develop and implement a strategy for pollution management.
2. Conduct regular (approximately every 1 to 2 years) surveys for invertebrates that may be present within SSTC-S boundaries.
3. Develop and distribute outreach and education materials on invertebrates to personnel, operators and visitors on SSTC-S.

6.2.4.2 Pollinators

A pollinator is an animal or insect that transfers pollen grains from flower to flower (DoD Legacy 2010a). Pollinators are responsible for pollinating 80 percent of the crops we consume, as well as the majority of plants and fruits consumed by wildlife. Examples of pollinators in the San Diego region include bees, butterflies, moths, beetles, flies, and birds. Several potential invertebrate and avian pollinator species occur on SSTC-S. Invertebrate species include western pigmy blue (*Brephidium exile*), monarch (*Danaus plexippus*),fiery skipper (*Hylephila phyleus phyleus*), marine blue (*Leptotes marina*), mourning cloak (*Nymphalis antiopa antiopa*), wandering skipper (*Panoquina errans*), checkered white (*Pontia protodice*), acmon blue (*Plebejus acmon*), common gray hairstreak (*Strymon melinus pudica*), painted lady (*Vanessa cardui*), anthomyiid flies (*Fucella* sp.), green lacewing (*Chrysopa* sp.), and tarantula hawk (*Pepsis sp.*). In addition, two avian species that is a known pollinator Anna's Hummingbird (*Calypte anna*) and Rufous Hummingbird (*Selasphorus rufus*), are common on SSTC-S.

The relationship between the fate of pollinators and the ability of installations to meet readiness and stewardship obligations has been a focus of the DoD Legacy Resources Management Program for the past several years.

Pollinators ensure that native landscapes on installations do not become barren, or overrun with invasive species. The DoD acknowledges that habitat restoration and invasive species removal go hand in hand. Through enhancing and restoring pollinator habitat by restoring native plant communities and removing and controlling invasive species, DoD installations can save money, protect threatened and endangered species, and contribute to biodiversity (DoD Legacy 2010a).

For more information on DoD's work to support pollinators, visit *http://www.DoDpollinators.org*. Another good source for information on enhancing pollinator populations can be found within The

Pollinator Partnership™/ NAPPC publication *Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners in the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast* available online at:

http://www.pollinator.org/PDFs/Calif.Coastal.Chaparral.rx2.pdf

Specific Concerns

- Improper use of pesticides;
- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

SSTC-S is currently managing for pollinator species through implementation of many programs; such as landscaping, invasive species control, and restoration efforts that indirectly benefit pollinators.

Management Objective and Strategy

Objectives: Maintain and enhance pollinator populations and their habitat when not in conflict with health and safety, or the military mission.

Strategies:

1. Inventory and monitor populations and habitat composition of pollinators.
2. Develop BMPs to ensure that pollinator species are not adversely impacted by SSTC-S activities.
3. Identify and develop pollinator friendly landscapes.
4. Develop and distribute outreach and education materials on pollinators to personnel, operators and visitors on SSTC-S.
5. Revegetate and restore land with plants that attract pollinators, and include pollinator-friendly plants with native species contained on the NAVFAC SW recommended plant list.
6. Control the spread of invasive species.
7. Review existing literature on pollinators.
8. Work with San Diego County Agricultural Department to explore feasibility of developing and implementing a management program that supports bee relocation as opposed to bee eradication.
9. Provide connectivity between vegetation areas by creating corridors of perennials, shrubs, and trees that provide pollinators shelter and food as they move through the landscape.
10. Provide windbreakers and nesting areas, such as bat boxes or sites without high vegetation for bee nests.
11. Inventory and become knowledgeable of local pollinators.
12. Maintain a minimum of lawn areas that support recreational needs.
13. Restrict the use of pesticides, including herbicides and insecticides when possible.
14. Provide water sources in large open areas.

15. Maintain natural meadows and openings that provide habitats for sun-loving wildflowers and grasses.

6.2.4.3 Fish and Essential Fish Habitat

Fish Bayside

For a complete listing of fish species observed on SSTC-S, see **Appendix F**.

The San Diego Bay supports an abundant population of coastal marine, and juvenile fish species, and a large number of fish nurseries (U.S. Navy 2006c). Since 1994 the Navy and Port have collaborated to conduct regular (every 3-5 years) in the San Diego Bay in order to identify, determine and quantify the seasonal utilization of the fishery populations, identify habitats that 1 support juvenile fish species, and determine geographic and/or habitat areas that support significant 2 populations of fish species utilized by federally listed avian species for forage. During this survey 58 species of fish were collected. Topsmelt (*Atherinops affinis*) was the most abundant species followed by deepbody anchovy (*Anchoa compressa*), slough anchovy (*Anchoa delicatissima*), northern anchovy (*Engraulis mordax*), and shiner perch (*Cymatogaster aggregata*) (Allen 1999; Pondella et al. 2006, U.S. Navy 2009d).

Fish Ocean Side

The habitats and associated fish species of the nearshore coastal areas are classified as surf zone and coastal pelagic zone (U.S. Navy 2010f). Coastal pelagic species inhabit the open water environment over the inner shelf, but they usually occur within a few kilometers of shore. In addition, fish species associated with rocky reefs and kelp beds overlap other nearshore habitat types (U.S. Navy 2010e). Common southern California surf zone fish species and common reef fish species are presented in **Table 6-4**.

Additionally, beach areas on SSTC-S have the potential to be grunion spawning habitat. California grunion are known to spawn on nearby Imperial Beach and the Coronado Strand. California grunion spawn at night as the highest tides recede; after approximately two weeks the recently hatched fish larvae are swept out to sea during high tides. California grunion use the upper intertidal habitat on beaches for spawning from late February to early September; grunion activity is expected to be concentrated from late March to early June (U.S. Navy 2010e).

Essential Fish Habitat

In September 2010, the U.S. Navy finalized a study of essential fish habitat (EFH) throughout San Diego Bay (Merkel 2010). The purpose of this study was to facilitate the valuation of habitats in the context of the EFH designation with special focus on the habitat types most likely to be impacted by U.S. Navy activities or to be used in the mitigation for potential U.S. Navy project impacts. The completion of this project resulted in two products: (1) a broad scale, qualitative assessment of the dominant habitat classifications within San Diego Bay with a map and description of those habitats; and (2) a detailed and quantitative description of a smaller set of habitats determined to be of greatest concern to the U.S. Navy. The habitat characterization is intended not only to provide information on the use of habitat by managed fish species, but also to provide information on ecosystem function and productivity within the dominant habitats present in the bay. The study helped to better describe and identify EFH locations in order to minimize, to the extent practicable, adverse effects on this habitat and to identify actions that may encourage the conservation and enhancement of EFH (U.S. Navy 2010f).

Table 6-4: Common Southern California Surf Zone and Reef Fish Species

Common Name	Scientific Name
Barred surfperch	*Amphistichus argenteus*
Sargo	*Anisotremus davidsonnii*
Deepbody anchovy	*Anchoa compressa*
Jacksmelt	*Atherinopsis californicensis*
White seabass	*Atractoscion nobilis*
Kelp surfperch	*Brachyistius frenatus*
Ocean whitefish	*Caulolatilus princeps*
Swell shark	*Cephalosyllium ventriosum*
Black croaker	*Cheilotrema saturum*
Blacksmith	*Chromis punctipinnis*
Blackeye goby	*Coryphopterus nicholsii*
Pile perch	*Damalichthys vacca*
California moray	*Gymnothorax mordax*
Rock wrasse	*Halichoeres semicintus*
California hornshark	*Heterodontus francisci*
Walleye surfperch	*Hyperprosopon argenteum*
Rainbow perch	*Hypsurus caryi*
Garabaldi	*Hypsypops rubicundus*
Black surfperch	*Embiotoca jacksoni*
California corbina	*Menticurrhus undulates*
Halfmoon	*Medialuna californienses*
Gray smoothhound	*Mustelus californicus*
Senorita	*Oxyjulis californica*
Kelp bass	*Paralabrax clathratus*
Barred sand bass	*Paralabrax nebulifer*
CO turbot	*Pleuronichthys coenosus*
Rubberlip surfperch	*Rhacochilus toxotes*
Spotfin croaker	*Roncador stearnsii*
California scorpionfish	*Scorpaena guttata*
Kelp rockfish	*Sebastes atrovirens*
Treefish	*Sebastes serriceps*
California Sheephead	*Semicossyphus pulcher*
Queenfish	*Seriphus politus*
Giant Black seabass	*Stereolepis gigas*
Barcheek pipefish	*Syngnathus exilis*
Leopard shark	*Triakis semifasciata*
Yellowfin croaker	*Umbrina roncador*
Salema	*Xenistius californiensis*

Source: U.S. Navy 2010e

Specific Concerns

- Overharvesting;
- Pollution from oil spills and other hazardous wastes;
- Habitat loss;
- Invasive species and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

The San Diego Bay resources are managed through the San Diego Bay INRMP (*Port of San Diego | Port of San Diego*), the health and presence of fish species in the San Diego Bay are intermittently evaluated through the regular fish inventories and EFH studies. In accordance with the San Diego Bay INRMP, a portion of fish species in the San Diego Bay are intermittently evaluated through the project site approval process. The most recent comprehensive San Diego Bay survey effort was in April and July 2005 (Pondella et al. 2006). Surveys identify and quantify San Diego Bay's utilization of fishery populations, identify habitats that support juvenile fish, and determine areas of San Diego Bay that support important populations of forage fish species. The INRMP and surveys are funded jointly by the U.S. Navy and the Port of San Diego.

The Navy is also in the process studying EFH throughout the San Diego Bay. This study will facilitate the valuation of EFH with special focus on the habitat types most likely to be impacted by Navy activities or be used to mitigate for potential Navy project impacts. In 2011, the U.S. Navy funded a project to map the marine habitat within the ocean side beach and boat training lanes in accordance with the SSTC Essential Fish Habitat consultation with the National Marine Fisheries Service also in the process studying EFH throughout the San Diego Bay. In 2012, that study was expanded to map the marine habitat surrounding the ocean side beach and boat training lanes, including areas adjacent to NASNI. These studies will facilitate the valuation of EFH with special focus on the habitat types most likely to be impacted by U.S. Navy activities.

Management Objective and Strategy

Objective: Employ a systematic approach to managing fish and EFH resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for marine resources management and conservation obtain focused training as related to conservation on a military installation on an annual basis.
2. Continue documenting non-native species that are observed during regular surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
4. Control the spread of invasive species.
5. Ensure compliance with Department of Fish and Game regulations and NBC instructions for fishing.
6. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

7. Comply with EFH guidance on defining effects of military activities on habitat for any in-water projects.
8. Provide marine fishes with habitat protection and water quality improvement.

6.2.4.4 Reptiles and Amphibians

For a complete listing of herpetofaunal species observed on SSTC-S, see **Appendix F.**

A total of five common amphibian and reptile species were observed on-site. These species include: pacific tree frog, western fence lizard, side-blotched lizard, San Diego alligator lizard, and San Diego gopher snake (*Pituophis catenifer annectens*). No sensitive amphibian or reptile species were found during the 2001–2002 surveys at SSTC-S (U.S. Navy 2010c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. The NBC INRMP addresses terrestrial and shoreline resources, while the San Diego Bay INRMP covers in-water resources jointly with the Port of San Diego (*Port of San Diego | Port of San Diego*). The latter is considered a bay wide plan by local and regional resource agencies, which provided letters of concurrence or signatures.

These plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship.

Management Objective and Strategy

Objective: Employ a systematic approach to managing wildlife resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting species that are incidentally observed during special status species surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
4. Survey for and monitor herpetofauna populations using guidelines recommended by Partners in Amphibian and Reptile Conservation (PARC).
5. Once finalized, implement DoD PARC Strategic Plan.

6. Revegetate areas on base with native species using species on the recommended plant list.
7. Control the spread of invasive species.
8. Evaluate predator control and develop strategies to control invasive predators (e.g., bullfrogs).
9. Maintain and promote partnerships with agencies and groups involved (e.g., USFWS and CDFW) in wildlife management.

6.2.4.5 Birds and Migratory Bird Management

For a complete listing of avian species observed on SSTC-S, see **Appendix F**. Several special status bird species are known to occur on SSTC-S and are discussed in **Section 6.2.5**.

The SSTC-S is a part of the Pacific Flyway used by millions of birds traveling between northern breeding grounds and southern wintering sites. It is one of a number of stopover sites used by migrants to replenish their energy during their long journey. San Diego Bay and nearshore Pacific Ocean waters support large populations of migratory birds that depend on local resources for food, shelter, resting, and staging before and during migration. Resident species that nest locally are in the salt marsh and upland habitats. Seabirds come northward from Mexico and Central America to nest on beaches and levees of the salt ponds (U.S. Navy 2010c).

Native habitats and their ability to support a diversity of bird species are dependent on quality, habitat size and diversity, and the degree of fragmentation. Grassland habitats support a number of grassland birds and provides foraging habitat for raptors. Beaches and coastal dunes support a variety of native and migrant shorebirds. A total of 95 bird species were observed during the 2001–2002 natural resources surveys at SSTC-S (U.S. Navy 2004c).

Raptors present in all habitats at SSTC-S include Red-tailed Hawk, Northern Harrier (*Circus cyaneus*), Cooper's Hawk, and American Kestrel (*Falco sparverius*). These species use the Wullenweber antenna and the adjacent tall trees as perching sites. The Cooper's Hawks and American Kestrels use the tall trees and palms as nesting sites. The nearby annual grasslands, open scrub, and open water areas provide good-quality foraging sites for the raptor species (U.S. Navy 2004c).

Bird species commonly observed in the California sagebrush and other open scrub series include Anna's Hummingbird, Northern Flicker, Song Sparrow, Loggerhead Shrike, and California Thrasher (*Toxostoma redivivium redivivium*). Cassin's Kingbird (*Tyrannus vociferans vociferans*) and Western Kingbird (*Tyrannus verticalis*) were observed in open areas, near the non-native grassland and residential area on Camp Surf (U.S. Navy 2004c).

Bird species observed within the annual grasslands include Northern Rough-winged Swallow (*Stelgidopteryx serripennis*), Cliff Swallow (*Petrochelidion pyrrhonota*), and Western Meadowlark. Savannah Sparrows (*Passerculus sandwichensis nevadensis*) were observed in the annual grasslands during winter (U.S. Navy 2004c).

Shorebird species commonly observed along the beach and bay shoreline include Surf Scoter, Bufflehead, American Avocet, Semipalmated Plover, Ruddy Turnstone, Western Sandpiper, Sanderling, Willet, Whimbrel (*Numenius americanus*), Marbled Godwit, and Long-billed Dowitcher. Gull species observed include Heermann's Gull, Ring-billed Gull, California Gull, and Western Gull (U.S. Navy 2004c).

The seasonal freshwater pond located within Camp Surf provides excellent habitat for wintering waterfowl such as Northern Pintail (*Anas acuta*), Cinnamon Teal (*Anas cyanoptera septentrionalium*), Green-winged Teal (*Anas crecca carolinensis*), Gadwall (*Anas strepera strepera*), American Wigeon

(*Anas americana*), Mallard (*Anas platyrhynchos platyrhynchos*), Northern Shoveler (*Anas clypeata*), and Black-necked Stilt (U.S. Navy 2004c).

Wintering upland species observed include Yellow-rumped Warbler, Lincoln Sparrow (*Zonotrichia lincolnii*), and White-crowned Sparrow (*Zonotrichia leuciphrys*) (U.S. Navy 2004c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise);
- Fire;
- Predation and
- Domoic acid toxicity.

Current Management

The MBTA (16 U.S.C. 703-712) protects all migratory birds and prohibits the taking of migratory birds, their young, nests, and eggs, except as permitted by the USFWS. The USFWS recommends that SSTC-S avoid impacting birds protected under the MBTA by surveying for nesting birds in areas proposed for disturbance and if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends conducting activities outside of nesting areas or outside of the general migratory bird-nesting season that extends from mid-February through the end of August, to help avoid direct impacts.

Prohibited Acts: Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not.

On March 15, 2005, the USFWS published in the Federal Register (FR 70(49):12710-12716) a final list of the bird species to which the MBTA does not apply. The list is required by the Migratory Bird Treaty Reform Act of 2004. The actual list of migratory birds protected by the MBTA is published in the CFR (Title 50, Part 10.13). When it became law in 2004, the Reform Act excluded any species not specifically included on the Title 50, Part 10 list from protection.

The 2003 National Defense Authorization 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 February 28, 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.

In addition, DoD and the USFWS entered into an MOU in July 2006, to Promote the Conservation of Migratory Birds, in accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (DoD 2007). This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations other than military readiness activities are consistent with the MBTA. The MOU also describes how the USFWS and DoD will work together cooperatively to achieve these ends. The MOU does not authorize the take of migratory birds; the USFWS, however, may develop incidental take authorization for Federal agencies that complete an Executive Order MOU.

Current management of migratory birds also includes habitat restoration, implementation of the DoD CBM, San Diego waterbird surveys, general bird surveys approximately every 5 years (during natural resource inventory surveys), annual Western Burrowing Owl surveys, and a Heron and Egret Management Plan.

SSTC-S's mission does not directly conflict with the presence of Herons; however, a strategy for mitigation has been developed for those projects with the potential to impact Herons or their nests. Mitigation includes planting Torrey pine trees, and not planting eucalyptus trees at Heron nest sites. Once planted, these sites are analyzed to determine their feasibility and appropriateness for supporting Torrey pines (e.g., soil, slope aspect).

Management guidelines set forth in the draft 2012 Heron and Egret Management Plan include (1) restriction of non-essential activity adjacent to active Heron nests; (2) conservation of nesting habitat; (3) continued monitoring of nesting locations, phrenology (timing) of nesting, reproductive effort, and success; and (4) construction of parking covers or shelters to lessen impact of Heron droppings. These management issues will likely be revisited by SSTC-S.

Management Objective and Strategy

Objective: Maintain and enhance populations, and nesting and foraging habitats of migratory birds on SSTC-S.

Strategies:

1. Assess the effects of all projects on migratory birds during NEPA process. Ensure compliance with MOU between USFWS/DoD on the Conservation of Migratory Birds and the "Migratory Bird Rule",
2. Identify any actions that require an MBTA permit and, if necessary, obtain appropriate permit for intentional take of migratory birds.
3. Develop effective management for minimizing the unintentional take of migratory birds.
4. Conduct regular surveys to determine what species of migratory birds may have potential to be on NBC.

5. Once finalized, implement monitoring protocols contained within the DoD Coordinated Bird Monitoring Plan. Contribute data to the Coordinated Bird Monitoring Database.
6. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed.
7. Develop migratory bird specific BMPs and ensure these BMPs are included in project plans (e.g., plan all tree trimming during the non-nesting season).
8. Develop and enhance partnerships with agencies and groups involved (e.g., USFWS and CDFW) in migratory bird management.
9. Develop and distribute outreach and education materials on migratory birds to personnel, operators and visitors on SSTC-S.
10. Revegetate with native species contained on the NAVFAC SW recommended plant list.
11. Control the spread of invasive species.
12. Participate in DoD Partners in Flight initiative.
13. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).
14. When feasible pick up sick and injured migratory birds and take to wildlife rehab facility.

6.2.4.6 Bird/Wildlife Aircraft Strike Hazard

A full BASH program is not in place at SSTC-S due to the limited air operations but may be considered if air operations increase in the future. Natural resource managers are responsible for ensuring BASH programs are addressed in this INRMP and is compliant with all applicable state and Federal natural resource laws and regulations as well as all applicable DoD, DoN, and U.S. Navy environmental policies, directives, and instructions.

6.2.4.7 Mammals

For a complete listing of mammal species observed, or detected, at SSTC-S, see **Appendix F**.

The diversity of mammal species on SSTC-S is low due to lack of undisturbed habitat. A total of five mammal species were observed during the 2001–2002 natural resources surveys and include cottontail rabbit (*Sylvilagus audubonii*), San Diego black-tailed jackrabbit, raccoon (*Procyon lotor*), striped skunk, and western harvest mouse (*Reithrodontomys megalotis longicaudus*). Of these species, only the San Diego black-tailed jackrabbit is considered a special status species (U.S. Navy 2004c).

Cottontail rabbits are abundant in the coast prickly-pear and California annual grassland habitats. California ground squirrels and southern pocket gopher (*Thomomys umbrinus bottae*) burrows are abundant in the California annual grassland habitat. In the central portion of SSTC-S, mammals use the California boxthorn and cactus patches for protection and cover and forage in the adjacent salt pan. Large dens, potentially gray fox dens given their historical occurrence on-site, were observed in numerous locations on SSTC-S. Coyotes (*Canis latrans*) are known to occur regularly on the SSTC-S (2006 USDA). No bat species were identified during surveys (U.S. Navy 2004c).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna,

- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. The NBC INRMP addresses terrestrial and shoreline resources, while the San Diego Bay INRMP covers in-water resources jointly with the Port of San Diego (*Port of San Diego | Port of San Diego*). The latter is considered a bay wide plan by local and regional resource agencies, which provided letters of concurrence or signatures. These plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship

Management Objective and Strategy

Objective: Employ a systematic approach to managing terrestrial mammals, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation, as needed.

Strategies:

1. Continue documenting mammal species during Natural Resources inventory efforts and those that are incidentally observed during special status species surveys.
2. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
3. Install bat boxes where appropriate.
4. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

6.2.4.8 Marine Mammals

Extensive natural history information for marine mammal species occurring within southern California waters has been summarized in previous works (Leatherwood et al. 1982, 1988; Reeves et al. 2002; Carretta et al. 2007; DoN 2008). Approximately 41 marine mammal species or stocks are known to occur within southern California waters based on NMFS Stock Assessment Reports (Carretta et al. 2007, DoN 2008). Of these, eight species are expected to be found within the SSTC-S project area. These include the California sea lion *(Zalophus californianus)*, Pacific harbor seal *(Phoca vitulina)*, bottlenose dolphin *(Tursiops truncatus)*, the eastern North Pacific gray whale *(Eschrichtius robustus)*, long-beaked common dolphin *(Delphinus capensis)*, short-beaked common dolphin *(D. delphis)*, Pacific white-sided dolphin *(Lagenorhynchus obliquidens)*, and Risso's dolphin *(Grampus griseus)*.

Sea lions and seals belong to the Order Carnivora, which is a group that includes true seals, sea lions, and fur seals. Species within the group Carnivora, or otherwise called pinnipeds, hunt and feed exclusively in the ocean, with certain species in southern California coming ashore to rest, molt, breed, and bear young.

Whales and dolphins belong to the group Cetacea, in which all species spend their lives entirely at sea.

Although cetaceans and pinnipeds are commonly seen off of SSTC, these animals are transitory and rarely spend extended periods of time in the area. SSTC is not known to be a preferred feeding site for marine mammals such as bottlenose dolphins and pinnipeds. Additionally, large cetaceans, such as gray

whales are seldom present in the shallow offshore waters of the SSTC, or if migrating near the outer edge of the boat lanes are rarely present for longer than the one the two hours it would take to transit past SSTC.

Specific Concerns

- Habitat loss and/or changes;
- Stranding;
- Climate change (e.g., changes in temperature or sea level rise) and
- Domoic acid toxicity.

Current Management

Marine mammal surveys are conducted on a regular basis in the San Diego Bay and along the ocean side NBC properties to determine species of marine mammals present in San Diego Bay and within the vicinity of SSTC-S. In addition to surveying for marine mammals, discrete water samples for chlorophyll analysis as well as continuous water quality data (chlorophyll, temperature, salinity, etc.) are collected.

Management Objective and Strategy

Objective: Protect and monitor populations of marine mammals at SSTC-S.

Strategies:

1. Continue quarterly surveys for marine mammals that may be present within SSTC-S boundaries but not covered by the San Diego Bay INRMP.
2. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information gleaned to guide adaptive management.
3. Develop and distribute outreach and education materials on marine mammals to personnel, operators and visitors on SSTC-S.
4. Follow injured wildlife protocol.

6.2.5 Special Status Species (Federally Listed and Other Special Status Species)

Special status species include those species that are state listed endangered, threatened, candidate, or California species of special concern (SOC) and California fully protected species (CFP); birds on the Federal Birds of Conservation Concern list (see **Figure 6-5**); marine mammals listed in the Marine Mammal Protection Act (MMPA), and plants identified by CNPS as belonging to the Rare Plant Rank list of 1B (see **Figure 6-6**). In addition, those migratory bird species that have been determined to be of the highest "concern" to the DoD and that have been identified on the DoD Partners in Flight (PIF) Priority Species list have been included. **Table 6-5** includes species either observed on SSTC-S during periodic natural resources survey, or species with the potential to occur on the installation.

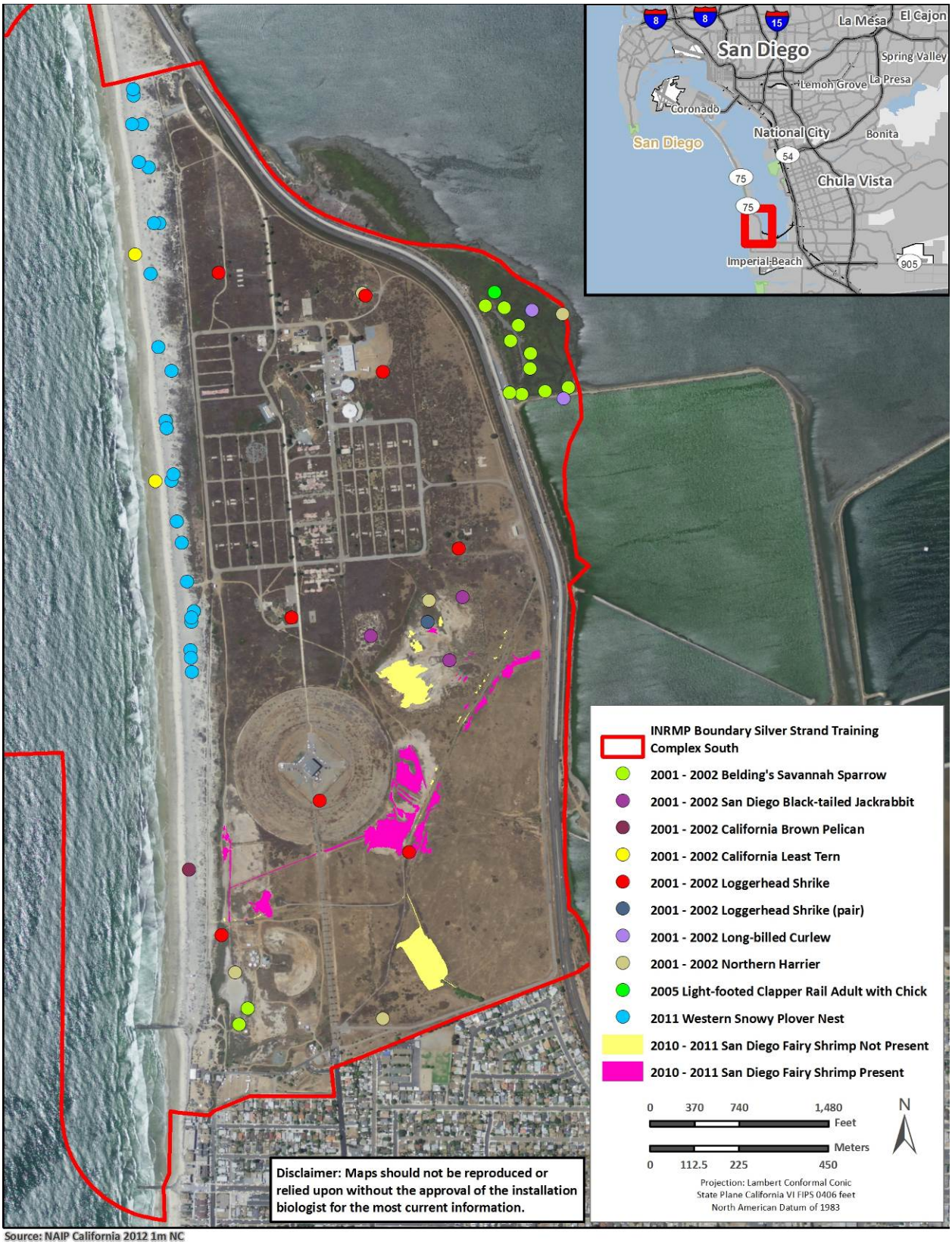
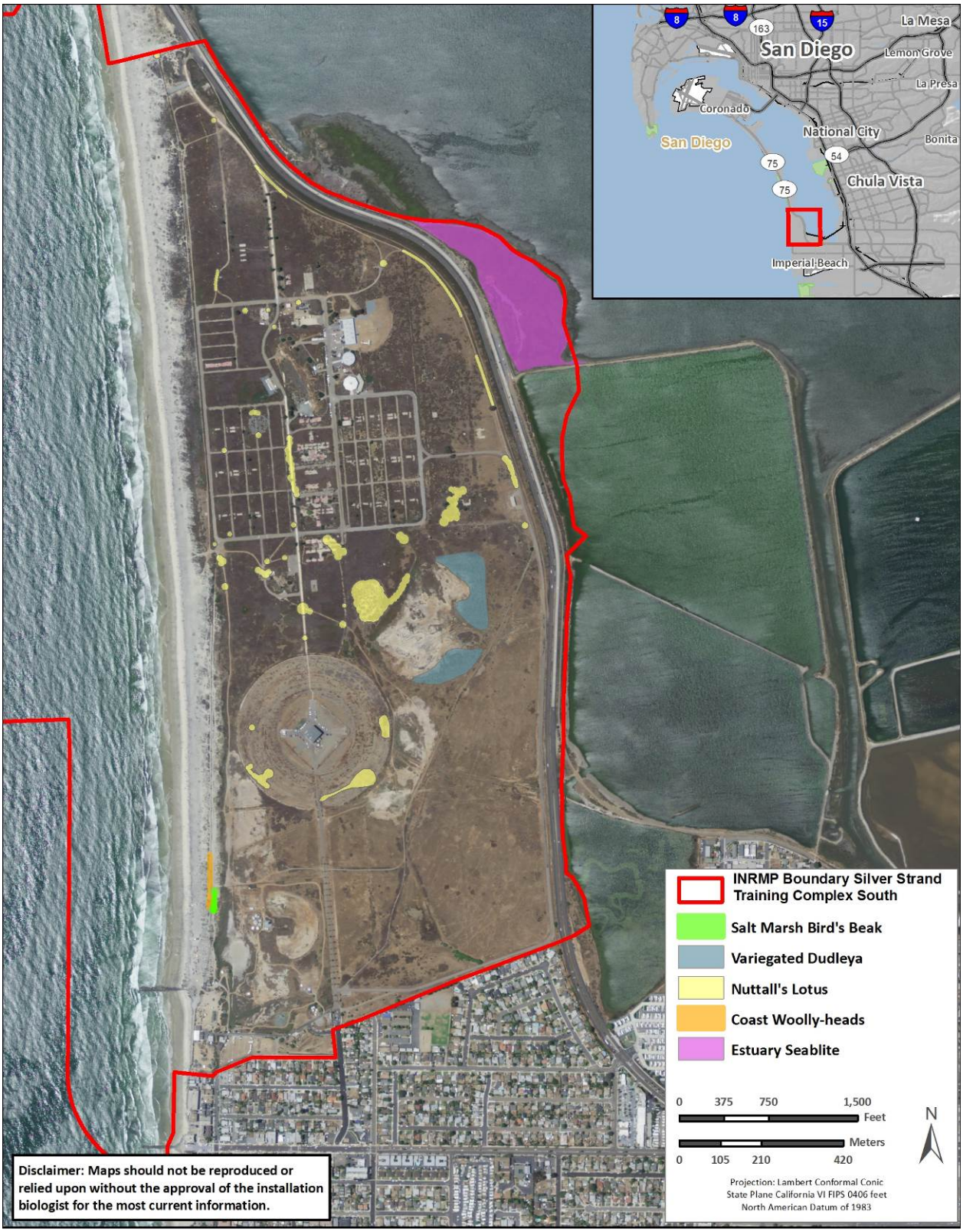


Figure 6-5: Silver Strand Training Complex South Special Status Wildlife Species



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 6-6: Silver Strand Training Complex South Special Status Plant Species

Table 6-5: Special Status Species Observed and Listed Species with Potential to Occur on Silver Strand Training Complex South

Common Name	Scientific Name	Federal Status	State Status	Other Status
Plants				
Salt marsh bird's-beak [1]	*Chloropyron maritimum* ssp. *maritimum*	FE	SE	CNPS 1B.2
Variegated dudleya [1]	*Dudleya variegate*	–	–	CNPS 1B.2
Nuttall's lotus [1]	*Acmispon prostratus*	–	–	CNPS 1B.1
Coast woolly-heads [1]	*Nemacaulis denudata* var. *denudata*	–	–	CNPS 1B.2
Estuary seablite	*Suaeda esteroa*	–	–	CNPS 1B.2
Invertebrates				
San Diego fairy shrimp [1]	*Branchinecta sandiegonensis*	FE	–	–
Reptiles				
Green sea turtle [1&2]	*Chelonia mydas*	FT	–	–
Birds[3]				
Tricolored Blackbird	*Agelaius tricolor*	BCC	SSC	–
Golden Eagle	*Aquila chrysaetos*	BGEPA, BCC	CFP	–
Short-eared Owl	*Asio flammeus flammeus*	–	SSC	–
Burrowing Owl	*Athene cunicularia*	BCC	SSC	DoD PIF
Ferruginous Hawk	*Buteo regalis*	BCC	–	–
Swainson's Hawk	*Buteo swainsoni*	BCC	–	–
Red Knot	*Calidris canutus roselaari*	BCC	–	–
Vaux's Swift	*Chaetura vauxi*	–	SSC	–
Western Snowy Plover [1]	*Charadrius nivosus nivosus*	FT, BCC	SSC	
Mountain Plover	*Charadrius montanus*	BCC	SSC	–
Northern Harrier	*Circus cyaneus*	–	SSC	–
White-tailed Kite	*Elanus leucurus*	–	CFP	–
Prairie Falcon	*Falco mexicanus*	BCC	–	–
American Peregrine Falcon	*Falco peregrines anatum*	BCC	CFP	–
Common Loon	*Gavia immer*	–	SSC	–
Gull-billed Tern	*Gelochelidon nilotica*	BCC	SSC	DoD PIF
Black Oystercatcher	*Haematopus bachmani*	BCC	–	–
Bald Eagle	*Haliaeetus leucocephalus*	FD, BCC,BGEPA	CFP	–

Common Name	Scientific Name	Federal Status	State Status	Other Status
Birds [3] (continued)				
Least Bittern	*Ixobrychus exilis*	–	SSC	–
Loggerhead Shrike	*Lanius ludovicianus*	BCC	SSC	DoD PIF
Short-billed Dowitcher	*Limnodromus griseus*	BCC	–	–
Marbled Godwit	*Limosa fedoa*	BCC	–	–
Long-billed Curlew	*Numenius americanus*	BCC	–	DoD PIF
Whimbrel	*Numenius phaeopus hudsonicus*	BCC	–	–
Black Storm-petrel	*Oceanodroma melania*	–	SSC	–
Belding's Savannah Sparrow	*Passerculus sandwichensis beldingi*	–	SE	–
Large-billed Savannah Sparrow	*Passerculus sandwichensis rostratus*	–	SSC	–
American White Pelican	*Pelecanus erythrorhynchos*	–	SSC	–
California Brown Pelican	*Pelecanus occidentalis californicus*	FD	CFP	–
Purple Martin	*Progne subis*	–	SSC	–
Light-footed Clapper Rail [1]	*Rallus longirostris levipes*	FE	SE, CFP	–
Black Skimmer	*Rynchops niger*	BCC	SSC	–
Rufous hummingbird	*Selasphorus rufus*	BCC	–	–
Lawrence's Goldfinch	*Spinus lawrencei*	BCC	–	–
California Least Tern [1]	*Sterna antillarum browni*	FE	SE, CFP	–
Elegant Tern	*Thalasseus elegans*	–	–	DoD PIF
Mammals				
San Diego black-tailed jackrabbit[1]	*Lepus californicus*	–	SSC	–

Source: U.S. Navy 2010c, CNPS 2010

Note: [1] Special Status Species with focused management. [2] Federally listed species with the potential to occur. [3] Birds are named using the American Ornithologists' Union nomenclature.

Key:
BCC = USFWS Bird of Conservation Concern
SSC = California Species of Special Concern
CFP = California Fully Protected Species
FT = Federally Threatened
FD = Federally Delisted
DoD PIF = DoD Partner in Flight Priority Species
FE = Federally Endangered
FC = Federal Candidate Species
ST = State Threatened
SE = State Endangered
BGEPA = Bald and Golden Eagle Protection Act

An installation's overall ecosystem management strategy must provide for protection and recovery of federally listed species. Under the ESA, an "endangered species" is defined as any species that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The USFWS has also presented an updated list of species that are regarded as candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and could warrant protection under the ESA. General management actions for listed species include the following:

- Preparation and implementation of specific management actions for listed species that include protocols for monitoring surveys and for site marking of sensitive areas;
- Maintaining GIS data on the distribution and habitat availability for listed species and sharing this information with the CNDDB;
- Implement Environmental Review requirements in accordance with OPNAVINST 5090.1C CH-1;
- Conduct Environmental Awareness briefings (e.g., natural resource training) as necessary;
- Minimization and conservation measures aimed at reducing the potential for accidental take;
- Investigating and implementing research projects to better understand ecological requirements of listed species and
- Investigation and implementation of habitat improvement and non-native species control to conserve listed species.

If threatened, endangered, or candidate species are discovered on the installation during a biotic inventory, species information and management actions should be incorporated into the INRMP.

The intent of this section is to identify objectives and strategies to manage SSTC-S using a regional ecosystem-based approach that manages special status species while protecting the operational functionality of the mission. While single-species management is not promoted as a general philosophical management approach on the installation, specific controls are used to protect special status species beyond management of the ecosystem. Other procedures in place for management of special status species are modifying the ecosystem and human interactions within this environment. The following sections include brief descriptions of those species actively managed by natural resources personnel at SSTC-S

For a complete description, background and species account including distribution, range, habitat and biology, of the Special Status Species described below, see **Appendix G**.

6.2.5.1 Federally Listed and Candidate Species

Five federally listed species, the federally listed endangered salt marsh bird's –beak (*Chloropyron maritimum* ssp. *maritimum*), endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*), threatened Western Snowy Plover (*Charadrius nivosus nivosus*), endangered Light-footed Clapper Rail (*Rallus longirostris levipes*), and the endangered California Least Tern (*Sterna antillarum browni*) are known to occur on SSTC-S. Additionally, one federally listed species the threatened green sea turtle (*Chelonia mydas*) has the potential to occur off-shore of SSTC-S.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

Management needs of threatened, endangered, and candidate species and their habitats are based on results contained within surveys performed for SSTC-S. Listed species that occur on SSTC-S include the Western Snowy Plover, the Light-footed Clapper Rail, the California Least Tern (does not nest on SSTC-S), the San Diego fairy shrimp, and salt marsh bird's-beak. SSTC-S will continue to conduct species surveys as deemed necessary and subject to available funding. Management strategies will be developed or revised based on the recommendations of those surveys. Other procedures in place for management of threatened, endangered, and candidate species are modifying the ecosystem and human interactions within this environment.

The Navy currently conducts management of listed species at SSTC-S in accordance with applicable Biological Opinions that are discussed in detail in the below appropriate sections. Examples of management strategies include annual surveys and assessment of species status on the installation, minimization of disturbances, and site preparation where necessary.

There is no critical habitat for any of the listed species in NBC. This is, in part, due to U.S. Navy environmental planning through INRMPs. ***Appendix D*** *identifies within the INRMP all management and conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.*

Management Objective and Strategy

Objective: Maximize effectiveness and efficiency of the NBC Endangered Species Program to achieve the best conservation possible while maintaining and improving training activities at the desired level.

Strategies:

1. Prioritize management issues within and between species, and within the overall natural resources program to guide management actions and funding expenditures.
2. Coordinate with USFWS to identify actions that adversely impact training capabilities, and identify activities that could adversely affect listed species. Adapt measures as warranted and consult with USFWS to receive incidental take coverage where appropriate.
3. Ensure that NBC remains in compliance with the ESA.
4. Periodically review the natural resources management program to ensure that management actions do not adversely impact threatened and endangered species.
5. Promote species recovery and ensure essential habitat is conserved by providing proper funding, providing a benefit to the species, and ensuring effectiveness of management strategies employed.

Salt Marsh Bird's-beak

Salt marsh bird's-beak is a federally endangered plant that occurs on the YMCA Camp Surf leased property. YMCA Camp Surf is not in the operations and training footprint of the SSTC (see **Figure 6-6**) (U.S. Navy 2010c).

Specific Concerns

- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Recreational use at YMCA Camp Surf, if not properly controlled (currently control seems adequate) and
- Lack of surface hydrology connection to ocean.

Current Management

All Salt marsh bird's-beak occurrences at SSTC-S are found in the YMCA Camp Surf area and management of this species is included in the YMCA Camp Surf Management Plan (see **Appendix P**). The Navy conducts surveys periodically for this species on SSTC-S.

Management Objective and Strategy

Objective: Maintain current population of salt marsh bird's-beak, and, if feasible, expand size and distribution within suitable habitat at YMCA Camp Surf. Promote species recovery consistent with Section 7.

Strategies:

1. Perform invasive species control in areas where salt marsh bird's-beak is known to exist.
2. Conduct periodic monitoring (recommend annually) to determine existing population health. Include hydrological monitoring as needed.
3. Complete a vulnerability assessment to assess threats to existing populations.
4. Complete a habitat evaluation to determine where salt marsh bird's-beak populations can be expanded
5. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).
6. Create a seed bank to increase plant stock in future years and ensure viable populations following drought or flood years.
7. Study pollinators to determine which species on SSTC-S are critical to plant reproduction.

San Diego Fairy Shrimp

The San Diego fairy shrimp was collected and identified during focused surveys for this species at SSTC-S during the winter of 2000–2001 and in February through May 2003. For the October 2010– May 2011 sampling, a total of 26 basins were confirmed to have the San Diego fairy shrimp. These results were from the wet and dry season surveys (ICF 2012).

During historical surveys, only 11 basins were confirmed with the species. There was also an increase in the number of basins detected at SSTC-S. Historical surveys identified 34 basins and the 2010–2011 surveys identified 59 basins or depressions that were potentially suitable for fairy shrimp. Of the 43 basins where a floral inventory was conducted, 22 basins contained vernal pool indicator species (ICF 2012). See **Figure 6-5** for the location of San Diego fairy shrimp populations on SSTC-S.

Specific Concerns

- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Training -- foot traffic;
- Unauthorized vehicle use of unpaved access roads -- especially along SSTC-S perimeter road adjacent to YMCA Camp Surf;
- Habitat loss from destruction and modification of vernal pools due to filling, grading, disking, leveling, and other activities, as well as the modification of surrounding uplands that alters vernal pool watersheds, such as those that alter water runoff patterns (amounts and seasonal distribution) or reduce the size of the watershed;
- Pesticides;
- Indirect threats to the San Diego fairy shrimp occur because of alteration of supporting watersheds adjacent to vernal pools that change drainage patterns in the occupied pools. An increase in road runoff leads to ponding, making the pools vulnerable to invasion by marsh plant species that out compete vernal pool plants and animals. At the other extreme, pools that are drained or blocked from their source of water are invaded by upland plants. Any change in the maximum and minimum water temperatures can affect the San Diego fairy shrimp;
- Indirect impacts associated with disposal of waste materials into habitat disposal of concrete, tires, refrigerators, sofas, and other trash adversely affects these animals by eliminating habitat, disrupting pool hydrology or, in some cases, releasing toxic substances and
- Malathion, herbicides, laundry detergent, household plant fertilizer, and motor oil have been documented to be fatal to the San Diego fairy shrimp through poisoning of the animals or by the formation of a barrier to gas exchange on the surface of the water, which can result in asphyxiation

Bullfrogs can also indirectly impact the San Diego fairy shrimp as they are a recognized predator of vernal pool species and the USFWS recommends that eradication of larvae, post-metamorphic, and adult bullfrogs should be a task item in vernal pool management plans.

Current Management

Vehicle traffic in the inland area of SSTC-S is always limited to roads. Vehicle traffic adjacent to vernal pools is limited to paved roads except by emergency vehicles (e.g., security, fire, and medical support) in emergency situations only (U.S. Navy 2010c).

The 2010 Biological Opinion on the U.S. Navy SSTC Operations (FWS-SDG-08B0503-09F0517) discusses San Diego fairy shrimp at SSTC-S Inland and requires (1) the avoidance of vernal pools occupied by San Diego fairy shrimp by designating drop zones are located at least 30 meters (100 feet) from each occupied pool; (2) Assure that military dogs do not enter the vernal pools at SSTC-S Inland;

(3) Mark pools to facilitate monitoring, and monitor the occupied vernal pools and their watersheds to determine the baseline and ongoing conditions regarding fairy shrimp distribution and abundance; botanical resources; topography, hydrology and water chemistry; and (4) Fencing the limits of the vernal pools occupied by San Diego fairy shrimp. For a complete list of Terms and Conditions and Conservation Measures, see **Appendix I.**

Management Objective and Strategy

Objective: At a minimum, maintain populations in all pools with previously documented occupation (based on 2001 & subsequent surveys); avoid anthropogenic transport of cysts to un-occupied areas, and promote species recovery.

Strategies:

1. Adherence to BO conservation measures and terms & conditions (especially development of vernal pool management plan) -- see SSTC BO (pp. 18-19 & pp. 123-125) for specifics and please summarize here. Management activities include avoidance of some pools, monitoring, and invasive species control (all to be implemented according to a fairy shrimp management plan for SSTC-S).
2. Support genetics research on San Diego fairy shrimp.
3. Perform invasive species control in areas where vernal pools are known to exist.
4. Conduct periodic monitoring of habitat to include protocol USFWS-San Diego fairy shrimp for conducting surveys (e.g., topography, water chemistry).
5. Complete a vulnerability assessment to assess threats to existing populations.
6. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).
7. Comply with cleaning protocols of footwear and equipment before and after use in vernal pools.

Green Sea Turtle

The population of green sea turtles in San Diego Bay numbers approximately 30 to 60 individuals; however, there is limited information about their movements or behavior (U.S. Navy 2010c). It is unknown how often they leave San Diego Bay or where they reside when they are outside the South San Diego Bay Power Plant channel. Female green sea turtles are believed to migrate from San Diego Bay to nesting grounds in Mexico prior to nesting season while the remaining male adults and subadults continue to be present within San Diego Bay. Eelgrass beds and associated algae and invertebrates known to be food for turtles are extensive in the south and south central San Diego Bay. Recent information on turtle foraging has broadened the general understanding of targeted food items as well as expanded the idea that adult green sea turtles are more omnivorous than previously thought. Considering recent foraging studies, resident turtles near Navy managed areas along the San Diego Bay may be utilizing invertebrates within deeper areas of San Diego Bay in conjunction with eelgrass and algae as food sources (U.S. Navy 2010c).

Green sea turtles have the potential to occur off-shore of SSTC-S while in transit in and out the San Diego Bay, and within the eelgrass beds on the ocean- and bay-side's of SSTC-S. This species is not currently managed on SSTC-S.

Specific Concerns

- Small boat collisions with green sea turtles;

- Development on and adjacent to beach;
- Stranding and
- Power plant closure may have an impact on green sea turtles in the San Diego Bay.

Current Management

The measures implemented by the Navy to reduce impacts to marine mammals also serve to mitigate potential impacts on the green sea turtle. Current mitigation measures as defined in the SSTC EIS for management of the green sea turtle include (U.S. Navy 2010c):

Current procedures for monitoring sea turtles before and after underwater detonations are designed to prevent harm to these animals.

1. A buffer zone will be established around each detonation point. For detonations occurring in 0 to 7 meters (0 to 24 feet) of water depth (VSW), the buffer shall be a 366-meter (1,200-foot) radius around the detonation point. For detonations occurring in 7 to 22 meters (24 to 72 feet) of water depth, the buffer shall be 430 meters (1,410 feet).
2. Two observers (one on the beach and one in a small craft for detonations in zero to 7 meters (24 feet) and two in small craft for 7 to 22 meters (24 to 72 feet) of water depth with binoculars will survey detonation area and the buffer zone for sea turtles from at least 30 minutes prior to commencement of the scheduled explosive event until at least 30 minutes after detonation. Observers will pay extra attention within the buffer zone to large amounts of floating kelp strands and other marine flotsam (if any), since these may provide shelter and prey used by sea turtles.
3. Divers placing charges on mines and dive support vessels will check the area immediately around the mine location for sea turtles.
4. If a vessel not associated with the event is sighted in the buffer zone or headed towards it, activities are suspended and the area is ensured clear prior to detonation.
5. If a sea turtle is sighted within the buffer zone or moving towards it, exercises will be suspended until the animal has voluntarily left the area and the area is clear of sea turtles for at least 30 minutes for detonations in 7 to 22 meters (24 to 72 feet) and 10 minutes for zero to 7 meters (24 feet) of water depth.
6. Immediately following the detonation, visual monitoring for sea turtles within the buffer zone will continue for 30 minutes. Any sea turtle observed after an underwater detonation either injured or exhibiting signs of distress will be reported to Navy environmental representatives from the regional Navy shore commander (Commander, Navy Region Southwest) and U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy will report these events to the NMFS' Southwest Regional Office. These voice or email reports will contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animals status. These reports will also be made for any vessel collisions during training activities.
7. Sequential detonations will be conducted either less than 10 seconds apart or greater than 30 minutes apart to minimize the potential for harm to animals that may arrive to feed on potential fish kill.

Management Objective and Strategy

Objective: Maintain and enhance populations of green sea turtle on SSTC-S.

Strategies:

1. Conduct regular (approximately every 1 to 2 years) surveys for the green sea turtle that may be present within SSTC boundaries, but not covered by the San Diego bay INRMP.
2. Develop and distribute outreach and education materials on the green sea turtle to personnel, operators and visitors on SSTC-S.
3. Follow injured wildlife protocol.

Western Snowy Plover

Surveys of the nesting activity of the Western Snowy Plover are conducted throughout the year (January through December) to document both nesting and non - nesting populations and distribution to determine the species' abundance, distribution, and nesting success (U.S. Navy 2008f). In 2011, 25 nests were documented at SSTC - S beaches. Of those 25 nests, an estimated 5 chicks fledged (see **Figure 6-5**). Restriction of the beaches to primarily training use (rather than recreational access), predator control efforts, as well as nest buffers and training lane restrictions help to maintain these numbers (U.S. Navy 2010c). Snowy Plovers are observed yearly during migration and winter at SSTC - S but large wintering flocks are not common here likely due to recreational disturbance (Shepherd pers. comm.).

Specific Concerns

- Dogs on beach;
- Recreational beach users;
- Development on and adjacent to beach;
- Other natural resources management objectives (e.g., invasive species removal during the nesting season);
- Facilities maintenance;
- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Military training on beach;
- Predation;
- Invasive species on beaches;
- Increased cover of native species and
- Potential domoic acid toxicity.

Current Management

Snowy Plovers are currently managed at SSTC-S under a single programmatic BO, the 2010 BO on the U.S. Navy's Silver Strand Training Complex Operations (FWS-SDG-08B0503-09F0517). Among other conditions, the BO requires: (1) predator control of mammalian and avian predators of the snowy plover;

(2) enhancement of nesting substrate; (3) no removal of kelp or other natural marine vegetation that is commonly used by beach insects; and (4) nest monitoring. For a complete list of Terms and Conditions and Conservation Measures see **Appendix I**.

The Navy will continue to submit Migratory Bird Depredation Permit requests to address management of the Gull-billed Tern, a significant predator on Least Tern and Snowy Plover eggs and chicks. To date, the Navy has not received authorization to capture, relocate, or take this sensitive species although documented predation on Least Tern chicks has been significant, predation of plover chicks is regularly observed, and permit applications have been submitted since 2005.

Management Objective and Strategy

Objective: Enhance productivity to maintain the Western Snowy Plover population and meet goals outlined within current NBC Biological Opinions and 2007 USFWS Recovery Plan. This includes maintenance of 5 - year average (2005 - 2009) baseline population levels.

Strategies:

1. Annually review and ensure continued compliance with USFWS BO.
2. Continue to manage dogs and educate owners to eliminate dog/plover interactions.
3. Educate workforce and beach users on sensitive wildlife species, including breeding season restrictions.
4. Implement site approval process and NEPA to avoid and minimize impacts to beach (e.g., direct development away from beach, direct lighting away from beach, and minimize predator perches).
5. Coordinate with all stakeholders and contribute to regional vulnerability assessments.
6. Maintain a program for Western Snowy Plover predator management. Encourage USFWS to develop a strategy to manage predation by Gull-billed Terns.
7. Educate SSTC-S workforce and visitors about sensitive species and habitat.
8. Develop and implement Long-term Habitat Enhancement Plan for SSTC-N and SSTC-S.
9. Control invasive species in existing Western Snowy Plover habitat.
10. Enhance Western Snowy Plover habitat through revegetation projects. Continue to coordinate with regional organizations and conduct sand replenishment projects.
11. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
12. Work to establish a natural resources law enforcement program on base.
13. Complete nest monitoring on an annual basis and band birds when it is determined to be appropriate to meet management goals.

Light-footed Clapper Rail

Narrow intertidal flats occur along the margins of tidal channels of the salt marshes of south San Diego Bay such as at the Delta beaches, which may be used for feeding areas by the Light-footed Clapper Rail. Light-footed Clapper Rails are managed at NOLF IB, and sporadic populations of the species have been observed in salt marsh areas at SSTC-S (U.S. Navy 2010c). The most recent Navy surveys were conducted in 2005 on SSTC-S but annual surveys are conducted by the state. A single adult Light-footed

Clapper Rail with a downy chick was detected in the pickleweed approximately 40 yards from the inland edge of the marsh below the restored upland berm (see **Figure 6-5**) (U.S. Navy 2010c).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Other natural resources management objectives;
- Impacts from recreational users at South Bay Biological Study Area;
- Invasive species within marsh;
- Predation and
- Possible impacts from contaminants, including heavy metals and PCB's.

Current Management

The Navy currently does not conduct activities at the location where this species may breed, which is leased to the County of San Diego for the South Bay Marine Biological Study Area. Periodic surveys are conducted to determine species presence and breeding status. The Navy has identified three primary approaches for protecting the Light-footed Clapper Rail (U.S. Navy 2010c):

- Develop and participate with other agencies in regional approach and formal agreements for conserving salt marsh across the species' range in the context of local land use requirements;
- Protect cordgrass sites from erosion; and
- Improve nesting and foraging opportunities when habitat restoration or creation projects are undertaken. The Navy has participated as partner in the Light-footed Clapper Rail captive propagation program at the Sweetwater Marsh NWR.

Management Objective and Strategy

Objective: Maintain marsh habitat for Light-footed Clapper Rail on SSTC-S while recognizing limited size or habitat on SSTC-S.

Strategies:

1. Coordinate with USFWS and CDFW to ensure marsh habitat within SSTC-S is being monitored for Light-footed Clapper Rail on an annual basis. Implement additional monitoring if necessary.
2. Implement site approval process and NEPA to avoid and minimize impacts to marsh habitat (e.g., direct development away, direct lighting away, and minimize predator perches).
3. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
4. Manage and monitor lease with city of Coronado for Biological Study Area to ensure appropriate management measures are in place.
5. If necessary, continue to work with USFWS to investigate impacts to Light-footed Clapper Rail from contaminants and determine appropriate management response.
6. Contribute to regional vulnerability assessment.

7. If necessary, perform invasive species control in areas where Light-footed Clapper Rail habitat is known to exist.
8. Enhance habitat through revegetation projects.

California Least Tern

Currently California Least Terns do not nest on SSTC-S. During surveys conducted in 2001 and 2002 this species was observed foraging along the shoreline and over the salt marsh habitat on the bay side of SSTC-S (U.S. Navy 2004d).

Specific Concerns

- Dogs on beach;
- Recreational beach users;
- Development on and adjacent to beach;
- Other natural resources management objectives;
- Facilities maintenance;
- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Military training on beach;
- Predation;
- Invasive species on beaches;
- Increased cover of native species and
- Domoic acid toxicity.

Current Management

Not applicable on SSTC-S due to absence of nesting.

Management Objective and Strategy

Not applicable on SSTC-S due to absence of nesting.

6.2.5.2 Other Special Status Species

In addition to federally threatened and endangered species, SSTC-S recognizes species that occur at a level of rarity that currently does not warrant Federal listing. **Table 6-5** lists other special status species and their corresponding CDFW or other Federal status. No focused management or surveys currently take place on SSTC-S for most of the other special status species.

Other Special Status Species with Focused Management

Variegated Dudleya

On SSTC-S variegated dudleya is found in the coast prickly-pear series and California annual grassland series that border salt marsh habitat near the radio facility. Many thousands of individuals of this species were found over only a few acres. The occurrence of variegated dudleya on SSTC-S is the last population on the immediate coast in California (U.S. Navy 2010c).

Specific Concerns

- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Training -- foot traffic;
- Facilities projects (e.g., construction and maintenance) and
- Foot traffic -- general (e.g., natural resources projects/surveys).

Current Management

Variegated dudleya is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the Navy as part of the project planning (U.S. Navy 2010c).

Management Objective and Strategy

Objective: Maintain populations of variegated dudleya on SSTC-S.

Strategies:

1. Perform invasive species control to reduce threats to existing populations.
2. Conduct periodic monitoring (at least biannually) to determine existing population health.
3. Complete a vulnerability assessment to assess threats to the existing population.
4. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).
5. Create a seed bank to increase plant stock in future years and ensure viable populations following drought or flood years.

Nuttall's Lotus

Nuttall's lotus is prevalent on SSTC-S and is commonly found in the sand verbena-beach bursage habitat, ruderal areas, and even in the cracks of the pavement near the developed areas. This plant has the potential to occur on any surface of the Station that is not completely developed (i.e., without paving or landscaping). Although easy to map, it is nearly impossible to count individuals due to its sprawling, mat-like growth form. Therefore as was done for the red sand verbena, when mapping Nuttall's lotus populations, a visual density estimate was made in lieu of counting or estimating numbers of individuals (U.S Navy 2010c).

Specific Concerns

- Invasive species;
- Training;
- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- Other natural resources management.

Current Management

Nuttall's lotus is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the Navy as part of the project planning (U.S. Navy 2010c).

In order to provide nesting cover for chicks, minimize invasive weeds, and protect rare plants, the locations of coast woolly-heads (*Nemacaulis denudata*), and Nuttall's lotus (*Acmispon prostratus*), are marked for avoidance prior to grading or herbicide use. Sensitive plants aren't always avoided, but effects are minimized as feasible to meet other goals. Coast woolly-heads and Nuttall's lotus are indicators of a healthy, natural habitat that is conducive to nesting by providing a mosaic of vegetation for chick shelter and escape cover.

Management Objective and Strategy

Objective: Maintain populations of Nuttall's lotus on SSTC-S.

Strategies:

1. Perform invasive species control to reduce threats to existing populations.
2. Conduct periodic monitoring (at least biannually) to determine existing population health.
3. Complete a vulnerability assessment to assess threats to the existing population.
4. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).
5. Create a seed bank to increase plant stock in future years and ensure viable populations following drought or flood years.
6. Incorporate use of Nuttall's lotus into revegetation projects, where appropriate.
7. Coordinate with avian program to ensure that no threat exists to listed bird species (e.g., California Least Tern).

Coast Woolly-heads

Coast woolly-heads is located along the beach and sand verbena-beach bursage in the southern portion of SSTC-S, and throughout the Station in sandy ruderal habitat. As it is extremely abundant where it occurs, each population was mapped, and an estimation of the number of individuals was made for each. Where it was possible to view the entire population, a visual estimate was made. Where the population was too large to visually assess the entire population from one vantage point, a one-meter-by-one-meter quadrat was placed and a direct count was obtained. Using GIS software to obtain the surface area of each population polygon, the density in the one-meter-squared quadrat was used to obtain an estimate for the

population (total surface area of polygon multiplied by the average density of the quadrats) (U.S. Navy 2010c).

Specific Concerns

- Invasive species;
- Training;
- Facilities projects (e.g.,. construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- Other natural resources management.

Current Management

Coast woolly-heads is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the Navy as part of the project planning (U.S. Navy 2010c).

In order to provide nesting cover for chicks, minimize invasive weeds, and protect rare plants, the locations of coast coolly-heads (*Nemacaulis denudata*), and Nuttall's lotus (*Acmispon prostratus*), are marked for avoidance prior to grading or herbicide use. Coast woolly-heads and Nuttall's lotus are indicators of a healthy, natural habitat that is conducive to nesting by providing a mosaic of vegetation for chick shelter and escape cover.

Management Objective and Strategy

Objective: Maintain populations of coast woolly-heads on SSTC-S.

Strategies:

1. Conduct invasive species control in areas where coast woolly-heads is known to exist.
2. Perform periodic monitoring (recommend at least every 3 years) to evaluate health of existing populations.
3. Complete a vulnerability assessment to determine threats to existing populations.
4. Complete NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).

San Diego Black-tailed Jackrabbit

Occurring in semi-open coastal scrub, grassland, and ruderal areas on Delta North and South, SSTC-N ocean beaches, SSTC-S, and NASNI, the large 0.5 to 0.6 meters (18 to 25 inches) San Diego black-tailed jackrabbit is characterized by large, long black-tipped ears, a black striped tail, and buffy brown coloration. It ranges from near Mt. Pinos (at the Kern-Ventura County line) southward and west of the southern California mountains into Baja California, Mexico (Hall 1981). This coastal form of the more widespread black tailed jackrabbit is strictly herbivorous, preferring habitat with ample forage such as grasses and forbs. Forested and thick chaparral regions are not suitable (Bond 1977).

The San Diego black-tailed jackrabbit breeds throughout the year, with the greatest number of births occurring from April to May. This jackrabbit is commonly observed on SSTC-S, primarily in the ruderal

habitats. They are occasionally observed on the beach and in the sand verbena-beach bursage habitat as well. Although this animal is listed as a California Special Concern Species, it is successfully breeding on SSTC-S and the population appears to be unique as it occurs in high densities within a low plant diversity habitat (U.S. Navy 2010c).

Specific Concerns

- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- Running jackrabbits trampling Western Snowy Plover nests.

Current Management

The Navy conducts periodic general mammal surveys during the natural resources inventory efforts. These are repeated approximately every 5 years.

Management Objective and Strategy

Objective: Support current populations of San Diego black-tailed jackrabbit on SSTC-S while maintaining threatened and endangered bird populations.

Strategies:

1. While conducting predator control, continue to release trapped jackrabbits in areas where conflict with nesting is reduced.
2. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.

Other Special Status Species with General Management

In addition to birds detected during the periodic natural resources surveys, several other special status species have been observed and are known to occur on SSTC-S (see **Table 6-5** for a complete list). No focused management or surveys currently take place on SSTC-S for these other special status bird species.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Fire;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. Plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals,

objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship.

All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Minimize the potential for adverse effects on special status species and their associated ecosystems while protecting the operational functionality of the installation mission by using an ecosystem-based management approach.

Strategies:

1. Investigate the need for implementing research projects to understand ecological requirements of special status species.
2. Continue use of the established NBC Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists and constraints maps to reflect presence of threatened, endangered, and other special status species.
5. Conduct regular surveys for threatened, endangered, and candidate species that may be present on SSTC-S.
6. Continue monitoring special status species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
8. Augment education program currently conducted at SSTC-S for military personnel who might have contact with sensitive species or their habitats.
9. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats. Implement erosion control BMPs to ensure adverse environmental impacts to sensitive habitat do not occur.
10. Revegetate with native species included on the NBC recommended plant list. Include sensitive plant species in the NBC recommended plant list.
11. Periodically review the natural resources management program to ensure that management actions do not adversely impact special status species habitat.
12. Maintain accurate, usable, and informative GIS data for ease in management planning and documentation.
13. Continue to protect existing native plant communities whenever possible.

6.2.6 Invasive Species Management

In 2006, the California Invasive Plant Council (Cal-IPC) updated the 1999 *Exotic Pest Plants of Greatest Ecological Concern in California* inventory list (Cal-IPC 2006). The updated Cal-IPC inventory ranks invasive species using a *High*, *Moderate*, *Limited*, or *Evaluated but not listed* scale based on ecological impact of the species. Invasive species were ranked based on four criteria that included (1) ecological impact of the species on native California ecosystems, (2) potential for species to either be or become invasive, (3) species distribution, and (4) documented levels of the species within a region or ecosystem. A description of each ranking level based on these four criteria as defined by Cal-IPC, is presented below (Cal-IPC 2006):

High: These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. These species are usually widely distributed ecologically, both among and within ecosystems.

Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology is conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited: The ecological impacts of these species are minor or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasion. Ecological amplitude and distribution are generally limited (these species may be locally persistent and problematic).

Evaluated but not listed: In general, this designation is for plant species that did not have enough information to warrant a rating or the information available indicated that the plant species does not currently have significant impacts within California.

Alert: This is an additional designation for some species in either the high or moderate category, but whose evaluation is limited. The designation alerts managers to species that are capable of rapidly invading unexploited ecosystems, based on initial localized observations and on observed ecological behavior in similar ecosystems elsewhere.

Terrestrial invasive species that are the most prevalent and problematic within SSTC-S include acacia, eucalyptus, slender-leaved ice plant (*Mesembryanthemum nodiflorum*), and crystalline ice plant (*M. crystallinum*), (U.S. Navy 2004c). While Cal-IPC is a valuable resource, new infestations appear frequently, and the sheer number of invasive species in the state of California can make it difficult for one agency to track in a timely manner. Installation staff may be required to do independent research to ensure that a potentially invasive species are not introduced to an area. Additionally, some species that have not previously appeared to be invasive may quickly become invasive due to climatic or other factors (Pers. Comm. Munson 2012).

Aquatic invasive species disrupt the balance of natural ecosystems by consuming or competing with native plants and animals, altering biogeochemical cycles, and reducing native biodiversity. Invasive marine species have arrived in the ROI from all over the world through direct and indirect means, and for intentional and unintentional purposes. Invasion risks stem from hull fouling, ballast water exchanges, and from aquarium, pet nursery, aquaculture, and seafood industry trade. The following vectors could pertain to the ROI (as identified by CDFG 2006): ships and boats; dry docks, navigation buoys and marine floats; floating marine debris; such as floating nets and plastic detritus; recreational boats and

equipment such as small recreational crafts, snorkeling and self-contained underwater breathing apparatus (SCUBA) gear, fins, wetsuits, jet skis, and similar materials; restoration projects due to the movement of marsh, dune, or seagrasses as well as associated organisms; intracoastal spread by unknown and natural migrants to new areas.

USACE permit projects involving disturbing activities in bay substrates require for *Caulerpa taxifolia*, an invasive aquatic alga. The U.S. Navy conducts project and training related surveys within the bay and ocean side habitats along with routine inventories in San Diego Bay, such as monitoring eelgrass transects to evaluate eelgrass habitat and confirm the absence of *Caulerpa* spp. Native to the Indian Ocean and believed to be an accidental introduction of the aquarium trade into southern California waters, the alga produces large amounts of a single chemical that is toxic to fish and other would-be predators. In areas where the species has become well established, it has caused ecological and economic devastation by overgrowing and eliminating native seaweeds, seagrasses, reefs, and other communities. This alga is considered a substantial threat to marine ecosystems in southern California, particularly to the extensive eelgrass meadows that make coastal waters such a rich and productive environment for fish and birds.

Several marine invasive plant and animal species are known to occur in the San Diego Bay. These include red algae (*Caulacanthus ustulatus, Lomentaria hakodatensis*), seaweed (*Sargassum muticum, S. horneri*), brown kelp (*Undaria pinnatifida*), and sea squirts (*Styela clava, Styela plicata, Polyandrocarpa zorritensis, Symplegma reptans*).

Invasive species management is a large part of pest management activities. The Federal Noxious Weed Act and EO 13112 require Federal agencies to control noxious and invasive species on Federal lands. The Federal Noxious Weed Act, enacted January 3, 1975, established a Federal program to control the introduction and spread of foreign noxious weeds into the United States. Amendments in 1990 established management programs for undesirable plants (including noxious weeds) on Federal lands. There are several plant species that are considered noxious and control is mandatory for those found on the Federal list. EO 13112 requires that Federal agencies prevent the introduction of invasive species, detect and control populations of invasive species, and restore native species and habitat conditions in ecosystems that have been invaded. Invasive species are alien species (not native to the ecosystem) whose introduction does, or is likely to, cause economic or environmental harm, or harm to human health. All of the invasive weeds listed on the Federal list are not necessarily found at SSTC-S.

The California Wildlife Action Plan has identified the growth and spread of floral and faunal invasive species in the state as a major concern to maintaining biodiversity in the state (CDFG 2007). As a result, natural resources personnel on SSTC-S and NAVFAC SW ensure that invasive species are not introduced on the installation, and have developed a program to control the spread of and the eradication of existing infestations of invasive species.

Problems associated with invasive non-native plants and animals are currently being addressed at many different levels in California, within the constraints of budgets and staffing resources. Examples include the Cal-IPC which is and NGO that supports coordination for activities addressing noxious weeds within the state. The NRCS also has a lead role in coordinating an aggressive state/Federal/private effort to eradicate, or at least stop, the spread of invasive species.

All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide/herbicides authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager. Chemical and manual exotic and invasive species treatments are required to be entered in the NAVFAC Online Pesticide Reporting System.

Specific Concerns

- Anthropogenic disturbance (e.g., vessel, vehicle, and aircraft movement within the ocean) can be a potential source of invasive species;
- Intake and discharge of ocean water for training purposes;
- Rapid spread of invasive non-native plants that displace native species and degrade habitat for native floral and faunal species;
- Plants, algae, and marine invertebrates and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

SSTC-S has developed a program to monitor and control the spread of existing infestations of invasive species, and to determine if new species populations have become established. Assessments of invasive species populations are conducted annually during the rainy season to determine extent of invasive species populations on SSTC-S. Once assessed, species are prioritized for treatment based on the extent of the infestation, and where the populations are located (e.g., next to listed species habitat). Additionally, the U.S. Navy conducts presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted Disturbing Activity can be carried out in *Caulerpa*-Free Systems. In the event that *Caulerpa* is detected, BMPs are implemented to isolate and prevent the spread of this species.

Management Objective and Strategy

Introduction and Spread of Invasive Species

Objective: Minimize non-native species encroachment in areas where severe to moderate encroachment occurs, and in new areas of encroachment where infestation might be spreading but is not yet severe.

Strategies:

1. Annually review and update NBC recommended plant list.
2. Develop and implement an Invasive Species Management Plan to control the spread of invasive species on SSTC-S. The plan should include specific prescriptions to evaluate individual invasive species, to identify targeted species, to control further spread of targeted species, and to develop and implement a program to monitor species abundance.
3. Conduct annual surveys to determine whether controls on existing infestations of species have been effective, and whether new populations have become established.
4. Develop and implement a review process for all projects that include a landscaping component to ensure nonnative species are not introduced.
5. Coordinate with the Natural History Museum to identify unknown species that may be invasive.
6. Develop outreach and education materials for distribution within the SSTC-S community.
7. Continue to conduct presence/absence surveys for *Caulerpa* spp. prior to initiation of any permitted disturbing activity.

Early Detection and Rapid Response

Objective: Enhance current early detection and rapid response management capabilities.

Strategies:

1. Ensure the bio-security plan establishes early detection protocol and rapid response options, to include the following:
    a. Establish adequate monitoring locations to detect invasive species introduction and spread.
    b. Develop a communication network as a rapid response tool to quarantine specific invaders and identify the pathway.
    c. Support rapid response by determining funding sources, contract vehicles, and cooperative mechanisms that can be accessed quickly.
    d. Prepare Instructions that include measures to prevent the introduction of invasive non-native species, detect early and respond rapidly to new introductions, and control and monitor established populations.
2. Prepare educational materials for SSTC-S military and civilian employees, contractors, and other visitors as a tool in early detection of non-native terrestrial species.

Project Planning

Objective: Ensure control and management of invasive species is included in project planning and maintenance projects.

Strategies:

1. Address non-native species in NEPA and other ground disturbing project plans.
    a. Ensure funding is secured for non-native removal during all phases (including post-project), if applicable.
    b. Monitor projects to ensure personnel are following BMPs, conservation measures, and other guidelines and requirements.
2. Manage roads, access routes, and new construction sites to minimize the spread of invasive non-native species and ensure that road or access routes are not created without authorization and project review approval.
    a. Require that maintenance or repair of existing roads stay within established footprints.
    b. Clean roadside mowing equipment of adhering dirt and vegetation between mowing cycles.
    c. Schedule roadside mowing to minimize weedy species seed distribution.
3. If applicable, project proponent must include invasive species treatments and revegetation of temporarily disturbed areas in project description.
4. Wash vehicles and personnel boots, bags, and clothes before coming on site; before moving to a different site on bases, as applicable; and before leaving base, as applicable. Implement standard operating procedures to ensure personnel are following guidelines.

Coordination with Regional Agencies

Objective: Promote cooperative interagency efforts to collect and analyze comprehensive monitoring data, including shared funding and staffing.

Strategies:

1. Coordinate with regional and local agencies on efforts undertaken by SSTC-S to control the spread of invasive and exotic species.

6.2.7 Grounds and Landscape Maintenance

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat. Planting windbreaks around buildings and parking areas, establishing wildflower areas, and reducing mowing are all ways to spend dollars more wisely, educate the public about the benefits of reduced maintenance, and become better stewards of the environment. In managing natural resources in the cantonment area, SSTC-S acknowledges its responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (1994). The memorandum's requirements include the following:

- Using regionally native plants for landscaping;
- Using construction practices that minimize adverse effects on the natural habitat;
- Reduce pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- Implementing water-efficient practices and
- Creating demonstrations of these practices to promote their use elsewhere.

Landscaping opportunities exist throughout NBC in association with administration buildings, training facilities, recreational areas, and housing. Normal grounds maintenance operations focus on lawn care, drainage ditch maintenance, road maintenance, landscaping maintenance, and pest management.

Specific Concerns

- Water use conservation requirements.

Current Management

The installation's representative biologist and NAVFAC SW landscape architect monitor landscaping and grounds projects to ensure that all projects follow the guidance contained in the NAVFAC SW recommended plant list (see **Appendix I**). This guidance includes:

1. Landscape designs and plant lists shall be reviewed and approved by the Installation Botanist, Installation Wildlife Biologist, and NAVFAC Landscape Architect in the planning stages of project design.
2. Ensuring that projects comply with the most recent version of the landscaping plant list.
3. It is vital that coordination with the Navy points of contact listed above occur early in the planning process to determine site-specific needs and constraints. Please note that not all species

on this list are appropriate for all settings. For example, in some areas trees may not be approved due to the presence of federally listed species.

4. Additional species may be included in the landscape design contingent upon the approval of the Navy points of contact listed above. All plants shall be verified for availability in size and quantities needed for each project prior to specifying on plans or scopes of work.
5. The list is updated periodically. Prior to initiating a project, please obtain the most recent list from either of the Navy points of contact listed above.

Management Objective and Strategy

Objectives: Maintain an aesthetically pleasing landscape on SSTC-S that preserves natural ecosystem functions, conserves water in landscaped areas, and promotes pollinator species.

Strategies:

1. Provide professional advice to assist the grounds landscaping and maintenance program in the use of native species as identified in the NAVFAC SW recommended plant list.
2. Maintain and annually update the list of recommended plants that can be used in landscaping.
3. Develop and implement BMPs for grounds maintenance at SSTC-S (e.g., water conservation). Periodically review the Landscape Management Plan to ensure plan BMPs still meet installation needs.
4. Restore native plant communities and collect seeds of native species for submittal to Natural History Museum.
5. Develop monitoring metrics, and set targets to ensure management strategies are meeting goals and objectives.

6.2.8 Pest Management

Authority for pest management activities on SSTC-S is directed under the Federal Insecticide, Fungicide and Rodenticide Act as amended (7 U.S.C. 136r-1), DoD Instruction 4150.07, SDMAI IPMP, December 2009, and OPNAVINST 6250.4C, Pest Management Programs, OPNAVINST 5090.1C CH-1, Chapter 17. IPM is a sustainable approach that incorporates the use of multiple techniques to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control might be an option used in conjunction with other methods. IPM strategies depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts. DoD Instruction 4150.07 establishes annual goals, or measures of merit, for IPM that include the following:

- *Goal 1.* 100 percent of DoD installations will have current pest management plans.
- *Goal 2.* Maintain the 55 percent pesticide use reduction achieved from 1993-2003 (in pounds of active ingredient).
- *Goal 3.* 100 percent of all installation DoD and contract pesticide applicators will be appropriately certified or licensed.

In addition, OPNAVINST 6250.4C directs the Navy and Marine Corps to (DoN 2012):

a. Prevent pests from adversely affecting military operations and missions.

b. Safeguard human health and morale by controlling pests that transmit diseases, annoy personnel, or represent a hazard to public health or safety.

c. Maintain and extend the service life of facilities, structures, and materiel by preventing economic pest damage.

d. Enhance the natural environment through the careful protection and management of ecosystems, endangered and threatened species, wildlife, watersheds and water quality in order to maintain optimal biodiversity.

e. Ensure pesticide use is safe and consistent with label directions.

f. Use the principles of IPM to avoid and minimize the use of pesticides when nonchemical alternatives are available and cost effective.

g. Comply with quarantine laws and regulations as related to protecting plants, animals and human health.

h. Comply with laws and regulations concerning pesticide storage, application, disposal of hazardous wastes, and transport of hazardous materials and substances.

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations. The NBC Instruction 5100.2G (10 Jan 2006) regarding Animal Control on board Naval Base Coronado Installations and Dog Beach and Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

1. Installation residents should keep and feed pet animals indoors and under close supervision.
2. Support programs to neuter or spay animals before they reach reproductive age.
3. Require routine vaccinations for rabies and other diseases.
4. Require microchipping registration of all pets brought onto installations.
5. Prohibit the feeding of feral animals on the installation.
6. Provide educational materials to pet owners regarding installation regulations and general pet management.
7. Never abandon animals.
8. Comply with all humane and animal control regulations at the Federal, state, and local level.
9. Except for guide and military working dogs, animals are not allowed in the barracks, work spaces, or recreational facilities at any time, and those in duty status are not permitted to bring animals on board.
10. All dogs must be properly vaccinated, on leash at all times, must not become a nuisance due to noise/odor, and must be picked up after.
11. No animals shall be left unattended or in a poorly ventilated vehicle.

Specific Concerns

- Water use conservation requirements and
- Overuse of fertilizers.

Current Management

The 2009 IPMP for SDMAI, which includes SSTC-S, describes pest management requirements, identifies pests for SDMAI, outlines roles and responsibility for IPM at each SDMAI, outlines procedures for pest control at each facility, and describes the administrative, safety, and environmental requirements of the program. Specific aspects of the program include pest identification, pesticide management (includes storage, transportation, and use and disposal), environmental health and safety, emergency pest management, and available program resources (U.S. Navy 2009a). All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager.

Threatened, endangered, or candidate species can be directly or indirectly affected by pest control activities. The following pest management operations require natural resource manager review:

- Weed and outdoor pest control in endangered/threatened species habitats and natural areas;
- Outdoor large area insecticide fogging;
- Pesticide applications to, over or adjacent to water bodies, waterways, or wetlands;
- Installation of bird barriers, exclusion devices, or repelling devices;
- Wildlife and feral animal control and
- Invasive species control.

Natural resources managers will obtain any necessary approvals, consultations, or permits. No pest management activities will violate the practices described for threatened, endangered, or candidate species by the California Department of Pesticide Regulation. SSTC-S will use the California Department of Pesticide Regulation Endangered Species Project website (*http://www.cdpr.ca.gov/docs/es/index.htm*) to determine the best chemicals to control pest species and their use limitation.

In addition, management of feral animals is a component of pest management at SSTC-S. Feral animals, especially feral cats and dogs, pose a potential threat to public health and safety. They also pose a threat to wildlife, especially federally listed species and migratory birds. Existing Navy policy included in SECNAVINST 6401.1A of 16 August 1994 regarding veterinary health services prohibits dogs, cats, and other privately owned or stray animals from running free on military installations. The CNO issued a policy letter on 10 January 2002 that clarifies the application of SECNAVINST 6401-1A. An objective of the existing policy is to control feral animals in a humane manner to prevent injury or disease to Navy personnel and eliminate adverse impacts on native wildlife. The instruction requires Navy commands to institute proactive pet management procedures in order to prevent establishment of free-roaming cat and dog populations.

The 2009 SDMAI IPMP identifies a number of strategies to conduct pest management at Navy installations in the San Diego Metro area. As long as the strategies discussed within the SDMAI are implemented, pests should not pose a threat at SSTC-S.

Management Objective and Strategy

Implementation of the Pest Management Plan

Objective: Ensure compliance with environmental legislation, regulations, and guidelines.

Strategies:

1. Update the SDMAI as necessary to ensure that the plan reflects changes in pest populations and current management issues. Incremental updates to the plan will be conducted annually.
2. Implement pest management controls from the SDMAI and other pest-related guidance and plans.
3. Conduct surveys of pests that pose a potential health risk to humans or natural resources.
4. Implement the control of wildlife and the effective elimination of concentrated and diseased populations.
5. Monitor pest and invasive species populations. Track usage of pesticide active ingredients and man-hours spent controlling pest and invasive species during implementation to ensure that the management strategies are sufficient.

Management of Feral Animals

Objective:

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations. The Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

Strategies:

1. Develop and implement a program to control feral animals on SSTC-S. Control populations of feral animals on SSTC-S.
2. Conduct surveys when appropriate to determine impact of feral animals on native species on SSTC-S.
3. Installation residents should keep and feed pet animals indoors and under close supervision.
4. Support programs to neuter or spay animals before they reach reproductive age.
5. Require routine vaccinations for rabies and other diseases.
6. Require microchipping registration of all pets brought onto installations.
7. Prohibit the feeding of feral animals on the installation.
8. Provide educational materials to pet owners regarding installation regulations and general pet management.
9. Comply with all humane and animal control regulations at the Federal, state, and local level.

6.2.9 Outdoor Recreation and Public Access

Specific Concerns

- Overuse of recreational areas on SSTC-S and
- Erosion and sedimentation.

Current Management

The outdoor recreation activities provided at SSTC-S include ocean front beaches, beach cabanas, jogging, cycling, walking and wildlife viewing trails. In addition, recreational access should be compliant with the requirements associated with the provisions of the American with Disabilities Act of 1990 as amended and the Disabled Sportsman Access Act as amended. As long as the strategies discussed within this INRMP are implemented, outdoor recreational activities should not pose a threat at SSTC-S.

Management Objective and Strategy

Objective: Provide quality outdoor recreation experiences while sustaining ecosystem integrity, and not conflicting with mission priorities.

Strategies:

1. Continue to limit public access and outdoor recreation for reasons that include general security and liability issues, the presence of federally endangered and threatened species, and fire safety.
2. Develop an outdoor recreation plan for SSTC-S. Identify and evaluate suitable outdoor recreation opportunities for installation personnel in undeveloped areas that do not contain or have the potential to impact sensitive species.
3. Develop and distribute outreach and education materials for recreational users of SSTC-S.

6.2.10 Law Enforcement of Natural Resources Laws and Regulations

Specific Concerns

- Unauthorized access or activities in natural areas, or areas used by nesting birds or marine mammals, may disrupt and limit the viability of native populations or habitats.
- Gaps in communication between NBC Environmental Division and NBC Force Protection, related to enforcement of closure areas or other areas requiring special protection, could result in mismanagement of natural resources, or non-compliance with Federal environmental regulations.

Current Management

SSTC-S has established the following objectives for enforcement: (1) Enforce laws and regulations pertaining to the implementation of the natural resources program; (2) Integrate natural resources enforcement into the overall natural resources program; and (3) Use enforcement personnel to enhance the natural resources program at SSTC-S.

There are no game wardens permanently stationed at SSTC-S. In 2011, NBC established a new partnership with CDFW Law Enforcement in which CDFW provided a specified number of weekend patrols focused primarily during the Least Tern and Snowy Plover nesting season. The game warden patrols are aimed at reducing recreational impacts on the nesting terns and plovers. NBC plans to continue this partnership as funding is available. The DoD police have the authority of the Commander (exclusive jurisdiction) and of the Sikes Act to enforce all Federal laws relating to the management of natural resources at SSTC-S, including the ESA, CWA and MBTA.

Management Objective and Strategy

Objective: Ensure compliance with state and Federal natural resources laws and regulations.

Strategies:

1. Provide training to personnel responsible for enforcement of applicable laws and regulations.
2. Continue to protect special status species and the natural communities.
3. Cooperate with other agencies, particularly the USFWS and CDFW, to ensure that natural resources laws are adequately enforced.
4. Periodically review Federal and state laws and regulations to ensure natural resources laws and regulations are adequately enforced.

6.2.11 Environmental Awareness and Outreach

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The NBC approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about the unique and valuable natural resources on the installation, the more responsibly they act toward using them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Activities such as fish stocking, land rehabilitation, and wildfire suppression can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public support these easily understood efforts. However, such issues as protection of sensitive areas for little known plant and wildlife species, prescribed burning, and permit fees and their uses require effective conservation communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

Specific Concerns

- Communication about the natural resources of NBC, environmental regulations, and protocols for situations where wildlife is trapped or injured, or birds are nesting or roosting in unwanted areas, may not be effectively conveyed due to staff turnover.

Current Management

The Sikes Act requires each military service to support environmental education for personnel and for the public where and when it is compatible with military safety and security needs. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program. The conservation effort on site will continue to expand as this INRMP and subsequent natural resource management programs are undertaken to ensure efficient and thorough management of the natural resources on base. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program.

Management Objective and Strategy

Objective: Provide people on the installation and in the surrounding community with an understanding of the SSTC-S natural resources program. Promote environmental stewardship through training and awareness.

Strategies:

1. Provide decision makers with the information they need to make educated decisions about installation natural resources.
2. Provide general conservation education to the SSTC-S community, including the means to attend training.
3. Periodically review outreach and education materials to ensure that each is still current and meeting the goals of the outreach and education program.
4. Reach out to local community groups for volunteers.
5. Establish a watchable wildlife program.
6. Educate the local community, as well as installation personnel and tenants, about the installation natural resources program. Develop and distribute educational materials about the SSTC-S natural resources program to stakeholders near SSTC-S (e.g., neighborhoods, county, etc.).

6.2.12 Geographic Information Systems Management, Data Integration, Access and Reporting

GIS is a computer system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface. GIS is used to create information layers used to develop and manipulate maps. GIS data are represented as different layers each containing data on a particular kind of feature (e.g., soils, wetlands, roads) from surveys, inventories, and other projects with spatial information. Each feature is linked to a position on the graphical image of a map. The data layers are organized to create maps and to perform statistical analysis.

GIS will also provide support for the entire environmental program and the training community. NBC will use GIS for complex analyses such as project siting, data interpolations, and risk assessments.

GIS software enables installation staff to capture, store, update, manipulate, analyze, and display all forms of geographically referenced data and tabular information about NBC. The management of reports in one central database enables users to quickly respond to data calls and identify gaps in natural resources management. The training of the NBC Environmental, Facilities Management, and Training staff and the allocation of their time to data entry, mapmaking, analysis of data, and interpretation of the results will determine the success of the installation GIS.

Once fully developed, the installation central databases can be used for the following:

- Providing maps;
- Selecting suitable areas for construction activities;
- Planning land rehabilitation projects;
- Providing special maps for Environmental Awareness materials;

- Ensuring avoidance of cultural resources during ground-disturbing projects;
- Ensuring avoidance of rare species habitats and other areas of special concern during construction projects;
- Identifying site options for use during NEPA evaluation of alternative sites;
- Calculating drainages and water flows;
- Determining Neotropical bird habitat preferences and
- Checking natural resource contractor's deliverables.

Specific Concerns

- GIS maps and shapefiles may not have appropriate metadata that identifies who, when, and for what purposes the data were collected.
- Natural resource management decisions could be misguided if there are information gaps in the natural resources database, or if the database is not kept current.

Current Management

Currently, there is no central repository for GIS data and reports, research, and other documentation. GIS data is submitted to Navy Assessment Management or the GIS IDIQ contractor. CNIC and NAVFAC guidance on metadata is being developed, but has not yet been finalized.

Management Objective and Strategy

Objective: Collect, store, develop, and maintain data about historical conditions, trends, and current status for critical indicators of ecological integrity and sustainability.

Strategies:

1. Use GIS and other natural resources data as benchmarks for developing future natural resources management goals and objectives.
2. Ensure that central database information is available to biologists, planners, contractors, and others in a quick and timely manner.
3. Annually review GIS data to advise resource managers of needs to update data sets during budget planning and programming.
4. Develop specific language that will be included in all contracts to ensure all spatial data produced are fully compatible with the installation GIS database.
5. Develop a standardized system for recording and mapping significant resource observations (e.g., plants, wildlife, erosion, damage) when incidentally encountered.
6. Provide annual funding for one person to be responsible for updating and maintaining the GIS database. This should include the necessary hardware, software, and training for the use of GIS.
7. All reports and other GIS data delivered and incorporated into the Navy GIS database.

7. Naval Outlying Landing Field Imperial Beach

7.1 Purpose, Approach and Rationale

Natural resources management at Naval Base Coronado (NBC) strives to integrate biodiversity conservation and an ecosystem-based approach into an adaptive management framework compatible with the military mission. As a result, the natural resources program consists of multiple resource disciplines that are frequently interconnected and share similar objectives. Management projects and plans often consist of multiple program elements with several different resource experts collaborating together. A number of items have been identified in subject areas that affect the natural resources present on and immediately adjacent to NBC. The purpose of this section is to identify goals, objectives, and strategies for natural resources management on Naval Outlying Landing Field Imperial Beach (NOLF IB).

The goal for management of natural resources at NBC **is to provide an adaptive ecosystem-based conservation program that will efficiently support the NBC mission and provide for sustainability of natural resources.**

Specific concerns, current management, and the management strategy for each natural resources area are described below. A summary of the strategies as well as the estimated time frame for completion is presented in **Appendix C, Tables C-1** and **C-5 (Project Table).**

Some of the strategies described in this section will be accomplished through interactive partnerships with other Federal, state, and local organizations. Natural resources staff at NBC will initiate partnerships based on the benefits to the regional ecosystem and the local environment.

7.2 Natural Resources Current Conditions and Management

7.2.1 Topography, Geology and Seismicity

NOLF IB occupies approximately 509 hectares (1,257 acres) in southwest San Diego County, in the Tijuana River Valley, south of the Silver Strand peninsula. NOLF IB is situated within the coastal plain of the Pacific Ocean. The installation is very flat with very little change in elevation. Tidal flats are situated in the western portion of the installation along the Tijuana River (U.S. Navy 2006d).

As continental drift shifted North America toward the west, a steep coastline and narrow continental shelf developed. Marine terraces were gradually carved along the shores. Then, in the late Cenozoic, tectonic uplift raised alluvial terraces to several hundred feet above modern sea levels. What is now the Tijuana River presumably cut through these terraces, although the floodplain suggests that flows were not consistently large. Then, in the Holocene, a rising sea began to reclaim the exposed margins of the coastal shelf. Rivers were drowned and lagoons formed as longshore drift created sandy barriers along the coast. With flooding, most of the coastal embayments filled with sediment. Without continuous river flow and scouring, their mouths closed between flood seasons (NERRS 2009).

Recent geologic factors that have shaped the estuary are the competing forces of rising sea level, which promotes inland migration of the estuary, and tectonic uplift, which reverses that trend. The location of the shore and the configuration of the mouth are additional variables that influence the size and condition of the estuary (NERRS 2009).

San Diego County lies almost entirely within the Peninsular Ranges geomorphic province (Burns 1997) and rides atop the Pacific Plate, following a northwesterly path while grinding against the North American Plate. As a result, grinding, earthquakes and past volcanic activity, in combination with weathering processes, have largely shaped San Diego County into a geologically diverse area (U.S. Navy

2006d). Seismic structures running close by include the Rose Canyon Fault Branch, which runs north to south along the eastern side of the Silver Strand (U.S. Navy 2010c). The Rose Canyon Fault is considered the most potentially damaging fault in the area (U.S. Navy 2006d) and is believed to have the potential to produce a 7.5 magnitude quake (U.S. Navy 2010c). Another major fault in the county, the Elsinore Fault runs diagonally from the northwest to southeast across the county through Lake Henshaw. The San Jacinto Fault, farther to the east and more or less paralleling the Elsinore Fault, has been the most active of San Diego County's fault zones (U.S. Navy 2010c).

There are multiple faults that either border or run through NBC area. As mentioned previously, the San Diego Bay area is the surface expression of a north-south-trending, nested graben, or depressed block of land bordered by parallel faults. There are three faults that border the NOLF IB (see **Figure 7-1**). The Newport-Inglewood-Rose Canyon fault zone and Silver Strand fault zone run north to south offshore. The Newport-Inglewood fault zone occurs mostly in Los Angeles and Orange counties; it has displayed continuing activity, including a 6.3 magnitude earthquake in Long Beach in 1933. The Newport-Inglewood fault zone eventually merges with the Rose Canyon fault zone, about 64 kilometers (40 miles) northwest of the city of ocean side (MACTEC 2010). The Rose-Canyon fault zone was described earlier (see **Section 4.2.1**). The third fault occurs about a mile southeast of the Naval Outlying Field, it is unnamed and runs northwest through the Tijuana River National Estuarine Research Reserve (TRNERR). The unnamed fault does not occur on NOLF IB area.

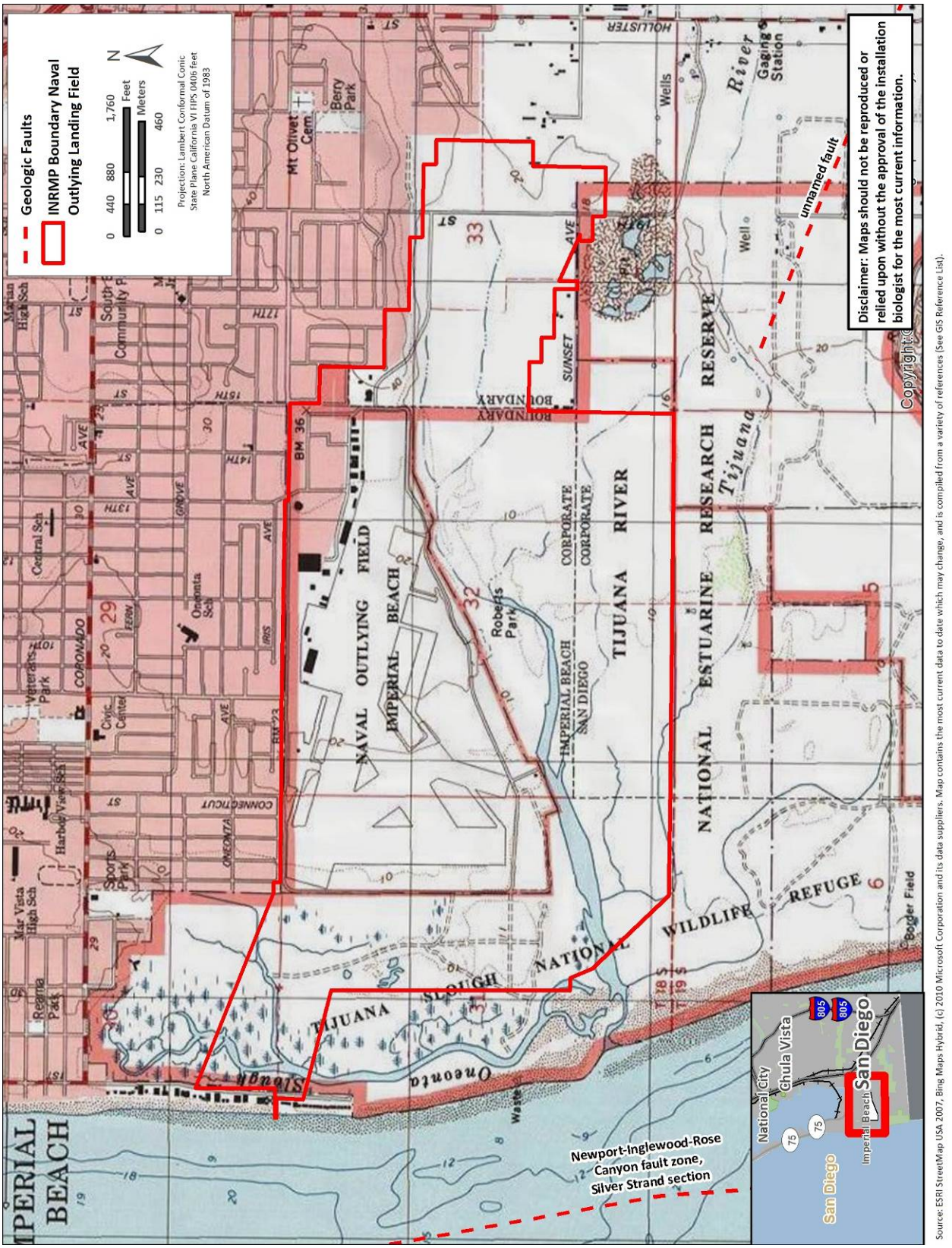
7.2.2 Watershed Management

The NOLF IB property is part of the Tijuana River watershed, a 4,532-square-kilometer (1,750-square-mile) watershed with 73 percent of its area in Mexico, and its terminus in the Tijuana Estuary on the U.S. side of the border, where NOLF is located. The watershed extends from the Laguna Mountains in the northeast to the Sierra Juárez Mountains in the southeast. Due to Mediterranean-semiarid climatic conditions, stream flow is mostly intermittent, with maximum flows occurring from November through April. Two major drainage networks join to form the Tijuana River, and they join near the international boundary and drain into the Pacific Ocean. These are the Cottonwood Creek-Río Alamar system (Río Alamar, lower Cottonwood, upper Cottonwood, Campo, Pine, and Tecate Creeks), and the Río Las Palmas system. The latter is almost completely in Mexico and is comprised of the Río Las Palmas, El Florido, the Río Seco, La Ciénega, Las Calabazas, Las Canoas, and El Beltrán Creeks. Other major water bodies on the U.S. side of the border include Pine Valley, Barrett Lake, and Lake Moreno. On the Mexican side are two major reservoirs: Presa Abelardo L. Rodriguez and Presa El Carrizo (U.S. Navy 2010b). Watershed management is important to natural resources management because it directly affects both surface water and groundwater quality and is critical to maintain valuable aquatic habitats.

Healthy, stable soils are the foundation of a healthy ecosystem. As soils lose their structure and begin to erode, other systems also begin to fail. Vegetation and wildlife decline in numbers and diversity, and the quality of surface water declines as it becomes loaded with eroded sediments. Some soil types take centuries to develop and are not easily replaced or repaired if lost or damaged. Inherent in the clay and sandy nature of NOLF IB's soils is a risk of significant erosion when vegetation is removed or, soil structures are disturbed. The fragile nature of these soils make the protection of NOLF IB's soils vital for maintaining many of the functional systems that make up a healthy ecosystem.

7.2.2.1 Soils

The soil of the NOLF IB airfield area is primarily composed of Huerhuero-Urban land complex soils, while the Tijuana Estuary area is primarily composed of Tidal Flats and Chino silt loams. Soils on NOLF IB are shown in **Figure 7-2**. The NRCS mapped four soil types on NOLF IB (NRCS 2011). These soil types include:



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 7-1: Naval Outlying Landing Field Imperial Beach Topography and Faults in the Vicinity

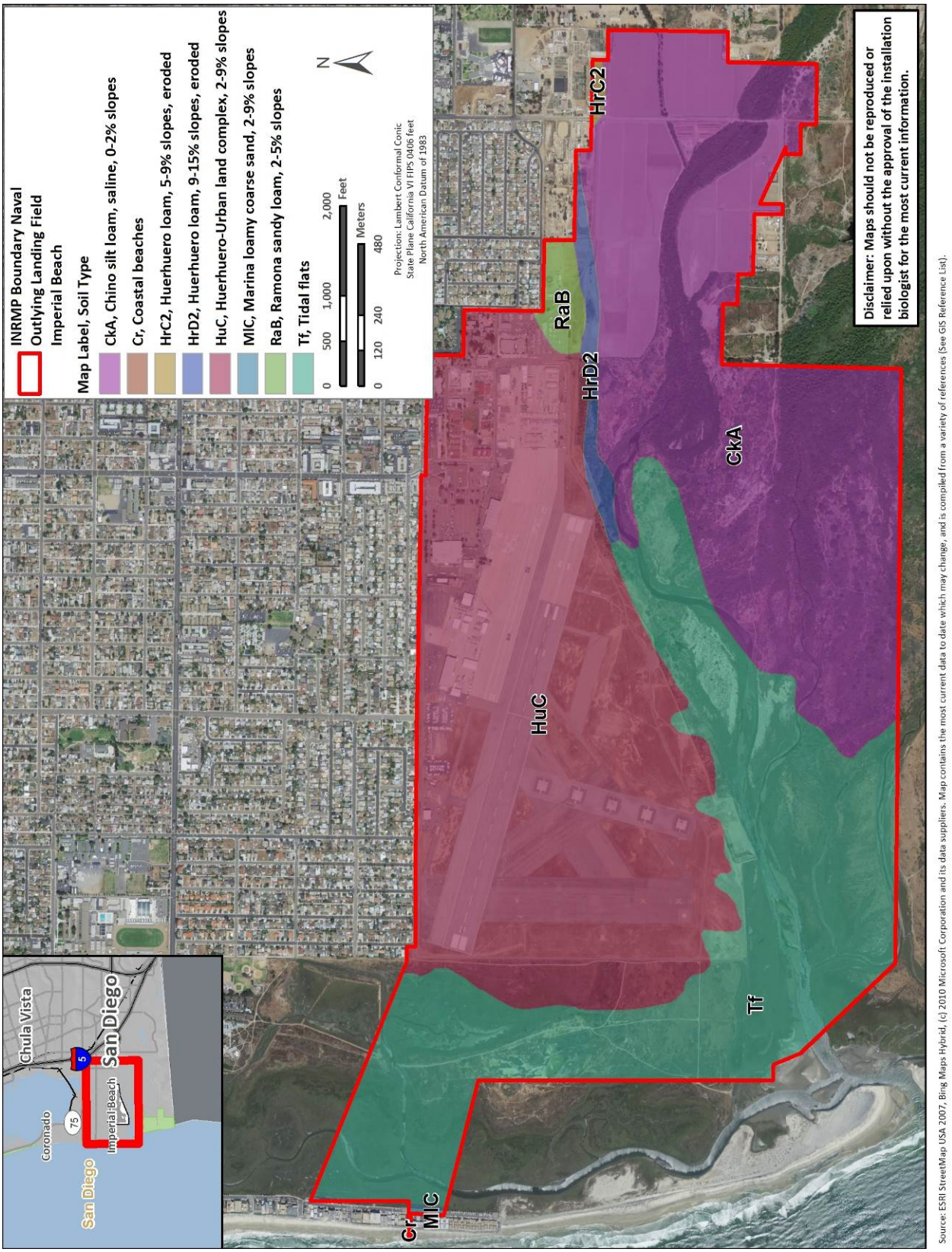


Figure 7-2: Naval Outlying Landing Field Imperial Beach Soils Map

- ***Huerhuero-Urban land complex (HuC).*** Approximately 65 percent of NOLF IB is composed of soils within the Huerhuero-Urban land complex, with 2 to 9 percent slopes. The airfield and developed portions of NOLF IB contain soils in this complex. Huerhuero soils occur on marine terraces. Their parent material is composed of calcareous alluvium derived from sedimentary rock. Huerhuero soils are moderately well drained.
- ***Tidal flats (Tf).*** Approximately 22 percent of NOLF IB is composed of tidal flats. Tidal flats soils occur on 0 to 2 percent slopes. These soils are very poorly drained and experience frequent flooding. Tidal flats occur in the western edge of NOLF IB and along the Tijuana River in the southern portion of NOLF IB.
- ***Chino silt loam (CkA).*** Approximately 12 percent of NOLF IB is composed of Chino silt loams, with 0 to 2 percent slopes. Chino soils are in basins and floodplains at elevations of near sea level to 3,100 feet. They formed in alluvium derived from granitic rocks. These soils are poorly to somewhat poorly drained. Runoff is slow to very slow and permeability is moderately slow. Chino silt loam soils occur in the southeastern corner of NOLF IB near the Tijuana River.
- ***Huerhuero loam (HrD2).*** Approximately 1 percent of NOLF IB is composed of Huerhuero loams with 9 to 15 percent slopes. These soils are characterized as being eroded. Huerhuero soils occur on marine terraces. Their parent material is composed of calcareous alluvium derived from sedimentary rock. Huerhuero soils are moderately well drained. A small strip of these soils occurs in the eastern portion of NOLF IB in between the airfield and the Tijuana River (NRCS 2011).
- ***Ramona sandy loam.*** Approximately 1 percent of NOLF IB is composed of Ramona sandy loam 2 to 5 percent slopes. The Ramona soil series formed in alluvium derived mostly from granitic and related rock sources. They are found on terraces and fans at elevations ranging from 76 to 1,067 meters (250 to 3,500 feet) with slopes ranging from nearly level to moderately steep. Ramona soils are well-drained with slow to rapid runoff and moderately slow permeability.

Specific Concerns

- Invasive species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

OPNAVINST 5090.1C CH-1 requires that installation sources of dust, runoff, silt, and erosion debris be controlled to prevent damage to land, water resources, equipment, and facilities, including adjacent properties. An erosion-and-sediment-control plan must be implemented where appropriate. Maintenance of vegetative cover is consistent with ecosystem management goals expressed earlier. Other materials can be used including bio-engineered bank stabilization techniques, gravel, fabrics, riprap, and recycled concrete and pavement that are environmentally safe and compatible with the site. Where bare ground is necessary, other measures for dust, sedimentation, and erosion control should be implemented (e.g., check dams, wind breaks, diversions). To minimize land maintenance expenditures and help ensure environmental compliance, physically intensive activities should be located on those areas least susceptible to erosion. The erosion potential of a site and adjacent water resources need to be identified and analyzed in preparing development, training, and land use plans.

Management Objective and Strategy

Objective: Minimize soil compaction and restore erosion sites.

Strategies:

1. Tailor land uses to appropriate soil types.
2. Continue to implement plans for eroded site rehabilitation.
3. Identify additional sites for land rehabilitation planning.
4. Survey areas where soil erosion and compaction might occur to ensure that BMPs within the erosion control plan are implemented and are effective.

7.2.2.2 Water and Sediment Quality

Storm drains are the primary means of drainage within the NOLF IB proper, while the Tijuana River Estuary dominates the entire southern portion of the property. On average, the Tijuana River has its peak flow in March. While the Tijuana River routinely experiences many months with no flow, its surges are regulated by three structures: the Morena Reservoir, the Barrett Reservoir, and the Rodriguez Dam on Rio de las Palmas in Mexico (U.S. Navy 2006d).

Per the Unified Watershed Assessment system, NOLF IB is within the Cottonwood-Tijuana Watershed (Hydrologic Unit 18070305). The Tijuana River drains a watershed of 195.0 square hectares (1,735 square miles), 78 percent of which is behind dams. Two-thirds of the watershed lies in Mexico, but the beginning and endpoints of the river are in the United States. The watershed flows into the TRNERR (California Coastal Commission 2006).

The Tijuana River Estuary is classified as a California Critical Coastal Area because it is a 2002 303(d)-listed impaired waterbody that flows into the TRNERR. The Critical Coastal Area Program is a non-regulatory planning tool used to foster collaboration among local stakeholders and government agencies to better coordinate resources and focus efforts on coastal watersheds in critical need of protection from polluted runoff. The estuary receives raw sewage, excessive sedimentation, trash, and bacterial, viral and chemical pollution from the watershed. Rapid and continued development in the watershed threatens the reserve and the abundant plant and animal life (California Coastal Commission 2006).

NOLF IB contains several depressions that are and have the potential to be ephemerally inundated; contain plant indicator species, and contain or have the potential to support fairy shrimp including the federally endangered San Diego fairy shrimp (U.S. Navy 2006d). Vernal pools are ephemeral pools that are filled with water during winter rains and support a highly specialized group of plants and animals. Vernal pools fall under jurisdiction of the Protection of Wetlands Executive Order 11990, which states that each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands. Vernal pools can also be protected under the ESA, if inhabited by a federally listed species (U.S. Navy 2006d).

Three miles of the Pacific Ocean shoreline, in the Tijuana Hydrologic Unit, is listed as impaired on the 2006 Clean Water Act 303(d) list of water quality limited segments requiring Total Maximum Daily Loads (TMDLs) (RWQCB 2007). The shoreline is impaired due to indicator bacteria from the United States/Mexico border, extending north along the shore approximately 3 miles. This stretch of impaired shoreline includes the shoreline west of NOLF IB. Potential sources of pollution are nonpoint and point sources. The proposed TMDL completion date is listed as 2010 (RWQCB 2007).

A 6-mile stretch of the Tijuana River is listed as impaired on the 2006 303(d) list for the following pollutant/stressor categories: eutrophic, indicator bacteria, low dissolved oxygen, pesticides, solids, synthetic organics, trace elements, and trash. Potential sources of pollution are nonpoint and point sources. The proposed TMDL completion date is listed as 2019 (RWQCB 2007).

The Tijuana River Estuary is listed as impaired on the 2006 303(d) list for the following pollutant/stressor categories: eutrophic (0.4 hectare), indicator bacteria (60.1 hectares), lead (0.4 hectare), low dissolved oxygen, nickel (0.4 hectare), pesticides (0.4 hectare), thallium (0.4 hectare), trash (0.4 hectare) and turbidity. In addition, trash and sediment depositions have been an enduring problem for the Tijuana River. Multiple efforts have been undertaken to remove trash and sediment, however these efforts did not address the area as a whole or the source of the problem. Furthermore, the continuing inflow of trash and sediment has not been fully characterized. Potential sources of pollution are nonpoint and point sources. Potential sources of pollution for the low dissolved oxygen in the estuary are: urban runoff/storm sewers, wastewater, unknown nonpoint source, and unknown point source. The proposed TMDL completion date is listed as 2019 (RWQCB 2007).

Specific Concerns

- Fire;
- Erosion and sedimentation;
- Development/anthropogenic disturbances and
- Flooding and trash.

Current Management

Planning and Monitoring: Erosion of soils above Naval Base Coronado (NBC) facilities and roadways is a factor to consider during construction planning. If natural erosion is occurring on a higher elevation terrace, the inputs of sediment can be drastic and pose a threat to facilities or traffic on roads. If the project is planned for an area below undeveloped land, one simple assessment involves making visual scans of the surrounding habitat.

Stabilization techniques: More often than not on NBC, development yields areas that require long-term soil stabilization because of their characteristics. Cut and fill slopes, dirt roads, and drainages are examples of situations found on NBC that need a permanent erosion control strategy. Occasionally, construction projects are in areas where future erosion is not particularly a factor. Examples of this include island zones planned for landscaping in parking areas or as medians, or, relatively level areas in developed zones that are planned for landscaping only. Often, only temporary soil stabilization is required in these areas. Techniques for permanent soil stabilization in areas of high and low erosion potential and temporary erosion control include installing structures that act as a soil blockage to prevent earth movement and soil degradation (e.g., gabion-type retaining walls, soil-nail walls, crib walls, and gunite facings).

Landscape design: Construction projects will almost always include landscaping in the overall plan. Not only is it an essential part of long-term erosion control, but for aesthetics as well. Decisions about plant types (native vs. non-native) used in revegetation/restoration segments of construction projects can be affected by budget issues. There are major advantages to planting native plants in bare areas resulting from construction projects. Sensitive wildlife species have more habitats available for use, irrigation is not required for ongoing maintenance, and landscaped areas merge with undeveloped adjacent native habitat zones. If native vegetation coverage is successfully established, it can provide the best, most cost-effective, long-term erosion control because the plants have evolved to grow in this particular area of

southern California. Revegetation/restoration and landscaping activities follow the Landscaping and Installation Appearance Plan Approved Plant List (see **Appendix H**).

***Water control measures*:** Practically all forms of development require installations that will control the flow of water during storms and work related tasks. There are many different forms of water control installations made up of different materials. Wood, metal, plastic, rock, rubber, concrete, and plant material are all utilized when runoff must be controlled. On NBC, natural drainages/slopes, parking lots, and roads are the primary generators of mass amounts of runoff. In natural resource situations, measures are usually taken to simply slow the rate at which sheetflow is traveling. When construction projects result in cut and fill slopes, water flow will be heavier with lack of vegetation cover, consequently requiring an installation that will direct large amounts of water to adequate drainage systems.

Management Objective and Strategy

Objective: Protect soils by maintaining soils and reducing runoff, erosion, and gully formation.

Strategies:

1. Monitor and rehabilitate degraded soil resources. Soil resources will be monitored, evaluated, and rehabilitated. Survey results will be analyzed to assist with identification of degraded soil or eroded areas.
2. Update and include the Erosion Control Plan as a component plan to this INRMP when it is completed.
3. Develop and disseminate informational materials and a short seminar on the erosion control best management practices (BMPs) and watershed protection issues.
4. Educate personnel who are likely to impact the watersheds on erosion and sedimentation BMPs and watershed protection issues.
5. Develop and use an erosion and sedimentation questionnaire designed to gauge the effectiveness of the informational materials and short seminar.
6. Periodically review erosion control BMPs to ensure that they are still adequate to control adverse erosion and sedimentation on NBC. Conduct surveys to determine whether activities on NBC are adversely impacting soil and water resources on NBC as a result of erosion and sedimentation.

Surface Water

Objective: Protect waterways from adverse effects of storm water runoff from development sites to the maximum extent feasible.

Strategies:

1. Conduct surveys of all streams within the installation to identify erosion, sediment accumulations, or other threats to stream stability.
2. Develop actions specific to each unstable stream reach that can be undertaken to assist with stream recovery. Support stream stability by managing activities that affect riparian buffers and water entering streams.
3. As funding allows, undertake natural channel design principles to restore stream reaches with highly unstable conditions.

4. Periodically evaluate streams to ensure that streams are not adversely impacted by installation activities.

7.2.3 Habitat Management

Habitat management is a broad term that encompasses a whole range of management issues that affect fish and wildlife, threatened and endangered species, and ecosystem goals.

7.2.3.1 Terrestrial Habitats, Vegetation Communities, and Land Cover

In 2009 and 2010 the U.S. Navy conducted vegetation mapping activities and **Table 7-1** shows the habitat and land cover types and acreages occurring on NOLF IB (U.S. Navy 2011g). The acreages of habitat and land cover types presented in **Table 7-1** are representative of the estimated acreages based on the revised boundary (see **Figure 7-3**). The National Vegetation Classification System (NVCS) format for vegetation mapping in California was first described in the Manual of California Vegetation (MCV) (Sawyer and Keeler-Wolf 1995), and since updated (Sawyer et al. 2009). The vegetation mapping protocols laid out in the MCV were used to identify visible boundaries between vegetation types, and are represented as visible changes in texture patterns and colors. In addition, the California Native Plant Society (CNPS) Vegetation Rapid Assessment Protocol method was used to document representative vegetation types at NOLF IB. At least two assessments were made per alliance/semi-natural stand/mapping unit, where possible (in some cases there is only one polygon for a given type, in others there was no second polygon available that could be accessed on foot, i.e., the other polygon(s) were mapped based on aerial photo interpretation only). More than two assessments were made on some vegetation types to capture some of the variability in sub-dominants within some of the alliances found at NOLF IB (U.S. Navy 2011g). The vegetation communities are based on the 2009 A Manual of California Vegetation, but it undetermined if the data collection and analyses meets the current standards of the National Vegetation Classification System as required by the Federal Geographic Data Committee; therefore, they may not match the NatureServe vegetation types.

The vegetation of NOLF IB encompasses a wide range of communities, including grasslands, coastal scrub, riparian scrub, riparian woodland, and marshes. A total of 25 distinct vegetation alliances and mapping units were identified at NOLF IB (see **Figure 7-3** and **Table 7-1**), plus 12 additional land cover types. Riparian vegetation represents the largest proportion of NOLF IB's vegetation, covering 19.3 percent of the area, primarily in the form of arroyo willow (*Salix lasiolepis*) woodlands. Marshes, both salt and freshwater, represent 15 percent, grasslands cover approximately 21 percent, and upland scrub 5 percent. Roads and developed areas represent 24 percent of the survey area, while 9 percent is agricultural fields. Individual alliances and mapping units are described as follows (U.S. Navy 2011g).

Beaches and Dunes

Sandy Beach. There is a very narrow spit of sandy beach within NOLF IB located at the western end of the project footprint's boundary.

Coastal Dunes. The coastal dunes within the survey area (now located outside of the official NOLF IB boundary) cover approximately 0.8 hectares (2.0 acres). The vegetation is dominated by dune primrose (*Cammissonia cheiranthifolia*) on the dunes themselves and salt grass (*Distichlis spicata*) in the surrounding areas. Additional species present include goldenbush (*Isocoma menziesii*), sea rocket (*Cakile maritima*, *C. edentula*) and various non-native grasses. The area also boasts a large, dense patch of salt marsh bird's-beak (*Cordylanthus maritimus* ssp. *maritimus*), which is listed as endangered by the USFWS and CDFW.

Table 7-1: Vegetation and Land Cover Types on Naval Outlying Landing Field Imperial Beach

Habitat/Land Cover Type	Acres on NOLF IB*
Agriculture	111.7
California sagebrush alliance	3.7
Sagebrush alliance	0.5
Mulefat Alliance	57.6
Ripgut brome alliance	22.6
Crowndaisey mapping unit	66.6
Coastal dunes	2.0
Inland dunes	2.6
Bermuda grass alliance	8.3
Developed	294.3
Salt grass alliance	0.9
California buckwheat alliance	29.9
California buckwheat alliance disturbed	1.4
Fennel mapping unit	4.0
Alkali heath alliance	19.7
Golden bush alliance	3.1
Southwestern spiny rush mapping unit	4.8
Landscaped (Native)	0.2
Rye grass alliance	5.2
California boxthorn alliance	7.2
Mowed grasslands	140.5
Coastal cholla mapping unit	1.8
Arrow weed alliance	8.1
Pond	2.2
Road	3.4
Parish's glassword alliance	14.9
Pickleweed alliance	69.5
Mud flats with sparse glasswort	2.7
Sandbar willow alliance	13.4
Black willow alliance	8.5
Arroyo willow alliance	151.7
Sandy beach	1.4
California bulrush mapping unit	3.0
California cordgrass alliance	31.2
Salt Cedar alliance	8.7
Trail	5.1
Water	41.1
Pistol range	2.0
Restoration area	2.5
Tidal flat	12.6
Total	**1,170.6**

Source: U.S. Navy 2011g

Notes: *The acreages of habitat and land cover types presented in **Table 7-1** are representative of the estimated acreages based on the revised boundary (see **Figure 7-3**).

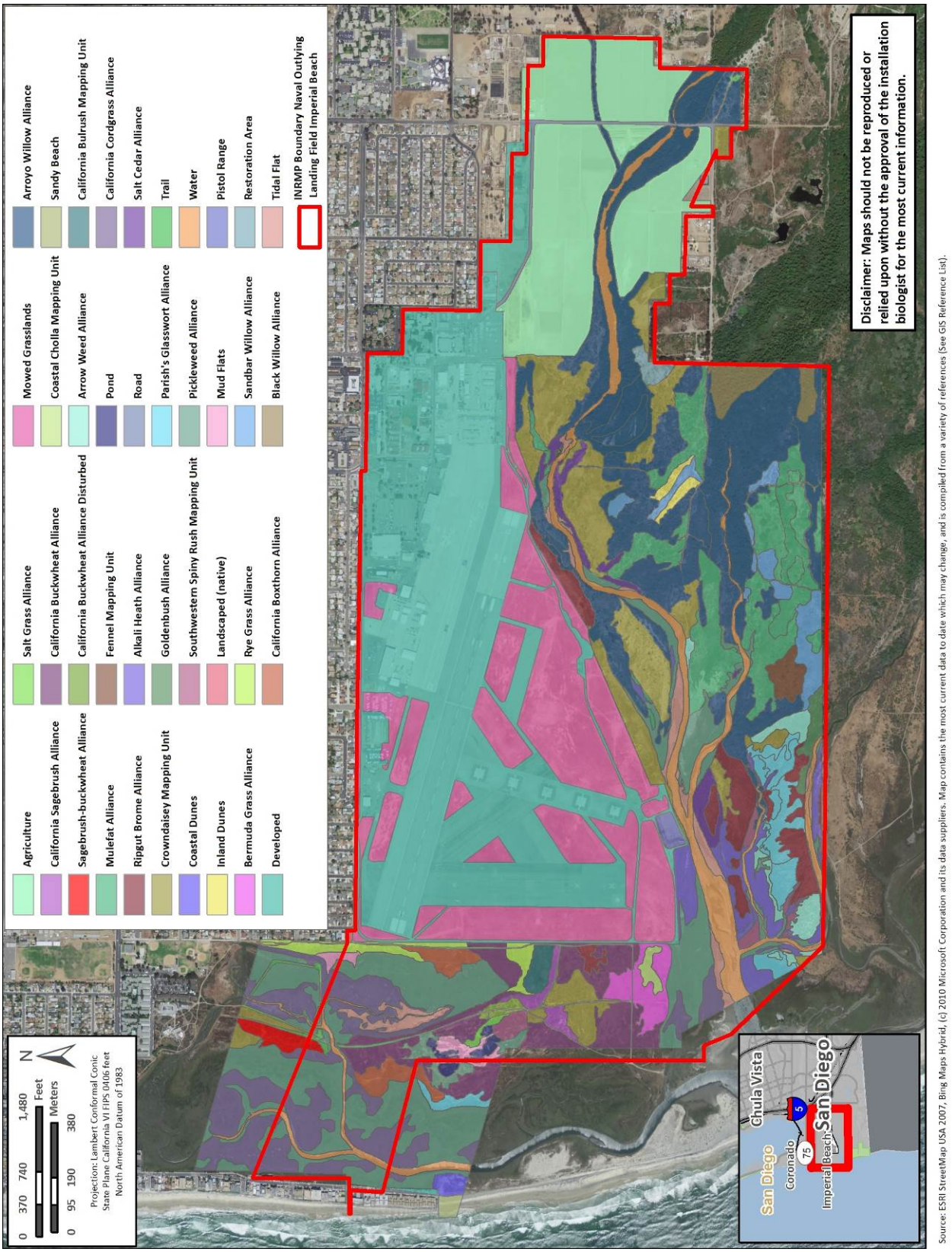


Figure 7-3: Naval Outlying Landing Field Imperial Beach Vegetation Communities and Land Cover

Inland Dunes. Located within an opening among riparian woodlands and scrubs, south of the Tijuana River, is a 2.6 acre area of open sandy flats and low dunes, an area that occurs in polygons separated from one another by a shallow channel dominated by sandbar willow (*Salix exigua*) and mulefat (*Baccharis salicifolia*). Although the area is very small, it is a distinctive habitat, such as to warrant being called out separately. Very sparsely vegetated (<15 percent total cover), the most abundant species are California croton (*Croton californicus*), and lesser amounts of milkvetch (*Astragalus trichopodus*), western ragweed (*Ambrosia psilostachya*), dune primrose, and tarragon (*Artemisia dracunculus*). Nuttall's lotus (*Acmispon prostratus*), a target species in the rare plant surveys conducted concurrently with the vegetation mapping, is a dune species; therefore, this area was searched, but Nuttall's lotus was not found.

Marshes

California Cordgrass Alliance. Stands of California cordgrass (*Spartina foliosa*) cover approximately 12.6 hectares (31.2 acres) of NOLF IB, usually with an extensive layer of Parish's glasswort (*Salicornia subterminalis*) mingled within the cordgrass. Inhabiting the lowest vegetated zones of the salt marsh, cordgrass grows in tidally inundated areas.

Pickleweed Alliance. Approximately 28.1 hectares (69.5 acres) of NOLF IB is comprised of pickleweed (*Salicornia virginica*) salt marsh. Cordgrass is also prominent in these areas although at a lower overall density than areas mapped as the Cordgrass Alliance. Other commonly occurring species include spreading alkali-weed (*Cressa truxillensis*), alkali heath (*Frankenia salina*), arrow grass (*Triglochin maritima*), and salty Susan (*Jaumea carnosa*). At the upper edges of the pickleweed, just below the transition to more upland types, there are many scattered patches of endangered salt marsh bird's-beak.

Alkali Heath Alliance. Transitioning into upland grasslands and scrubs approximately 7.9 hectares (19.7 acres) of NOLF IB are dominated by alkali heath at the upper levels of the salt marsh habitats, above the pickleweed. Pickleweed remains common in these areas, along with a variety of grasses. Several occurrences of southwestern spiny rush, a CNPS 4 sensitive species, can be found among the alkali heath (in addition to those areas mapped as a separate alliance-see below).

Southwestern Spiny Rush Mapping Unit. Approximately 1.9 hectares (4.8 acres) of NOLF IB are dominated by southwestern spiny rush marsh. Fairly small (the 1.9 hectares (4.8 acres) are divided among eight different polygons), these areas were called out as a distinct Mapping Unit because spiny rush is a CNPS 4 sensitive species. The understory was comprised either of pickleweed and/or Parish's Glasswort or alkali heath.

California Bulrush Mapping Unit. Covering 1.2 hectares (3.0 acres), this freshwater marsh dominated by California bulrush (*Scirpus californicus*) is located adjacent to the western end of the airfield.

Grasslands and Other Upland Herbaceous Types

Parish's Glassword Alliance. Approximately 6 hectares (14.9 acres) of NOLF IB, classified as Parish's Glasswort alliance, are characterized with at least 10 percent absolute cover of glasswort present over non-native annual grasses, which are primarily brome species, especially ripgut brome (*Bromus diandrus*) and red brome (*B. madritensis*). Ryegrass (*Lolium perenne*) occurs in small patches or mixed within the bromes. Alkali heath is prominent in this alliance. This alliance was placed among the upland grassland section because they do not appear to be tidally inundated or otherwise function as marshes.

Ripgut Brome Alliance. Ripgut brome alliance, a non-native grassland alliance, covers approximately 9.14 hectares (22.6 acres) of NOLF IB. Other brome species are also prominent in this type, as are ryegrass and various forbe species, mostly non-native.

Ryegrass Alliance. Approximately 2.1 hectares (5.2 acres) of NOLF IB are mapped as the ryegrass alliance. Brome species are quite prominent in this acreage, as are slender wild oats (*Avena barbata*), bermuda grass (*Cynodon dactylon*), and an assortment of native and non-native forb species at very low density. A few scattered shrubs, such as buckwheat and boxthorn (*Lycium californica*), may occur.

Bermuda Grass Mapping Unit. Bermuda grass alliance occurs on about 3.3 hectares (8.3 acres) of NOLF IB, and while Bermuda grass has the highest percent cover among the grasses, it may not be readily visible at certain times of the year; it tends to be a rather low-growing plant, which spreads out beneath taller bromes, rye grass, and wild oats, which are also quite prominent in these areas.

Salt Grass Alliance. Salt grass alliance occurs in just one polygon covering 0.36 (0.9 acres) of NOLF IB.

Mowed Grasslands

An additional 57.1 (141.3) acres of annual grasslands occur within the airfield itself. These grasslands are mowed to a height of a few inches to manage bird/animal airstrike hazard (BASH) risks to aircraft. They are comprised primarily of brome species with some low forbs such as goldfields (*Lasthenia californica*).

Herbaceous Stand that Includes Crowndaisy and Fennel Mapping Units. Approximately 28.5 hectares (70.6 acres) of NOLF IB are dominated by crown daisy (*Chrysanthemum coronarium*), a California Invasive Plant Council (Cal-IPC) weed species, at times as nearly monospecific stands. In addition to crowndaisy, many other weedy species are present, often at very high cover values bordering on codominant or possibly dominant status. Some of the most prominent weed species are black mustard (*Brassica nigra*), shortpod mustard (*Hirschfeldia incana*), pepperweed (*Lepidium campestre*), wild radish (*Raphanus sativa*), and Russian thistle (*Salsola tragus*). Rather than attempt to identify all weed species present at each locale, the choice was made to label them in this fashion since the crown daisies are the more ubiquitous species.

Crown Daisy and Fennel Mapping Units. Although fennel (*Foeniculum vulgare*) was found throughout the upland areas of NOLF IB, there is one polygon of 1.6 hectares (4.0 acres) where fennel occurs at such densities that it is the sole dominant species present. Also prominent in the polygon are patches of giant reed (*Arundo donax*), coyote brush (*Baccharis pilularis*), and a few emergent arroyo willows. While this is not a described VegCAMP alliance, the area is unique enough to the vegetation at NOLF IB to warrant a separate call-out. Absent the fennel, the area would likely be mapped as the coyote brush alliance, since this is the next most prominent species present.

Upland Scrubs

California Buckwheat Alliance. The California buckwheat alliance covers approximately 12.7 hectares (31.3 acres) of NOLF IB. Total shrub cover varies greatly (between 35-85 percent), and although buckwheat is the dominant shrub species present, other species occur at varying densities, including California sagebrush, boxthorn, coyote brush, goldenbush, and laurel sumac (*Malosma laurina*). Also abundant in many of these areas is coastal cholla (*Cylindropuntia prolifera*).

California Sagebrush Alliance. Approximately 1.5 hectares (3.7 acres) of NOLF IB were mapped with California sagebrush as the sole dominant species at about 25 percent cover. Other shrub species present included goldenbush and buckwheat. Non-native forbs and grasses covered approximately 35 percent of the polygon, comprised of crowndaisy (15%), fennel (5%), and brome species (20%).

Goldenbush Alliance. In the extreme southern portion of the property is an area consisting of 1.3 hectares (3.1 acres), where goldenbush occurs as the sole dominant overstory species with an understory of non-native annual forbs grasses.

Sagebrush-Buckwheat Alliance. In some areas buckwheat and sagebrush are co-dominant (present at nearly equal cover), mapped as the California sagebrush-California buckwheat alliance rather than either of two separate alliances described above. About 0.2 hectares (0.5 acres), in a single polygon, were mapped as this type.

California Boxthorn Alliance. Boxthorn is the dominant shrub species on approximately 2.9 hectares (7.2 acres) at NOLF IB, with total shrub cover ranging 30 percent to 75 percent. Also present at low densities are buckwheat, sagebrush, and coastal cholla.

Arrowweed Alliance. The arrowweed alliance covers approximately 3.3 hectares (8.1 acres) of NOLF IB. This acreage is dominated by arrowweed (*Pluchea sericea*) with low densities of scrub species such as buckwheat, sagebrush, and goldenbush.

Coastal cholla Mapping Unit. West of the southern corner of the airfield is an area consisting of 0.7 hectares (1.8 acres), where coastal cholla occurs as the sole dominant overstory species with an understory of non-native annual grasses. Although this is not a published alliance, the area is very unique and cannot easily fit into any described alliance.

Riparian Scrubs and Woodlands

Mulefat Alliance. This riparian alliance, dominated by mulefat, includes approximately 23.3 hectares (57.6 acres) of NOLF IB. Willows, including arroyo willow or sandbar willow (or both), may be present at very low frequencies. Scattered salt cedar (*Tamarix ramosissima*) also occurs in many of the mulefat alliance areas, as well as patches of giant reed, and upland weed species such as hottentot fig (*Carpobrotus* sp.) and crown daisy.

Sandbar Willow Alliance. The Sandbar willow alliance comprises approximately 5.4 hectares (13.4 acres) at NOLF IB. Sandbar willow is generally located below other willow species along the elevational gradient from riparian to upland, and indeed, some of the polygons where sandbar willow was mapped as the dominant species followed that pattern. However, there are several patches where the wandbar willow was located on the opposite side of the mature arroyo willow riparian forest. The sort of hydrologic, soil, or past site history factors that could offer an explanation of the sandbar willow present in those patches is unknown.

Black Willow Alliance. On the southeast corner of the survey area are patches of willow woodland where black willows (*Salix goodingii*) are present at much greater densities than occur in the arroyo willow alliance. These areas were mapped as black willow alliance, although arroyo willows still represent a fairly high cover as well and cover about 3.4 hectares (8.5 acres). The SKW membership rules for the black willow alliance state that when mixed with other willows, black willows must represent at least 30 percent of the willow canopy (i.e., arroyo willows can actually represent more of the overall willow cover than do black willows, but black willows are considered more diagnostic of a particular type of willow woodland; therefore, they are given precedence when naming the alliance for a given polygon) (Sawyer *et al.* 2009).

Arroyo Willow Alliance. The arroyo willow alliance covers approximately 61.4 hectares (151.7 acres) of the project survey site. In this alliance arroyo willow is the sole dominant species of willow. Others species, such as black willows and shining willows (*Salix lucida*) may be present as occasional trees

among the arroyos, and cottonwoods (*Populus fremontii*) may also occur. The understory is generally sparse and comprised primarily of mulefat, tarragon, and Douglas wormwood (*Artemisia douglasiana*).

Salt Cedar* (Tamarix ramosissima) *Semi-Natural Shrubland Stand. While scattered individuals and small groves of salt cedar occur throughout the southern portion of NOLF IB, in some places salt cedars grow in dense, nearly monospecific stands. These thickets cover approximately 3.5 hectares (8.7 acres) of NOLF IB, including 1.2 hectares (3.2 acres) due south of the west end of the airfield, where there is a patch of salt cedar with a nearly equal mix of arroyo willows. This patch is considered as belonging to the salt cedar thickets vegetation type (since the level of dominance by salt cedar prevents the stand from classification as the arroyo willow alliance).

Specific Concerns

- Invasive species encroaching on native species habitat and federally protected species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Overuse, or improper use, of fertilizers.

Current Management

Management of native habitats at NOLF IB includes their enhancement by the removal of invasive exotic plant species and planting of native species, as well as habitat restoration of sorely disturbed areas. Removing invasive exotic plants, planting native species, and restoring habitat activities are conducted through coordination with the Naval Facilities Engineering Command, Southwest (NAVFAC SW) biologist.

Management Objective and Strategy

Objective: Develop and implement a program for natural land and habitat restoration and rehabilitation.

Strategies:

1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue invasive and noxious weed identification and control as necessary.
3. Complete evaluation and prioritization of active erosion sites.
4. Update vegetation mapping.
5. Ensure that natural resources staff responsible for plant community conservation update training regarding management of these resources on a military installation on an annual basis.
6. Develop specifications and standards for reseeding/revegetation of disturbed sites for use in contracts, maintenance, and other projects.
7. Periodically review management to ensure it still meets ecosystem management goals.

7.2.3.2 Wetlands and Floodplains

Wetlands and Other Waters of the United States

Wetlands, as defined by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE), are "areas that are inundated or saturated by surface or groundwater 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" (USACE 1987). In September 2008 the USACE published the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (*Version 2.0*). The Regional Supplement was part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. The definition of a wetland was not changed (USACE 2008).

The northern branch of the Tijuana River crosses through the southern half of NOLF IB, flowing east to west and emptying into the Pacific Ocean. A portion of the Tijuana River Estuary, within the TRNERR occurs within the southern portion of NOLF IB. The Oneonta Slough, composed of tidal salt marsh wetlands adjacent to the Pacific Ocean, occurs in the western portion of NOLF IB. According to the topographic map for the area, these wetlands appear to be tidally influenced and receive water from the Tijuana River. In 2009 and 2010 a jurisdictional delineation was completed in order to identify and delineate the waters of the United States and associated jurisdictional wetlands at NOLF IB. The study area included 511 hectares (1,263 acres). Of this, 169 hectares (420 acres) of coastal terrace lands are developed as the helicopter air strip Ream Field within a fenced compound. Outside the airfield compound, part of the Navy land is located in the Tijuana River Valley floodplain, the western extremity of the Tijuana River where it meets the Pacific Ocean. Tidal flats associated with the interface between the ocean and river floodplain form the bulk of the remaining lands, including portions of the northern arm of the Tijuana Estuary (Oneonta Slough) to the west. Approximately 223 hectares (551 acres) of Navy tidal flats are managed as the Tijuana Slough National Wildlife Refuge (TSNWR) under a Memorandum of Understanding (MOU) between the U.S. Navy and U.S Fish and Wildlife Service (USFWS). Finally, about 98 hectares (243 acres) of over-flight easement are jointly managed by the California Department of Parks and Recreation (CDPR), National Marine Fisheries Service (NMFS), and the USFWS as part of the 1,024-hectare (2,531-acre) TRNERR and TSNWR. To the west is also a strip of residential housing. The northern border of the marsh and U.S. Navy property is also bounded by residences, and agricultural fields predominate to the east. A total of 205.7 hectares (508.2 acres) of USACE jurisdictional wetlands and other waters of the United States were found on NOLF IB during the 2009-2010 wetland inventory (see **Table 7-2** and **Figure 7-4**).

Table 7-2: Jurisdictional Wetlands and Non-jurisdictional Wetlands on Naval Outlying Landing Field Imperial Beach

NWI Wetland Class	Acres
Jurisdictional Wetlands	461.1
Other Waters of the U.S. (mudflats, tidal channels)	47.1
Wetland/non-wetland Complex	34.3
Total	**542.5**

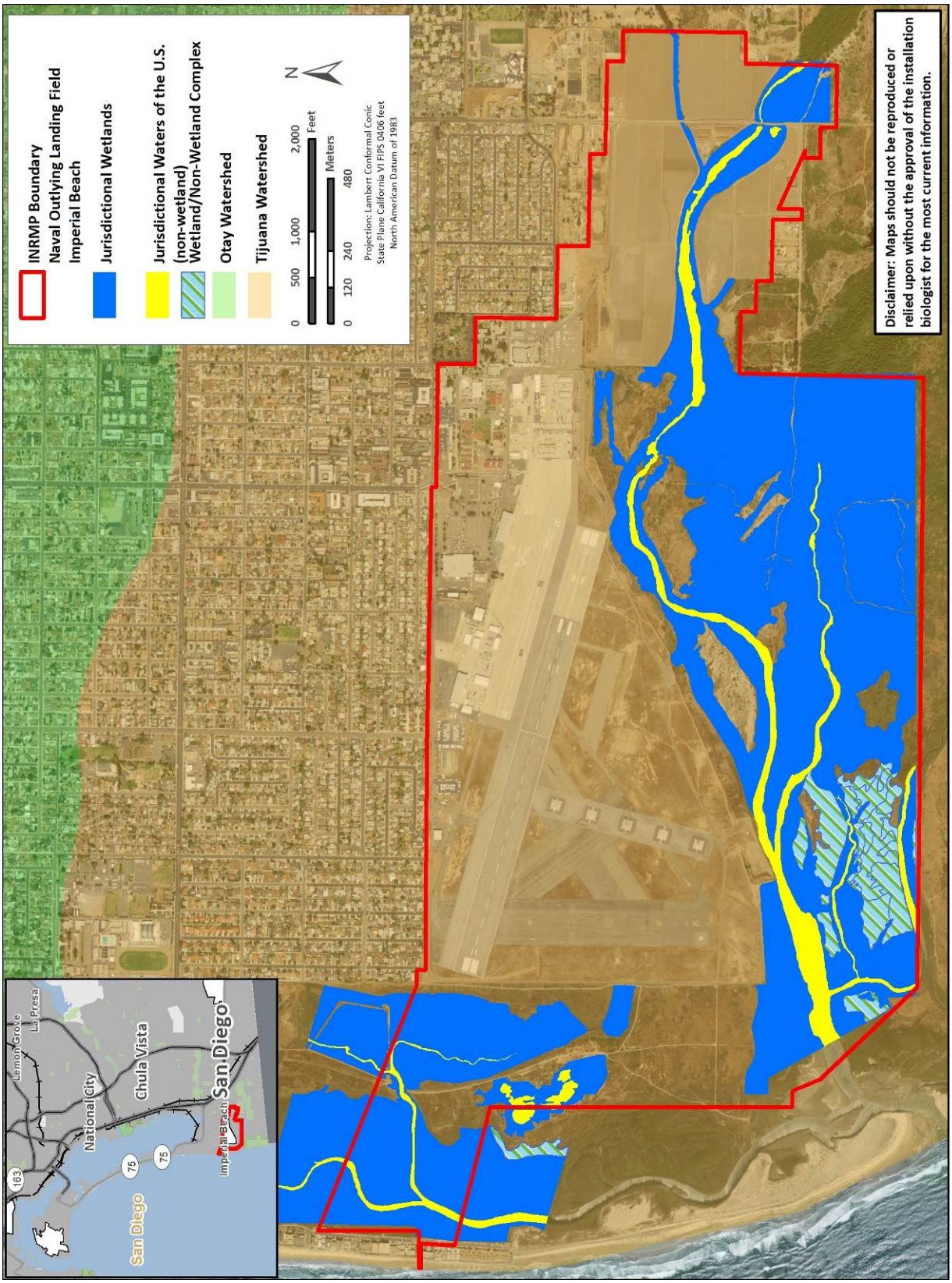


Figure 7-4: Naval Outlying Landing Field Imperial Beach Watersheds and Wetlands

Vernal pool hydrology information was also recorded, a total of 0.2 hectares (0.45 acres) of vernal pools were recorded. Many non-wetland inclusions occur throughout the higher-elevation portions of the study area. Where these were large enough to be separately mapped, these totaled 14,914 square feet (1,358.6 square meters). Non-jurisdictional ditches excavated in uplands totaled 7,171 feet (2,186 meters) in length. Section 10 and Other Waters of the United States total 19 hectares (47.1 acres). These include intertidal mudflats, tidal channels, small ponds associate with a historic quarry, and other open water areas. All Section 10 areas are coincident with Section 404 jurisdictional areas.

Floodplains

Portions of the estimated floodplain of the Tijuana River occur on NOLF IB property and periodic flooding has affected the agricultural fields there. A flood in January/February of 1980 resulted in $15 million of damage in the Tijuana River Valley. Historically notable flooding has occurred in 1993, 2008, and 2009 that required people and their animals to be rescued. Agricultural fields that once existed in the area have been erased by these flood events, and are now filled in with riparian scrubs and woodlands. Wild animals living in these areas must be capable of escaping these periodic floods (U.S. Navy 2011g).

Wetland management strategies vary depending primarily on the wetland type, size, location and condition. A wetland's value is decided by the quality of the functions and values it provides, including its biomass production, habitat, erosion control, stormwater storage, water quality protection, aquifer recharge potential, and low flow augmentation. Some of the factors used to measure the quality of these functions are the wetland's size, its location in the watershed, the amount of development in the watershed, vegetative structure and composition, rate of water flow through the wetland, the size of natural buffers, and surrounding land uses. Regardless of the habitat value, wetland areas are almost always poor choices for building sites or for most activities, other than providing non-consumptive enjoyment of the outdoors. Installation natural resources staff will ensure during the program/project review process that program/project managers are aware of the laws and regulations regarding the protection of wetlands. Refer to **Section 2.4.2** for additional information on regulatory compliance related to the CWA.

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species encroaching into wetland habitat;
- Climate change (e.g., changes in temperature or sea level rise);
- Erosion and sedimentation from either anthropogenic or natural causes;
- Pollution and
- Wetlands attracting wildlife leading to elevated BASH risks on NOLF IB.

Current Management

Future delineations will be conducted on a project-by-project basis.

The major goal in wetland and floodplain management is to minimize the impact that activities at NOLF IB has on wetlands and floodplains. The natural resources staff strives to enhance healthy, functional wetlands. When possible, it is the goal to avoid impacts, direct and indirect; enhancing waters of the United States to increase functions and services provided by waters of the United States including wetlands. It is also the goal to maximize floral diversity of wetland communities, which, in turn, maximizes the faunal diversity of the ecosystem. Through achieving these goals, and through mitigating for unavoidable impacts to wetlands, NOLF IB can manage for no net loss of wetland and floodplain acreage, functions, and services. Wetland management needs to be closely coordinated with the NBC

BASH biologists to ensure that wetland management does not lead to increased BASH risks (e.g., open water can attract wildlife).

The USFWS and NBC have an MOU relating to the protection of natural resources within the Tijuana Marsh on NOLF IB. Under this agreement, the 245.4 hectares (606.42 acres) of the Tijuana Marsh occurring on NOLF IB will be managed as part of the TSNWR. Specifically, the USFWS agrees to prepare an inventory and management plan for fish and wildlife resources on Navy lands within the Tijuana Marsh and administer relative biological programs; to be responsible for the preservation and recovery of threatened and endangered species, and to enforce Federal and state laws on NOLF IB consistent with the operation of a TSNWR. Under the MOU, Naval Base Coronado agrees to permit USFWS to conduct management and research activities within the Tijuana Marsh, assist in preservation and management, and permit the USFWS to enforce all rules, regulations, and laws within its power which will assist in the operation of the Tijuana Marsh as part of the National Wildlife Refuge System (U.S. Navy and USFWS 1992). According to Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1C CH-1, the U.S. Navy will comply with the national goal of no net loss of wetlands, and will avoid loss of size, function and value of wetlands.

Management Objective and Strategy

Objective: Maintain healthy, functional waters of the United States on NOLF IB, including wetlands and non-wetland waters of the United States, and prevent indirect or unplanned encroachments.

Strategies:

1. Update the wetland delineation and inventory, including wetland distribution and categories, as needed.
2. Conduct Environmental Review for activities that could affect directly and indirectly, waters of the United States, including wetlands.
3. Plan development and training activities to avoid wetland impacts to the maximum extent possible and minimize unavoidable impacts on waters of the United States, including wetlands.
4. Maintain water quality to protect surface waters and wetlands from excessive sediment-laden runoff. Prevent erosion, scour to maintain water quality.
5. Remain in compliance with the CWA, RHA, etc., and implement procedures to manage for a no net loss of wetland and floodplain acreage, functions, and services.
6. Reduce habitat fragmentation and control the spread of invasive species.
7. Periodically review the natural resources management program to ensure that management actions do not adversely impact directly and indirectly, waters of the United States, including wetlands.
8. Implement erosion control BMPs to ensure adverse environmental impacts to waters of the United States, including wetlands do not occur.
9. Watershed analysis of potential restoration areas focusing on increasing floodwater retention while improving water quality.
10. Improve road crossings within the active channel and adjacent wetlands.
11. Continued participation by the Tijuana River Valley Recovery Team.
12. Continue habitat restoration (invasive species removal and revegetation).

7.2.3.3 Marine Habitats

Not applicable to NOLF IB.

7.2.3.4 Wildland Fire

A portion of NOLF IB lands are managed as part of the TSNWR. The wildland fire management policies provided for the TSNWR are described in the 2004 *San Diego National Wildlife Refuge Complex, Fire Management Plan* which is primarily focused on suppression efforts and lays out how they allocate resources (USFWS 2004).

7.2.4 Fish and Wildlife Management

For the purposes of this INRMP, wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. The primary goal of wildlife management at NOLF IB is to maintain wildlife populations at levels compatible with land use objectives while promoting the existence, importance, and benefits of nongame species. There are wetlands that are often used by birds, creating a bird/wildlife strike hazard (BASH) issue.

The basis of managing a rich assemblage of nongame wildlife is to provide a mosaic of habitats that are structurally and biologically diverse. In managing for a diversity of habitats and diversity within those habitats, the potential exists for numerous species to be found. NOLF IB should employ these basic techniques for managing wildlife.

- ***Monitoring Wildlife.*** Creating, monitoring, and updating GIS data on wildlife species will allow NOLF to store, retrieve, present, and analyze the data to make informed management decisions.
- ***Managing for Migratory Birds.*** The Migratory Bird Treaty Act (MBTA) provides for a year-round closed season for nongame birds and prohibits the taking of migratory birds, nests, and eggs, except as permitted by the USFWS. Impacts on birds protected under the MBTA will be avoided through surveying for nesting birds in areas proposed for disturbance and, if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends that conducting activities outside of nesting areas or outside of the general migratory bird-nesting season can help avoid direct impacts.
- ***Protecting Sensitive Areas.*** NOLF IB should maintain biological diversity by protecting, to the extent practical, sensitive areas that provide unique habitat niches. Protection measures might include restricting vehicle movement, and protecting habitats of exceptional biological value by establishing protective buffers and maintaining healthy and diverse ecosystems.

7.2.4.1 Invertebrates

For a complete listing of invertebrate species observed on NOLF IB, see **Appendix F**.

Terrestrial Invertebrates

During the 2002-2004 invertebrate study, 143 individual terrestrial arthropods were captured from 35 families (see **Appendix F**) at different locations in riparian and coastal sage scrub habitats. A total of 14 different orders were observed throughout the entire survey area: Araneae, Blattodea, Coleoptera, Diplopoda, Diptera, Hemiptera, Homoptera, Hymenoptera, Lepidoptera, Mantodea, Neuroptera, Odonata, Orthoptera, and Thysanura. Riparian and coastal sage scrub and upland coastal sage scrub habitats showed wider arthropod diversity. Among all four locations, beetles (Coleoptera), plant juice-feeders

(Homoptera), bees and wasps (Hymenoptera), and butterflies and moths (Lepidoptera) were most commonly collected (U.S. Navy 2006d). During surveys conducted in 2009, a total of 173 insect (and other terrestrial invertebrates) taxa that represented 19 invertebrate orders and 103 families (see **Appendix F** for a complete list) were documented. The greatest number of families was found in the Diptera (flies) with 24 families and 30 taxa, followed by the Hyemenoptera (ants, bees, and wasps) with 22 families and 36 taxa, and the Coleoptera (beetles) with 13 Families and 25 taxa. The Hemiptera (true bugs), Homoptera (aphids and plant hoppers), and Lepidoptera (moths and butterflies) were each represented by eight families, with 16, 30, and 19 taxa, respectively (U.S. Navy 2011g).

Aquatic Invertebrates

Surveys for aquatic invertebrates were conducted in 2009 on NOLF IB. In total 13 taxa of aquatic invertebrates, including three arthropoda (*Callianassa californiensis, Pachygrapsus crassipes, Portunus xantusii xantusii*) and eight mullusca (*Musculista senhousia Mytilus edulis, Crassostrea virginica, Tagelus californianus, Macoma nasuta, Protothaca* spp., *Cerithidea californica,* and *Nassarius tegula*) (U.S. Navy 2011g). No special status marine invertebrates are known to occur on NOLF IB.

Specific Concerns

- Pollution and oil spills;
- Improper use of pesticides;
- Increase and spread of invasive species and
- Habitat modification.

Current Management

Opportunities for the management of fish and wildlife species on NOLF IB are primarily accomplished by managing habitats. The USFWS and Naval Base Coronado have an MOU relating to the protection of natural resources within the Tijuana Marsh on NOLF IB. Under this agreement, the 245.4 hectares (606.42 acres) of the Tijuana Marsh occurring on NOLF IB will be managed as part of the TSNWR. Specifically, the USFWS agrees to prepare an inventory and management plan for fish and wildlife resources on Navy lands within the Tijuana Marsh and administer relative biological programs; to be responsible for the preservation and recovery of threatened and endangered species, and to enforce Federal and state laws on NOLF IB consistent with the operation of the TSNWR. Under the MOU, Naval Base Coronado agrees to permit USFWS to conduct management and research activities within the Tijuana Marsh, assist in preservation and management, and permit the USFWS to enforce all rules, regulations, and laws within its power which will assist in the operation of the Tijuana Marsh as part of the National Wildlife Refuge System (U.S. Navy and USFWS 1992). NOLF IB natural resources personnel coordinate with CDFW and USFWS to identify, prioritize and implement habitat enhancement projects targeted for particular species or groups of species (i.e., migratory birds). Projects to manage wildlife habitat include invasive plant control, enhancing and protecting wetlands, and conducting surveys (e.g., migratory nesting bird survey).

Habitat loss has a direct correlation to a decline or loss of fish and wildlife populations. Installation INRMPs are meant to be used as tools in operational, training, and construction planning endeavors to minimize or prevent loss of habitat, thus preserving species diversity and populations at respective installations.

Management Objective and Strategy

Objective: Increase biodiversity of the invertebrate community at NOLF IB

Strategies:

1. Develop and implement a strategy for pollution management.
2. Conduct regular surveys for invertebrates that may be present within NOLF IB boundaries.
3. Develop and distribute outreach and education materials on invertebrates to personnel, operators and visitors on NOLF IB.
4. Survey for vernal pool invertebrates.

7.2.4.2 Pollinators

A pollinator is an animal or insect that transfers pollen grains from flower to flower (DoD Legacy 2010a). Pollinators are responsible for pollinating 80 percent of the crops we consume, as well as the majority of plants and fruits consumed by wildlife. Examples of pollinators in the San Diego region include bees, butterflies, moths, beetles, flies, and birds. Several potential invertebrate and avian pollinator species occur on NOLF IB. Invertebrate families include bumblebees, honeybees (Family: Apidae), digger wasps (Family: Sphecidae), hawk moths (Family: Sphingidae), snout beetles, true weevils (Family: Curculionidae), sweat bees (Family: Halictidae), skippers (Family: Hesperiidae), hairstreaks, coppers, blues (Family: Lycaenidae), brush-footed butterflies (Family: Nymphalidae), whites and sulfurs (Family: Pieridae), and metalmarks (Family: Riodinidae). In addition, two common avian species that are known pollinators include Anna's Hummingbird (*Calypte anna*), and Costa's Hummingbird (*Calypte costae*).

The relationship between the fate of pollinators and the ability of installations to meet readiness and stewardship obligations has been a focus of the DoD Legacy Resources Management Program (DoD Legacy) for the past several years.

Pollinators ensure that native landscapes on installations do not become barren, or overrun with invasive species. The DoD acknowledges that habitat restoration and invasive species removal go hand in hand. Through enhancing and restoring pollinator habitat by restoring native plant communities and removing and controlling invasive species, DoD installations can save money, protect threatened and endangered species, and contribute to biodiversity (DoD Legacy 2010a).

For more information on DoD's work to support pollinators, visit *http://www.DoDpollinators.org*. Another good source for information on enhancing pollinator populations can be found within The Pollinator Partnership™/ NAPPC publication *Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners in the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast* available online at:

http://www.pollinator.org/PDFs/Calif.Coastal.Chaparral.rx2.pdf.

Specific Concerns

- Improper use of pesticides;
- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

NOLF IB is currently managing for pollinator species through implementation of many programs; such as landscaping, invasive species control, and restoration efforts that indirectly benefit pollinators.

Management Objective and Strategy

Objectives: Maintain and enhance pollinator populations and their habitat when not in conflict with health and safety, or the military mission therefore, an assessment of current management cannot be made at this time. However, many programs such as landscaping, invasive species control, and restoration efforts indirectly benefit pollinators on NOLF IB.

Strategies:

1. Inventory and monitor populations and habitat composition of pollinators.
2. Develop BMPs to ensure that pollinator species are not adversely impacted by NOLF IB activities.
3. Identify and develop pollinator friendly landscapes.
4. Develop and distribute outreach and education materials on pollinators to personnel, operators and visitors on NOLF IB.
5. Revegetate and restore land with plants that attract pollinators, and include pollinator-friendly plants with native species contained on the NAVFAC SW recommended plant list.
6. Control the spread of invasive species.
7. Review existing literature on pollinators.
8. Work with San Diego County Agricultural Department to explore feasibility of developing and implementing a management program that supports bee relocation as opposed to bee eradication.
9. Provide connectivity between vegetation areas by creating corridors of perennials, shrubs, and trees that provide pollinators shelter and food as they move through the landscape.
10. Provide windbreaks and nesting areas, such as bat boxes or sites without high vegetation for bee nests.
11. Inventory and become knowledgeable of local pollinators
12. Maintain a minimum of lawn areas that support recreational needs.
13. Restrict the use of pesticides; including herbicides, and insecticides when possible.
14. Provide water sources in large open areas. Should only be done on NOLF if it is compatible with mission and BASH requirements.
15. Maintain natural meadows and openings that provide habitats for sun-loving wildflowers and grasses.

7.2.4.3 Fish

For a complete listing of fish species observed on NOLF IB, see **Appendix F**.

In 2009 surveys for fish were conducted within the water courses of NOLF IB. A total of five species representing four families were documented. The dominant species recorded were the arrow gobby

(*Clevelandia ios*) and the California killifish (*Fundulus parvipinnis*) which made up 61 percent and 34 percent respectively, of all documented species. Topsmelt (*Atherinops affinis*) was the next most abundant fish species at 4 percent of the total catch. The remaining 1 percent was comprised of the California halibut (*Paralichthys californicus*) and the longjaw mudsucker (*Gillichthys mirabilis*) (U.S. Navy 2011g).

Specific Concerns

- Overharvesting;
- Pollution from oil spills and other hazardous wastes into the Tijuana Estuary/River;
- Improper use of pesticides;
- Habitat loss;
- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predators.

Current Management

Opportunities for the management of fish and wildlife species on NOLF IB are primarily accomplished by managing habitats. The USFWS and Naval Base Coronado have an MOU relating to the protection of natural resources within the Tijuana Marsh on NOLF IB. Under this agreement, the 245.4 hectares (606.42 acres) of the Tijuana Marsh occurring on NOLF IB will be managed as part of the TSNWR. Specifically, the USFWS agrees to prepare an inventory and management plan for fish and wildlife resources on Navy lands within the Tijuana Marsh and administer relative biological programs; to be responsible for the preservation and recovery of threatened and endangered species, and to enforce Federal and state laws on NOLF IB consistent with the operation of the TSNWR. Under the MOU, NBC agrees to permit USFWS to conduct management and research activities within the Tijuana Marsh, assist in preservation and management, and permit the USFWS to enforce all rules, regulations, and laws within its power which will assist in the operation of the Tijuana Marsh as part of the National Wildlife Refuge System (U.S. Navy and USFWS 1992). NOLF IB natural resources personnel coordinate with CDFW and USFWS to identify, prioritize and implement habitat enhancement projects targeted for particular species or groups of species (i.e., migratory birds). Projects to manage wildlife habitat include invasive plant control, enhancing and protecting wetlands, and conducting surveys (e.g., migratory nesting bird survey).

Habitat loss has a direct correlation to a decline or loss of fish and wildlife populations. Installation INRMPs are meant to be used as tools in operational, training, and construction planning endeavors to minimize or prevent loss of habitat, thus preserving species diversity and populations at respective installations.

Management Objective and Strategy

Objective: Employ a systematic approach to managing wildlife resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.

2. Continue documenting species that are incidentally observed during special status species surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals
4. Survey for and monitor herpetofauna populations using guidelines recommended by Partners in Amphibian and Reptile Conservation (PARC).
5. Once finalized, implement Department of Defense (DoD) PARC Strategic Plan.
6. Install bird and bat boxes.
7. Revegetate areas on base with native species using species on the recommended plant list.
8. Control the spread of invasive species.
9. Ensure compliance with NBC instructions for fishing and National Environmental Policy Act (NEPA).
10. Evaluate predator control and develop strategies to control invasive predators (e.g., bullfrogs).
11. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

7.2.4.4 Reptiles and Amphibians

Twenty-one herpetofauna species were observed on NOLF IB in the combined 2000 and 2002 herpetological surveys (see **Table 7-3**) (U.S. Navy 2006d). In addition, surveys were conducted in 2009, a total of seven reptiles and three amphibians were observed. The African clawed-frog (*Xeonpus laevis*), an introduced species, was the only new documented species on NOLF IB (U.S. Navy 2011g).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. INRMPs are the primary vehicles by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing wildlife resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Table 7-3: Herpetofauna Species Observed on Naval Outlying Landing Field Imperial Beach during 2000, 2002 and 2009 Surveys

Scientific Name	Common Name	Status	Year Observed
Amphibians			
Pseudacris regilla	Pacific treefrog		2000
*Xeonpus laevis**	African clawed-frog		2009
*Rana catesbeiana**	Bullfrog		2002
Reptiles			
Elgaria multicarinatus	Southern alligator lizard		2000
Elgaria multicarinatus webbi	San Diego alligator lizard		2002
Anniella pulchra	California legless lizard	CSCS	2000
Anniella pulchra pulchra	Silvery legless lizard	CSCS	2002
Sceloporus occidentalis	Western fence lizard		2000, 2002
Uta stansburiana	Side-blotched lizard		2000, 2002
Phrynosoma coronatum	Coast horned lizard		2000
Plestiodon skiltonianus skiltonianus	Western skink		2000
Plestiodon skiltonianus interparietalis	Coronado Island skink	CSCS	2002
Aspidoscelis hyperythra	Orange-throated whiptail		2000
Lampropeltis getulus	Common kingsnake		2000
Lampropeltis getulus californiae	California kingsnake		2002
Masticophis flagellum	Coachwhip		2000
Masticophis flagellum fuliginosus	Baja California coachwhip		2002
Pituophis melanoleucas	Gopher snake		2000, 2002
Pituophis catenifer annectens	San Diego gopher snake		2002
Thamnophis hammondii	Two-striped garter snake	CSCS	2000
Crotalus viridis	Western rattlesnake		2000, 2002
*Pseudemys scripta**	Slider		2002

Source: U.S. Navy 2006d
Notes: * Introduced Species
Key: CSCS = California Special Concern Species

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting species that are incidentally observed during special status species surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
4. Survey for and monitor herpetofauna populations using guidelines recommended by PARC.
5. Once finalized, implement DoD PARC Strategic Plan.

6. Revegetate areas on base with native species using species on the recommended plant list.
7. Control the spread of invasive species.
8. Evaluate predator control and develop strategies to control invasive predators (e.g., bullfrogs).
9. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

7.2.4.5 Birds and Migratory Bird Management

For a complete listing of avian species observed on NOLF IB, see **Appendix F**. Due to the BASH potential many migratory bird species pose (particularly large-bodied, flocking, and soaring species), migratory birds are managed closely under the installation's BASH program, see also **Section 7.2.4.6**. Several special status bird species are known to occur on NOLF IB and are discussed in **Section 7.2.5**.

The ornithological survey conducted on NOLF IB in 2002 recorded 2,977 individual birds representing 118 species and 3 sub-species. A total of 53 species appeared to be breeding within the study area. Species were observed in three distinct habitats on NOLF IB, identified as estuarine, riparian, and agricultural/human-influenced (U.S. Navy 2006d). In addition, surveys were conducted in 2009, in total 132 distinct species and two subspecies of savannah sparrow were observed. Twenty-two of the 134 total species and subspecies are considered sensitive species by either the Federal Government or the state of California (U.S. Navy 2011g). There are wetlands that are often used by birds, creating a BASH issue.

Common birds in the estuarine habitats include: Snowy Egret (*Egretta thula*), American Widgeon, Mallard, American Coot (*Fulicia americana*), Sandpipers (*Calidris* spp.), Willet, Semipalmated Plover, Dowitcher species (*Limnodromus* spp.), Marbled Godwit, Black-bellied Plover, American Avocet, Red-winged Blackbird (*Agelaius phoeniceus*), and Bushtit (*Psaltriparus minimus*) (U.S. Navy 2006d).

Common birds in the agriculture/human-influenced habitats on NOLF IB include Killdeer, Western Meadowlark, Black-bellied Plover, Common Yellowthroat (*Geothlypis trichas*), Song Sparrow, Savannah Sparrow, Belding's Savannah Sparrow, and White-crowned Sparrow (U.S. Navy 2006d).

Common bird species in the riparian habitats on NOLF IB include Mallard, California Quail (*Callipepla californica*), hummingbird species (Anna's Hummingbird, Rufus Hummingbird [*Selasphorus rufus*], Allen's Hummingbird [*S. sasin*], and Calliope Hummingbird [*Selasphorus calliope*]), Red-winged Blackbird, Hermit Thrush (*Catharus guttatus*), Bewick's Wren (*Thryomanes bewickii*), Yellow-rumped Warbler, Common Yellowthroat, Orange-crowned Warbler, Song Sparrow, and Bushtit (U.S. Navy 2006d).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise);
- Fire;
- Predation and
- Increased bird populations leading to elevated BASH risks.

Current Management

MBTA

The MBTA (16 U.S.C. 703-712) protects all migratory birds and prohibits the taking of migratory birds, their young, nests, and eggs, except as permitted by the USFWS. The USFWS recommends that NOLF IB avoid impacting birds protected under the MBTA by surveying for nesting birds in areas proposed for disturbance and if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends conducting activities outside of nesting areas or outside of the general migratory bird-nesting season that extends from mid-February through the end of August, to help avoid direct impacts.

Prohibited Acts: Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not.

On March 15, 2005, the USFWS published in the Federal Register (FR 70(49):12710-12716) a final list of the bird species to which the MBTA does not apply. The list is required by the Migratory Bird Treaty Reform Act of 2004. The actual list of migratory birds protected by the MBTA is published in the CFR (Title 50, Part 10.13). When it became law in 2004, the Reform Act excluded any species not specifically included on the Title 50, Part 10 list from protection.

The 2003 National Defense Authorization 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.
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 February 28, 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.

In addition, DoD and the USFWS entered into an MOU in July 2006, to Promote the Conservation of Migratory Birds, in accordance with Executive Order (EO) 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (DoD 2007). This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations other than military readiness activities are consistent with the MBTA. The MOU also describes how the USFWS and DoD will work together cooperatively to achieve these ends. The MOU

does not authorize the take of migratory birds; the USFWS, however, may develop incidental take authorization for Federal agencies that complete an EO MOU.

Current management of migratory birds also includes habitat restoration, implementation of the DoD CBM, San Diego waterbird surveys, general bird surveys approximately every 5 years (during natural resource inventory surveys), annual Western Burrowing Owl surveys, and a Heron and Egret Management Plan.

Herons and Egrets

NOLF IB's mission does not directly conflict with the presence of Herons; however, a strategy for mitigation has been developed for those projects with the potential to impact Herons or their nests. Mitigation includes planting Torrey pine trees, and not planting eucalyptus trees at Heron nest sites. Once planted, these sites are analyzed to determine their feasibility and appropriateness for supporting Torrey pines (e.g., soil, slope aspect).

Management guidelines set forth in the draft 2012 Heron and Egret Management Plan include: (1) restriction of non-essential activity adjacent to active Heron nests; (2) conservation of nesting habitat; (3) continued monitoring of nesting locations, phrenology (timing) of nesting, reproductive effort, and success; and (4) construction of parking covers or shelters to lessen impact of Heron droppings. These management issues will likely be revisited by NOLF IB.

Management Objective and Strategy

MBTA

Objective: Maintain and enhance populations, and nesting and foraging habitats of migratory birds on NOLF IB.

Strategies:

1. Assess the effects of all projects on migratory birds during NEPA process. Ensure compliance with MOU between USFWS/DoD on the Conservation of Migratory Birds and the "Migratory Bird Rule."
2. Identify any actions that require an MBTA permit and, if necessary, obtain appropriate permit for intentional take of migratory birds.
3. Develop effective management for minimizing the unintentional take of migratory birds.
4. Conduct regular surveys to determine what species of migratory birds may have potential to be on NBC.
5. Once finalized, implement monitoring protocols contained within the DoD Coordinated Bird Monitoring Plan. Contribute data to the Coordinated Bird Monitoring Database.
6. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed.
7. Develop migratory bird specific BMPs and ensure these BMPs are included in project plans (e.g., plan all tree trimming during the non-nesting season).
8. Develop and enhance partnerships with agencies and groups involved (e.g., USFWS and CDFW) in migratory bird management.

9. Develop and distribute outreach and education materials on migratory birds to personnel, operators and visitors on NOLF IB.
10. Revegetate with native species contained on the NAVFAC SW recommended plant list.
11. Control the spread of invasive species.
12. Participate in DoD Partners in Flight initiative.
13. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).
14. NOLF IB Migratory Bird MAPS Monitoring Station.

Herons and Egrets

Objective: Maintain nesting for Herons and Egrets on NOLF IB while balancing and coordinating management with BASH concerns and impacts to listed species.

Strategies:

1. Finalize and implement Heron and Egret Management Plan. Include management provisions for herons and egrets within plan into INRMP.
2. Maintain relationship with Wildlife Assist and Project Wildlife to rescue and rehabilitate injured herons.
3. Coordinate with local and regional efforts on disease research.
4. Reduce BASH risks by encouraging herons to nest in areas of NOLF IB that are furthest away from the runways.
5. Conduct heron and egret surveys of metro area bases approximately every 3 years.

7.2.4.6 Bird/Wildlife Aircraft Strike Hazard

Bird strikes to aircraft are a serious safety and economic problem in the United States, annually causing millions of dollars in damage to civilian and military aircraft and occasionally loss of human life. The Navy has experienced approximately 20,000 bird/aircraft strikes since 1980 resulting in two deaths, 25 aircraft destroyed and over $300 million in damage. Naval Safety Center data indicates that 65 percent of all bird strikes occur within the PSA of the airfield which is 229 meters (750 feet) in both directions from the centerline of the runway. In addition, at NOLF IB, data indicates that only 30 percent of bird/aircraft strikes are actually reported, thus underestimating the number and severity of the problem. The FAA PSA is 305 meters (1,000 feet) in both directions of the center line of the runway (FAA Advisory Circular 159/5300-13). FAA Part 139.337, a wildlife assessment is triggered by one of the following: (1) multiple animal strikes; (2) substantiated damage to the aircraft; (3) engine ingestion of wildlife; or (4) when size and numbers of wildlife on or near the airport are capable of causing a damaging event (U.S. Navy 2008d).

Specific Concerns

- Invasive species (flora and fauna);
- Habitat changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise);

- Fire and
- Increased presence of wildlife on or near active runways.

Current Management

A BASH plan was developed for NBC in 2008 and a new BASH plan was finalized in 2012, these provided guidance to minimize wildlife populations on and around the airfield that pose a threat to aviation safety. The primary goal of the BASH program is to minimize the potential for loss of aircrew life. The BASH program achieves this objective by addressing the aviation safety hazard associated with wildlife on and near airfields. The BASH program needs to manage wildlife populations and work with installation personnel to improve bird strike reporting and communication of wildlife activities within the airfield environment. An effective BASH program also strives to minimize secondary BASH impacts, such as damage to aircraft and loss of training. Aircraft collisions with wildlife are too costly and hazardous to not be property addressed or managed (U.S. Navy 2008d).

The purpose of the 2012 BASH plan included the following objectives (U.S. Navy 2011d):

1. To establish policy and procedures for implementing the Commander, Navy Installations Command BASH Program (CNIC INST3700, 7 July 2011).
2. To establish mandatory BASH event reporting and remains collection procedures in accordance with OPNAVINST 3750.6, CNIC BASH program Manual, and the FAA Advisory Circular 150/5200-32 a of 22 December 2004.
3. To establish BASH program procedures in accordance with reference CNIC BASH program Manual and FAA Advisory Circular 150/5200-33 b of 28 August 2007.

The BASH plan includes: 1) conduction of wildlife monitoring; 2) implementation of a habitat management program; 3) use of bird dispersal techniques when appropriate and warranted; 4) implementation of species specific population control program; 5) development of operation procedures to address bird/animal aircraft strike hazards; 6) adoption of a zero-tolerance policy for birds within the primary surface area, exceptions maybe granted by the Bird Hazard Working Group for specific birds such as threatened and endangered species or species of conservation concern; and 7) increased communications, safety and training of aviators, aircrews and operational personnel related to BASH issues (U.S. Navy 2008d).

Natural resource managers are responsible for ensuring BASH programs are addressed in this INRMP and is compliant with all applicable state and Federal natural resource laws and regulations as well as all applicable DoD, DoN, and U.S. Navy environmental policies, directives, and instructions (U.S. Navy 2012e) .

Management Objective and Strategy

Objective: Reduce hazards between wildlife and aircraft at NOLF IB.

Strategies:

1. Educate personnel at the airfield about the NBC natural resources program.
2. Periodically review the BASH plan to ensure that it does not conflict with this INRMP.
3. Continue to participate in NBC Bird Hazard Working Group to identify and address BASH risks.

4. Coordinate Natural Resources projects with the BHWG including the USDA BASH Biologist assigned to NBC to ensure natural resources management is compatible with BASH program.

7.2.4.7 Mammals

Mammal species that have been documented on NOLF IB include: California vole (*Microtus californicus*), house mouse (*Mus musculus*), deer mouse (*Peromyscus maniculatus*), California mouse (*P. californicus*), cactus mouse (*P.eremicus*), western harvest mouse, San Diego pocket mouse (*Chaetodipus fallax*), desert shrew (*Notiosorex crawfordi*), ornate shrew (*Sorex ornatus*), Botta's pocket gopher (*Thomomys bottae*), desert cottontail (*Sylvilagus audubonii*), San Diego black-tailed jackrabbit, California ground squirrel, and raccoon (NOLF IB 2004, U.S. Navy 2006d). The most recent general mammal surveys were conducted 2009, in total five large mammal species and 14 small mammal species (including bats) were recorded. New species not previously observed or documented include: coyote (*Canis latrans clepticusscat*), striped skunk (*Procyon lotor psora*), domestic dog (*Canis lupus familiaris*), domestic cat (*Felis silvestris catus*), California pocket mouse (*Chaetodipus californicus*), black rat (*Rattus rattus*), big brown bat (*Eptesicus fuscus*), western red bat (*Lasturus blossevillii*), Mexican free-tailed bat (*Tadarida brasiliensis*), and Yuma myotis (*Myotis yumanensis*) (U.S. Navy 2011g).

During the small mammal trapping survey conducted in 2002, the western harvest mouse was the most commonly captured species in all habitats. The San Diego pocket mouse was only captured in the riparian forest/scrub habitat during the survey. The deer mouse was captured mostly in coastal sage scrub habitat, with a few individuals also appearing in the riparian forest/scrub habitat. A single California vole was captured in a disturbed marsh habitat. The house mouse was captured mostly in the disturbed marsh habitats (U.S. Navy 2006d). Two of the species captured during the 2002 small mammal trapping survey, the San Diego pocket mouse and the San Diego black-tailed jackrabbit, are listed as a California Species of Special Concern. Numerous ground squirrel colonies occur in the disturbed open ground surrounding the airfield (U.S. Navy 2006d).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing terrestrial mammals, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation, as needed.

Strategies:

1. Continue documenting mammal species during Natural Resources inventory efforts and those that are incidentally observed during special status species surveys.
2. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
3. Install bat boxes where appropriate.
4. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

7.2.4.8 Marine Mammals

Not applicable to NOLF IB.

7.2.5 Special Status Species (Federally Listed and Other Special Status Species)

Special status species include those species that are federally or state listed endangered, threatened, or candidate or California species of special concern (SOC) and California fully protected species (CFP); birds on the Federal Birds of Conservation Concern (BCC) list (see **Figure 7-5**); and plants identified by CNPS as belonging to the Rare Plant Rank of 1B. In addition, those migratory bird species that have been determined to be of the highest "concern" to the DoD and that have been identified on the DoD Partners in Flight (PIF) Priority Species list have been included. **Table 7-4** includes special status species that were either observed or recognized as having the potential to occur on NOLF IB during the 2005 natural resources survey. In addition, species marked with an asterisk are those species identified by NOLF IB natural resources personnel as focus management species as required by OPNAVINST 5090.1C CH-1. **Table 7-4** includes species either observed on NOLF IB during the 2005 natural resources survey, or species with the potential to occur on the installation.

An installation's overall ecosystem management strategy must provide for protection and recovery of federally listed species. Under the ESA, an "endangered species" is defined as any species that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The USFWS has also presented an updated list of species that are regarded as candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and could warrant protection under the ESA. General management actions for listed species include the following:

- Preparation and implementation of specific management actions for listed species that include protocols for monitoring surveys and for site marking of sensitive areas;
- Maintaining GIS data on the distribution and habitat availability for listed species and sharing this information with the CNDDB;
- Implement Environmental Review requirements in accordance with OPNAVINST 5090.1C CH-1;
- Conduct Environmental Awareness briefings (e.g., natural resource training) as necessary;
- Minimization and conservation measures aimed at reducing the potential for accidental take;
- Investigating and implementing research projects to better understand ecological requirements of listed species and

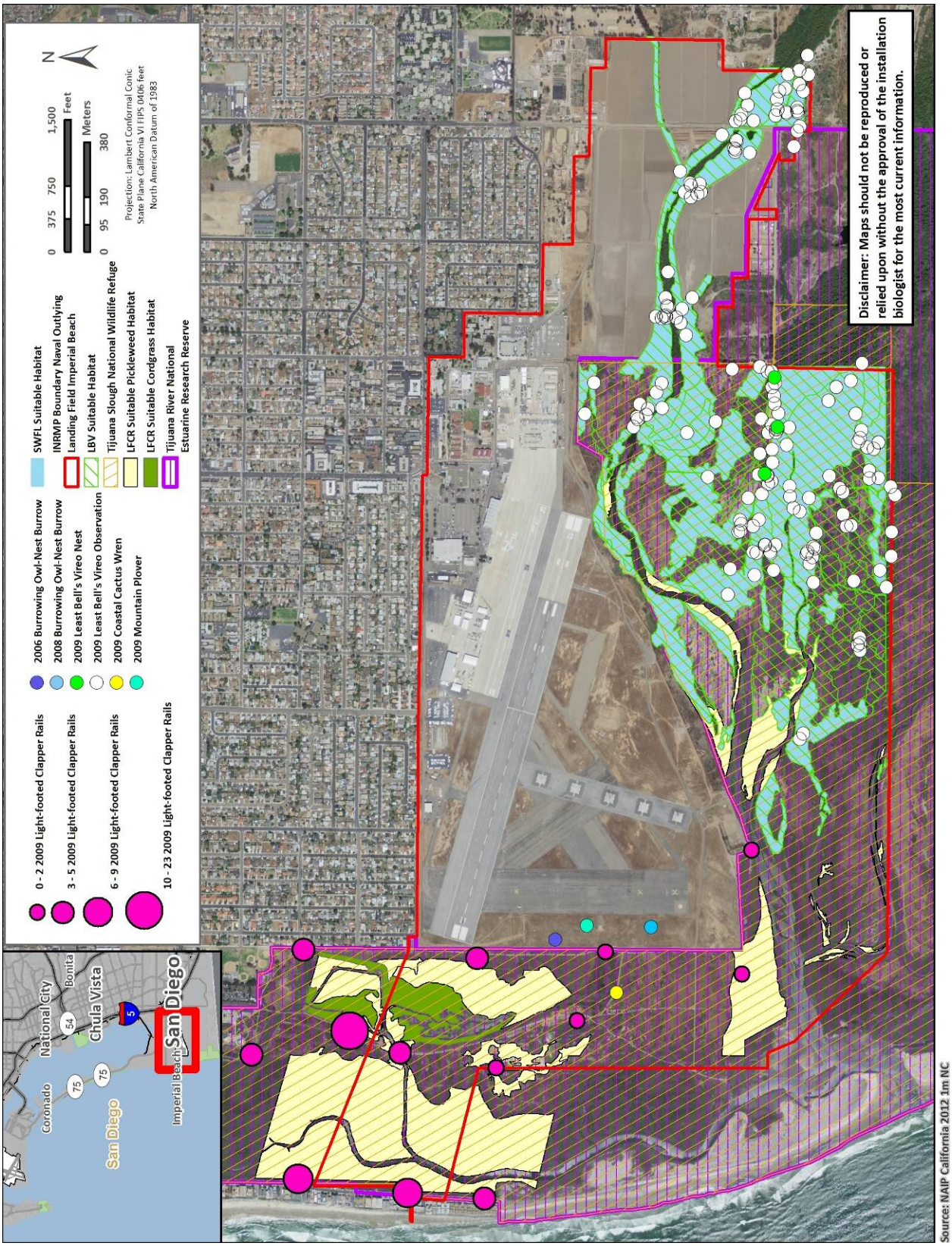


Figure 7-5: Naval Outlying Landing Field Imperial Beach Special Status Species Birds

Table 7-4: Special Status Species Observed or with the Potential to Occur on Naval Outlying Landing Field Imperial Beach

Common Name	Scientific Name	Federal Status	State Status	Other Status
Plants				
Salt marsh bird's-beak[1]	*Chloropyron maritimum* ssp. *maritimum*	FE	SE	CNPS 1B.2
Estuary seablite	*Suaeda esteroa*	–	–	CNPS 1B.2
Invertebrates				
San Diego fairy shrimp[1]	*Branchinecta sandiegonensis*	FE	–	–
Reptiles				
Silvery legless lizard	*Anniella pulchra pulchra*	–	SSC	–
Orange-throated whiptail	*Aspidoscelis hyperythra*	–	SSC	–
Coronado Island skink	*Plestiodon skiltonianus interparietalis*	–	SSC	–
Two-striped garter snake	*Thamnophis hammondii*	–	SSC	–
Birds[2]				
Golden Eagle	*Aquila chrysaetos*	BGEPA, BCC	CFP	DoD PIF
Western Burrowing Owl [1]	*Athene cunicularia hypugaea*	BCC	SSC	DoD PIF
Coastal Cactus Wren	*Campylorhynchus brunneicapillus sandiegoensis*	BCC	SSC	DoD PIF
Western Snowy Plover[1]	*Charadrius nivosus nivosus*	FT, BCC	SSC	–
Mountain Plover	*Charadrius montanus*	BCC	SSC	DoD PIF
Northern Harrier	*Circus cyaneus*	–	SSC	–
Clark's Marsh Wren	*Cistothorus palustris clarkae*	–	SSC	–
Yellow Warbler	*Setophaga petechia brewsteri*	BCC	SSC	–
Willow Flycatcher	*Empidonax traillii*	BCC	SE	–
Southwestern Willow Flycatcher [1&2]	*Empidonax traillii extimus*	FE	SE	–
American Peregrine Falcon	*Falco peregrines anatum*	BCC	CFP	–
Common Loon	*Gavia immer*	–	SSC	–
Gull-billed Tern	*Gelochelidon nilotica*	BCC	SSC	DoD PIF
Loggerhead Shrike	*Lanius ludovicianus*	BCC	SSC	DoD PIF
Long-billed Curlew	*Numenius americanus*	BCC	–	DoD PIF

Common Name	Scientific Name	Federal Status	State Status	Other Status
Birds[2] (continued)				
Belding's Savannah Sparrow [1]	*Passerculus sandwichensis beldingi*	–	SE	–
Large-billed Savannah Sparrow	*Passerculus sandwichensis rostratus*	–	SSC	–
American White Pelican	*Pelecanus erythrorhynchos*	–	SSC	–
California Brown Pelican	*Pelecanus occidentalis californicus*	FD	CFP	–
Nuttall's Woodpecker	*Picoides albolarvatus*	BCC	–	–
Light-footed Clapper Rail[1]	*Rallus longirostris levipes*	FE	SE, CFP	–
Rufous Hummingbird	*Selasphorus rufus*	BCC	–	–
Allen's Hummingbird	*Selasphorus sasin*	BCC	–	–
California Least Tern[1]	*Sterna antillarum browni*	FE	SE, CFP	–
Elegant Tern	*Thalasseus elegans*			DoD PIF
Least Bell's Vireo [1]	*Vireo belli pusillis*	FE	SE	–
Mammals				
Western red bat	*Lasiurus blossevillii*	–	SSC	–
San Diego black-tailed jackrabbit[1]	*Lepus californicus*	–	SSC	–

Source: U.S. Navy 2006d, USFWS 2010a, CDFG 2010a, CDFG 2010b
Notes: [1] Special Status Species with focused management. [2] Birds are named using the American Ornithologists' Union nomenclature.
Key:
BCC = USFWS Bird of Conservation Concern
SSC = California Species of Special Concern
CFP = California Fully Protected Species
FT = Federally Threatened
FD = Federally Delisted
DoD PIF = DoD Partner in Flight Priority Species
FE = Federally Endangered
FC = Federal Candidate Species
ST = State Threatened
SE = State Endangered
MMPA = Marine Mammal Protection Act
BGEPA = Bald and Golden Eagle Protection Act

- Investigation and implementation of habitat improvement and non-native species control to conserve listed species.

If threatened, endangered, or candidate species are discovered on the installation during a biological inventory, species information and management actions should be incorporated into the INRMP.

The intent of this section is to identify objectives and strategies to manage NOLF IB using a regional ecosystem-based approach that manages special status species while protecting the operational functionality of the mission. While single-species management is not promoted as a general philosophical management approach on the installation, specific controls are used to protect special status species beyond management of the ecosystem. Other procedures in place for management of special status species are modifying the ecosystem and human interactions within this environment. The following sections include brief descriptions of those species actively managed by natural resources

personnel at NOLF IB. Note that all wildlife species are considered for management and managed as needed for aircraft safety under the NBC BASH program, including Special Status Species.

For a complete description, background and species account including distribution, range, habitat and biology, of the Special Status Species described below, see **Appendix F**.

7.2.5.1 Federally Listed and Candidate Species

Six federally listed species, the federally listed endangered salt marsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*), endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*), threatened Western Snowy Plover (*Charadrius nivosus nivosus*), endangered Light-footed Clapper Rail (*Rallus longirostris levipes*), endangered California Least Tern (*Sterna antillarum browni*), and the endangered Least Bell's Vireo (*Vireo belli pusillis*) are known to occur on NOLF IB. Additionally, one federally listed species, endangered Southwest Willow Flycatcher (*Empidonax traillii extimus*), has the potential to occur on NOLF IB.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

Management needs for threatened, endangered, and candidate species and their habitats are based on results contained within surveys performed regularly on NOLF IB. NOLF IB will continue to conduct species surveys as deemed necessary and subject to available funding. Management strategies will be developed or revised based on the recommendations of those surveys. The Navy currently conducts management of listed species at NOLF IB in accordance with applicable Biological Opinions that are discussed in detail in the below appropriate sections. Examples of management strategies include annual surveys and assessment of species status on the installation, minimization of disturbances, and site preparation where necessary.

In addition, a portion of NOLF IB lands are managed as part of the TRNERR. The land management policies provided for the TRNERR are intended to protect areas that contain sensitive habitats and endangered, threatened, or sensitive native species, therefore, the type and intensity of public use and resource management allowed within the TRNERR vary depending upon the sensitivity of the resources in a given area. Activities in areas within and/or adjacent to tidal channels, natural salt marsh habitat, and the back dunes, as well as riparian and coastal sage scrub habitats, are limited to those activities that directly contribute to resource protection and restoration and to public uses that are determined to be compatible with the protection of sensitive resources. Such restrictions are necessary to maintain a natural and healthy estuarine ecosystem for the endangered and threatened species (i.e., Light-footed Clapper Rail, California Least Tern, Western Snowy Plover, Least Bell's Vireo, and salt marsh bird's-beak) that are supported within these habitats (TRNERR 2010).

There is no critical habitat for any of the listed species in NBC. This is, in part, due to U.S. Navy environmental planning through INRMPs. ***Appendix D*** *identifies within the INRMP all management and*

conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.

Management Objective and Strategy

Objective: Maximize effectiveness and efficiency of the NBC Endangered Species Program to achieve the best conservation possible while maintaining and improving training activities at the desired level.

Strategies:

1. Investigate the need for implementing research projects to better understand ecological requirements of listed species.
2. Continue use of the established Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists to reflect presence of threatened, endangered, and other sensitive species.
5. Conduct regular surveys for threatened, endangered, and candidate species that may be present on NOLF IB.
6. Continue monitoring sensitive species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
8. Establish an education program for military personnel who might have contact with sensitive species or their habitats.
9. Maintain updated educational materials.
10. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats. Reduce habitat fragmentation.
11. Implement erosion control BMPs to ensure adverse environmental impacts to threatened, endangered, and candidate species habitat do not occur.
12. Revegetate with native species included on the NBC recommended plant list. Include sensitive plant species in the recommended plant list.
13. Periodically review the natural resources management program to ensure that management actions do not adversely impact special status species habitat.
14. Continue to protect existing native plant communities whenever possible.

Salt Marsh Bird's-beak

One individual plant was observed in the eastern portion of the pickleweed estuarine area during a brief visit of the lower estuarine area during the 2002 natural resources inventory. In addition, during surveys conducted in 2009 and 2010, several patches of this species were observed and approximately 1,500 individuals were mapped. The salt marsh bird's-beak occurrences documented during these

surveys were restricted to a very narrow band between the outer edge of the pickleweed habitat, just below the upland scrubs and grasslands, and the more permanently inundated pickleweed marsh (U.S. Navy 2011g) (see **Figure 7-6**).

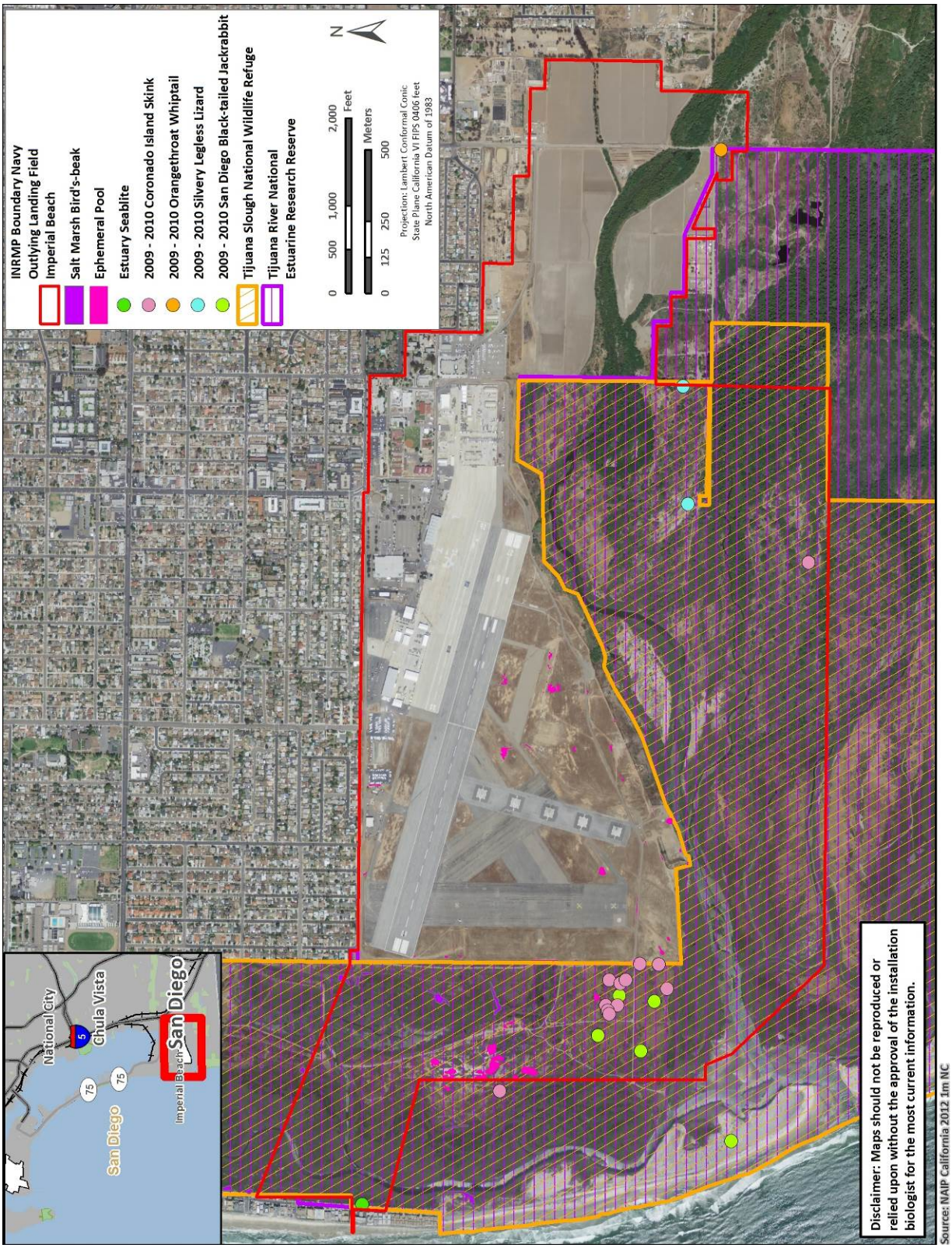


Figure 7-6: Naval Outlying Landing Field Imperial Beach Special Status Wildlife Species and Plants

Specific Concerns

- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Possible recreational use at estuary and
- Flood control and river maintenance to restore natural flow.

Current Management

Salt marsh bird's-beak is managed through habitat protection, inventory, and monitoring, most occurrences on NOLF IB are managed by the TSNWR. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the Navy as part of the project planning (U.S. Navy 2011g). No designated critical habitat currently exists on NOLF IB. **Appendix D** identifies within the INRMP all management and conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.

Management Objective and Strategy

Objective: Maintain populations of salt marsh bird's-beak on NOLF IB, and promote species recovery consistent with ESA.

Strategies:

1. Perform invasive species control around areas known to contain salt marsh bird's-beak habitat, avoidance and minimization measures will be detailed in the project work plan.
2. Periodic monitoring (recommend at least every 3 years—the reason this is less frequent than recommended at YMCA Camp Surf is because NOLF has more occurrences of larger numbers of individuals distributed over a much larger area [i.e., the species is not as imperiled at NOLF] and because access to occurrences is through sensitive habitat occupied by the Light-footed Clapper Rail).
3. Complete a vulnerability assessment of plant habitat and conduct habitat evaluation.
4. Establish a seed bank to ensure viable populations in future years.
5. Conduct a study of pollinators in the salt marsh bird's-beak habitat to determine critical relationships between plant populations and pollinators.
6. Continue to participate with the TJ River Valley Recovery Team.
7. Partner with the TSNWR.

San Diego Fairy Shrimp

As part of the ecological inventory at NOLF IB, protocol fairy shrimp surveys were performed throughout areas where vernal pools occur in 2008-2009 and 2010-2011. There were a total of eight vernal pools sampled during the 2008-2009 wet season survey effort; local salt ponds were also examined during this sampling effort. Of these pools, there were four vernal pools in which San Diego fairy shrimp were observed (see **Figure 7-6**). Pools occurred within the road in several locations along the perimeter road within the fenced flightline portion of the property.

Initial reconnaissance efforts identified 67 depressions as having potential to be pooling areas; of these approximately 50 pools were found that held sufficient water to meet vernal pool requirements during the 2010-2011 fairy shrimp survey effort. Some depressions that appeared to be individual pools were combined when it was discovered that they were occasionally connected. Many pools were found to be much smaller than expected and most of these pools only held water in the initial sample when frequent rains kept the pools filled. Protocol wet-season sampling was performed within pools that met the requirements. Pools that were not sampled in the first wet season effort were sampled six times over the winter and spring of 2010 and 2011. Despite several rain events, no San Diego fairy shrimp were observed in any pools sampled during the 2010-2011 effort.

In addition, dry season surveys were conducted in 2009 and 2010. Dry sampling was done on pools that were not sampled during initial wet sampling surveys as well as pools which had inconclusive wet sampling results (inundated depressions that were evaluated; however, fairy shrimp were not identified during wet sampling). Distinctive Branchinecta cysts were found in small numbers (less than ten) in samples from three of five basins sampled at NOLF IB. All of the pools in which cysts were found during the 2009 effort were located within the fenced flightline portion of the property on the perimeter road. Dry sampling was performed throughout September and October 2010 for all observed potential pooling basins where comprehensive protocol surveys had not been conducted previously. Fairy shrimp cysts were found within four different pools during this effort, all of which are located within the fenced flightline portion of the property (U.S. Navy 2011g) (see **Figure 7-6**).

San Diego fairy shrimp have been documented within the vernal pools within the TSNWR on NOLF IB, west of the airfield (see **Figure 7-6**). These vernal pools were formerly designated as critical habitat for this species (U.S. Navy 2010c). The final rule for designation of critical habitat for the San Diego fairy shrimp was issued on December 12, 2007 (72 Federal Register 70647), and excluded habitat at NOLF IB. Since the final rule came into effect on January 11, 2008, NBC property no longer includes any critical habitat for this species (USFWS 2010b).

Specific Concerns

- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Training;
- Unauthorized vehicle use of unpaved access roads -- currently this concern is limited to unpaved airfield perimeter road, but distribution could expand in the future with continued road use;
- Facilities projects (e.g., construction and maintenance) and
- Recreational use of estuary (e.g., foot traffic in habitat).

Current Management

Several activities at NOLF IB have the potential to disperse cysts. Landscaping crews drive over the roads throughout the site to mow and maintain the field. Lawnmowers are designed to lift the grass along with any lighter particles and fling them away from the lawnmower, so lawnmowers could also distribute fairy shrimp cysts over a wide area. Helicopters are continually hovering over the field as pilots work on maintaining their skills and flight hours. Low flying helicopters blow large quantities of air down against the ground which could disperse any lighter particles such as cysts into the surrounding area. Birds from the nearby TSNWR often forage in these pools and can transport soil and cysts between pools. Much of the vernal pool habitat at NOLF IB is protected and managed as part of the TRNERR. Most of the

pooling areas within the fence are highly volatile and are constantly changing. Many of these pools are located on roads and are almost inevitably influenced by vehicle traffic and may be unintentionally modified by such activity. Nevertheless, some of the road pools are capable of holding water for long periods of time.

The final rule for designation of critical habitat for the San Diego Fairy Shrimp was issued on December 12, 2007 (72 Federal Register 70647), and excluded habitat at NOLF IB. Since the final rule came into effect on January 11, 2008, NBC property no longer includes any critical habitat for this species. Critical habitat for these species was not designated on NBC property because the National Defense Authorization Act of Fiscal Year 2004, Public Law 108-136, amended Section 4 of the ESA by exempting military lands that are subject to an INRMP from critical habitat designation, if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation (U.S. Navy 2008f).

Management Objective and Strategy

Objective: At a minimum, maintain populations in all pools with previously documented occupation based on 2001 and subsequent surveys and avoid anthropogenic transport of cysts to unoccupied areas (including San Clemente Island).

Strategies:

1. Conduct invasive species control and monitor populations to ensure no excessive predation.
2. Perform periodic monitoring using established protocols for San Diego fairy shrimp surveys.
3. Complete a vulnerability assessment.
4. Complete the NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).

Western Snowy Plover

Western Snowy Plovers were not recorded on NOLF IB property during general avian surveys in 2009-2010. The sandy beaches and dunes along the ocean shore of the nearby Tijuana estuary support important breeding populations of the Western Snowy Plover (U.S. Navy 2011g).

Specific Concerns

- Development on and adjacent to beach;
- Other natural resources management objectives (e.g., invasive species removal during the nesting season);
- Facilities maintenance;
- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Military training on beach;
- Predation;
- Invasive species on beaches and
- Flooding and sedimentation.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

The Western Snowy Plover is not known to occur within the NOLF IB property. During the 2009 Navy NR inventory conducted at NOLF (U.S. Navy 2011g), the Western Snowy Plover was observed within the survey boundary within a small strip of sandy beach and coastal dunes. These observations were later found, however, to be outside of the NOLF IB installation boundary. The area was believed to be a part of the NOLF boundary but was later discovered to be within USFWS property. All management of Western Snowy Plover within the Tijuana Estuary is conducted by the USFWS and CA State Parks.

Light-footed Clapper Rail

Nine times Light-footed Clapper Rails were detected on NOLF IB during the 2002 natural resources inventory in the northwestern section of the Tijuana Estuary: two during spring (30 March 2002), two during the breeding season (April 22-24 and May 31, 2002), and five during the fall (October 23-24, 2002) (U.S. Navy 2006d).

Twenty-nine pairs of Light-footed Clapper Rails were detected on NOLF IB in 2005, including one pair at the river's edge near the mouth of the Tijuana River (off of the southwest corner of the airfield. No nests were found during the April 16, 2005 nest search. During focal surveys for secretive marsh birds in 2009, a total of 61 birds were recorded during the breeding season in May and June. A third of these were detected at one of the 13 stations, which was located closest to its preferred cordgrass habitat. Light-footed Clapper Rails were all observed aurally during general avian surveys in the estuary west of the airfield boundary fence (U.S. Navy 2011g) (see **Figure 7-5**).

The Light-footed Clapper Rails on NOLF IB are part of a larger population in the Tijuana Estuary supported through management by the USFWS and the TRNERR. A Navy-funded survey on 1 March 2005 resulted in a count of 79 breeding pairs in the TSNWR. Additional pairs were detected on 16 April 2005 during the nest searching effort in the upland area of the marsh containing fresh water reed ponds not covered on 1 March 2005, increasing the total count of Light-footed Clapper Rails at the TSNWR and NOLF IB to 87 pairs (Hoffman 2007). NOLF IB has contained between 12 to 64 percent of the Light-footed Clapper Rail population in the Tijuana Estuary since annual censuses began in 1980. This subpopulation has thrived under a management regime that includes maintaining tidal flow in the marsh and restricting human activity (Hoffman 2007). During the annual state survey conducted in 2012, 101 pairs of Light-footed Clapper Rails were documented in the Tijuana Marsh.

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Other natural resources management objectives;
- Facilities maintenance;
- Stormwater management;

- Predation;
- Invasive species within marsh;
- Impacts from Environmental Restoration clean-up projects;
- Possible impacts from contaminants, including heavy metals and PCB's and
- Flood control and river maintenance to restore natural flow.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Enhance productivity to maintain populations of Light-footed Clapper Rail on NOLF IB.

Strategies:

1. Coordinate with the USFWS and CDFW to ensure NOLF IB property within USFWS TSNWR is being surveyed for Light-footed Clapper Rail. Implement additional monitoring if necessary.
2. Implement site approval process and NEPA to avoid and minimize impacts to marsh habitat (e.g., direct development away, direct lighting away, and minimize predator perches).
3. Follow stormwater management plan regarding monitoring SWTAs. Coordinate all marsh impacts with NRO.
4. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
5. Amend stormwater management plant to recognize nesting seasons of Light-footed Clapper Rail and ensure clearing of outfalls adjacent to marsh areas occurs during non-breeding season.
6. As necessary, perform invasive species control in areas where Light-footed Clapper Rail habitat is known to exist.
7. Enhance habitat through revegetation projects.
8. Work with USFWS to investigate impacts from contaminants and determine appropriate management response.
9. Support regional captive-rearing efforts.
10. Continue to participate with the TJ River Valley Recovery Team.

Southwestern Willow Flycatcher

Surveys performed in 2009 failed to detect any Southwestern Willow Flycatchers at NOLF IB. Habitat does exist at the site to support pairs of this species: black willow stands in the southeastern corner and arroyo willow stands near watercourses. One Willow Flycatcher, likely the northern California subspecies (*E. T. brewsteri*), was observed during the March 2009 survey indicates that appropriate habitat exists (U.S. Navy 2011g).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Nest parasitism;
- Facilities maintenance;
- Impacts from recreational trail use;
- Predation. The Black-throated Magpie Jay, a non-native species recently established in the TRV;
- Invasive species within riparian habitat and
- Dieback of riparian plants, likely due to reduced freshwater inflows from Mexico and associated saltwater intrusion.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

The Southwestern Willow Flycatcher occurred historically within the Tijuana River Valley, and suitable riparian habitat is found on NOLF IB. The U.S. Navy conducts USFWS protocol surveys approximately every three years to assess the presence/absence of this species, but the SWFL has not been found on the property to date. Surveys were most recently completed in 2009 and 2012 (U.S. Navy 2011g). Habitat for this species is managed and maintained through the terms of the MOU with the USFWS (USFWS 1992). The U.S. Navy also funds the removal of invasive riparian plants, including giant reed (*Arundo donax*), and the restoration of riparian habitat.

California Least Tern

California Least Terns were noted at NOFL IB only during the sensitive marsh bird surveys in 2009. They breed on sandy beaches at the mouth of the nearby Tijuana River and are present from April to August (U.S. Navy 2011g).

Specific Concerns

- Development on and adjacent to beach;
- Other natural resources management objectives;
- Facilities maintenance;
- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Military training on beach;
- Predation;

- Invasive species on beaches and
- Flooding and sedimentation.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

The California Least Tern is known to forage along the Tijuana River within NOLF IB; however, this species does not nest on NOLF. Foraging habitat on the installation is protected through the terms of the MOU with USFWS (USFWS 1992). All management of California Least Tern nesting areas within the Tijuana Estuary is conducted by the USFWS and California State Parks.

Least Bell's Vireo

Five Least Bell's Vireos were documented in the willow riparian area on NOLF IB during the breeding season (i.e., late-April to early-June) during the 2002 natural resources inventory (U.S. Navy 2006d). During focal surveys in 2009, a total of 23 pairs or territorial males were recorded along with an additional seven transient males. Of these 23 pairs, 15 were confirmed nesting, either by adults carrying nesting material or associating with fledglings or by observing nests with eggs. Vireos were found in riparian vegetation and substantial willow stands, primarily within the eastern and southeastern portion of NOLF IB, and were also abundant in areas characterized by dense stands of arroyo willow and arrow willow/mulefat (U.S. Navy 2011g).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Nest parasitism;
- Facilities maintenance;
- Impacts from recreational trail use;
- Predation. The Black-throated Magpie Jay, a non-native species recently established in the TRV;
- Invasive species within riparian habitat and
- Dieback of riparian plants, likely due to reduced freshwater inflows from Mexico and associated saltwater intrusion.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Enhance productivity to maintain populations of Least Bell's Vireo on NOLF IB.

Strategies:

1. Implement site approval process and NEPA to avoid and minimize impacts to marsh habitat (e.g., direct development away, direct lighting away, and minimize predator perches).
2. Conduct invasive species control.
3. Enhance habitat through revegetation projects.
4. Control Brown-headed Cowbirds to decrease nest parasitism.
5. Survey population at least every 3 years using USFWS protocol. Include nest and territory monitoring, if feasible.
6. Continue to coordinate trails management through TRNERR Trails Committee.
7. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
8. Investigate the major predators of Least Bell's Vireo nests and the diet of Black-throated Magpie Jays in the valley to determine impact on Vireos. If warranted, consider implementing a control program."
9. Continue to participate with the TJ River Valley Recovery Team.
10. Work with USFWS to investigate the major predators of Least Bell's Vireo nests and the diet of Black-throated Magpie Jays in the Tijuana River Valley to determine impact on vireos. If warranted, consider implementing a control program.

7.2.5.2 Other Special Status Species

In addition to federally threatened and endangered species, NOLF IB recognizes species that occur at a level of rarity that currently does not warrant Federal listing. **Table 7-5** lists other special status species and their corresponding CDFW or other Federal status. No focused management or surveys currently take place on NOLF IB for most of the other special status species.

One rare plant, as listed by the CNPS, was documented on NOLF IB during the periodic natural resources surveys (see **Figure 7-6**). This species is listed on the CNPS Lists 1B. List 1B includes plants that are rare, threatened, or endangered in California and elsewhere. The plants of List 1B are rare throughout their range with the majority of them endemic to California. Most of the plants of List 1B have declined significantly over the last century. List 1B plants constitute the majority of the plants in CNPS' Inventory with more than 1,000 plants assigned to this category of rarity. All of the plants constituting List 1B meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Wildlife Code, and are eligible for state listing (CNPS 2010).

Other Special Status Species with Focused Management

Western Borrowing Owl

One Western Burrowing Owl was observed by U.S. Navy personnel on NOLF IB in January 2004. It was observed using a burrow on the airfield, near the "Dog House" by a culvert (Conkle 2004). Several other

observations of Western Burrowing Owls on the airfield, particularly south of the runway, were made in 1997 and 1998 (NOLF IB undated). Only one pair of Western Burrowing Owls was found to be nesting at NOLF IB during a 2006 survey. This Burrowing Owl Pair did fledge four young on NOLF IB in 2006. One additional Burrowing Owl was present on NOLF IB but was predated, likely by a mammalian species (U.S. Navy 2006d).

Specific Concerns

- Development within suitable habitat and habitat fragmentation;
- Lack of nesting burrows;
- Lack of habitat maintenance and mowing due to infrequent mowing. Grass and shrub height within owl habitat should be maintained between 4 to 8 inches;
- Facilities maintenance;
- Predation by Burrowing Owls on Snowy Plover and Least Terns;
- Predation by raptors;
- Lack of sufficient food resources (i.e., insects);
- Invasive weeds altering habitat (e.g., fountain grass) and
- Climate change (e.g., changes in temperature or sea level rise) and associate impacts (e.g., changes in food resources).

Current Management

A Western Burrowing Owl management plan is being developed and owl monitoring (including burrow marking) continues every year based on funding availability. Mowing in areas of potential Western Burrowing Owl habitat continues on a regular basis.

The following procedures are common to all Western Burrowing Owl management areas:

- Small signs are placed next to each active burrow to identify the site as a nest and restrict any potentially harmful activities.
- The use of rodenticides and insecticides is forbidden. Herbicides are permitted for use with approval from the natural resource department. The use of pesticides that may affect ground squirrels in Western Burrowing Owl habitat is explicitly restricted.
- Surveys are conducted during the breeding and nonbreeding seasons. Burrows are examined for condition and predation on sensitive species. Adults, and any relocated juveniles, are banded during breeding season surveys using USFWS colored leg bands. Winter surveys are conducted to measure productivity of each site. Artificial burrows have been installed in recent years.
- Burrowing Owls and their habitat are managed to encourage successful breeding and sustainability with the goal of supporting a minimum number of nesting pairs.
- All active burrows are marked with standard markers to ensure that burrows are not destroyed by maintenance activities (e.g., mowing, pest management, and golf course maintenance).
- Beneficial mowing continues each year to allow for the success of Western Burrowing Owl foraging. Mowing contracts include language to avoid burrow markers.

- Ground squirrels are managed to benefit Western Burrowing Owls. Burrowing Owls use burrows created by ground squirrels. Ground squirrel control is done in areas where the ground squirrels increase the BASH risk or negatively affect other essential operations. To sustain ground squirrel populations, no rodent control is conducted unless mandated by an outbreak of disease or the rodents are negatively impacting a listed species. Squirrel burrows are never filled, buried, or gassed without consulting the NBC Wildlife Biologist.
- Specific areas that support Western Burrowing Owls as well as current nesting areas and/or nesting areas from the previous year are considered mitigation sites.
- Burrowing Owls that are documented predators of the federally listed California Least Tern and Western Snowy Plover are removed or managed in a manner that eliminates their impact on the listed birds (e.g., covered with a flight cage).

Management Objective and Strategy

Objective: Maintain and enhance Western Burrowing Owl populations on NOLF IB while considering BASH concerns and impacts to listed species.

Strategies:

1. Finalize and implement the NBC Burrowing Owl Management Guidelines.
2. Educate workforce on Western Burrowing Owl management.
3. Implement site approval process and NEPA to avoid and minimize impacts to owls (e.g., direct development away from habitat, direct lighting away, and minimize predator perches).
4. Maintain healthy population of California ground squirrels.
5. Monitor grass growth around airfield and maintain grass height of approximately 4 inches.
6. Coordinate with all stakeholders.
7. Control invasive weeds to provide sufficient open, grassy areas for nesting and wintering.
8. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
9. Continue burrow monitoring through BASH program (weekly surveys during nesting season and twice monthly during non-nesting), quarterly base-wide surveys at NASNI/NOLF IB. Ensure that all owl chicks are banded.
10. Ensure owls found preying on threatened, endangered, and candidate species are not lethally removed.

Belding's Savannah Sparrow

A total of 57 individuals were observed in the estuarine and agriculture/human-influenced habitats on NOLF IB during the 2002 natural resources inventory: 23 individuals were observed during the spring survey, 27 individuals were observed during the breeding season, 2 individuals were observed during the fall survey, and 5 individuals were observed during the winter survey (U.S. Navy 2006d). Additionally this species was observed during general avian surveys conducted in 2009. It was documented that of the state endangered and protected species, the Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*) is by far the most common. This subspecies is endemic to the salt marshes of southern

California and was observed throughout the estuary and Border Field State Park, adjacent to NOLF IB (U.S. Navy 2011g) (see **Figure 7-5**).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Other natural resources management objectives;
- Facilities maintenance;
- Stormwater management;
- Predation;
- Invasive species within marsh and
- Impacts from Environmental Restoration clean-up projects.

Current Management

Belding's Savannah Sparrow is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. Known locations are mapped, and site-specific surveys are conducted to confirm the locations of this species. Invasive plant control and some habitat enhancement are periodically undertaken by the U.S. Navy as part of the project planning (U.S. Navy 2010c). No designated critical habitat currently exists on NOLF IB. **Appendix I** identifies within the INRMP all management and conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.

Management Objective and Strategy

Objective: Maintain and enhance populations of Belding's Savannah Sparrow on NOLF IB.

Strategies:

1. Coordinate with USFWS and CDFW to ensure NOLF IB property within USFWS TSNWR is being surveyed
2. Implement site approval process and NEPA to avoid and minimize impacts to marsh habitat (e.g., direct development away, direct lighting away, and minimize predator perches).
3. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
4. Amend stormwater management plant to recognize nesting seasons of Belding's Savannah Sparrow and ensure clearing of outfalls adjacent to marsh areas occurs during non-breeding season. Follow stormwater management plan regarding monitoring SWTAs. Coordinate all marsh impacts with NOLF IB.
5. As necessary, perform invasive species control in areas where Belding's Savannah Sparrow habitat is known to exist.
6. Enhance habitat through revegetation projects.

San Diego Black-tailed Jackrabbit

The San Diego black-tailed jackrabbit is known to occur on NOLF IB. This species is fairly abundant in upland coastal sage on the property. The habitat at NOLF IB is quite suitable for rabbits; many clumps of shrubs are separated by open grasslands. Rabbits eat a wide variety of shrubs forbs and grasses, and have potential to be eaten by almost any predator at NOLF IB (U.S. Navy 2011g). See **Figure 7-6** for observations of San Diego black-tailed jackrabbit on NOLF IB.

Specific Concerns

- Facilities projects (e.g., construction and maintenance);
- Climate change (e.g., changes in temperature or sea level rise) and
- High jackrabbit population leading to elevated BASH risks."

Current Management

San Diego black-tailed jackrabbit is managed through habitat protection, inventory, and monitoring; most individuals occur in areas that receive some degree of use. As part of the project siting process, avoidance measures are undertaken, where practicable, to protect this species. The San Diego black-tailed jackrabbit is a fairly common species within the upland coastal sage scrub at NOLF IB. Management of this species within the USFWS/Navy overlay with the TSNWR is conducted by USFWS, per the MOU (USFWS 1992). The Navy conducts periodic general mammal surveys during the natural resources inventory efforts. The last survey was conducted in 2009 and is scheduled to be repeated approximately every five years. Airport Wildlife Hazard Surveys are conducted twice each month through the Navy's BASH program and consists of ten-minute monitoring periods at eight pre-selected survey points throughout each airfield. These surveys are used to document use of the airfield by all wildlife including this species. Due to the limited amount of vegetation and cover, San Diego black-tailed jackrabbits are rarely observed within the NOLF IB fence line (Pers. Comm. Eddson 2012).

Management Objective and Strategy

Objective: Maintain healthy populations of San Diego black-tailed jackrabbit while considering flight mission and BASH concerns on NOLF IB.

Strategies:

1. To avoid lethal removals, work with local scientists (e.g., San Diego Natural History Museum) and CDFW to relocate jackrabbits to areas of the county where numbers are low.
2. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.

Other Special Status Species with General Management

In addition to special status species detected during the periodic natural resources surveys, several other special status species have been observed and are known to occur on NOLF IB (see **Table 7-5** for a complete list). No focused management or surveys currently take place on NOLF IB for these other special status species.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;

- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. Plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship.

All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary. In addition, a portion of NOLF IB lands are managed as part of the TRNERR. The land management policies provided for the TRNERR are intended to protect areas that contain sensitive habitats and endangered, threatened, or sensitive native species, therefore, the type and intensity of public use and resource management allowed within the TRNERR vary depending upon the sensitivity of the resources in a given area. Activities in areas within and/or adjacent to tidal channels, natural salt marsh habitat, and the back dunes, as well as riparian and coastal sage scrub habitats, are limited to those activities that directly contribute to resource protection and restoration and to public uses that are determined to be compatible with the protection of sensitive resources. Such restrictions are necessary to maintain a natural and healthy estuarine ecosystem for the special status species (i.e., Belding's Savannah Sparrow) that are supported within these habitats (TRNERR 2010).

Management Objective and Strategy

Objective: Minimize the potential for adverse effects on special status species and their associated ecosystems while protecting the operational functionality of the installation mission by using an ecosystem-based management approach.

Strategies:

1. Establish an education program for military personnel who might have contact with special status species or their habitats. This training program will help ensure the success of special status species management on NBC and prevent inadvertent impacts on special status species.
2. Investigate the need for implementing research projects to understand ecological requirements of special status species.
3. Continue use of the established NBC Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
4. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
5. Review and update species lists and constraints maps to reflect presence of threatened, endangered, and other special status species.
6. Conduct regular surveys for threatened, endangered, and candidate species that may be present on NOLF IB.

7. Continue monitoring special status species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
8. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
9. Augment education program currently conducted at NOLF IB for military personnel who might have contact with sensitive species or their habitats.
10. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats. Implement erosion control BMPs to ensure adverse environmental impacts to sensitive habitat do not occur.
11. Revegetate with native species included on the NBC recommended plant list. Include sensitive plant species in the recommended plant list.
12. Periodically review the natural resources management program to ensure that management actions do not adversely impact special status species habitat.
13. Maintain accurate, usable, and informative GIS data for ease in management planning and documentation.
14. Continue to protect existing native plant communities whenever possible.

7.2.6 Invasive Species Management

Invasive species management is a large part of pest management activities. The Federal Noxious Weed Act and EO 13112 require Federal agencies to control noxious and invasive species on Federal lands. The Federal Noxious Weed Act, enacted January 3, 1975, established a Federal program to control the introduction and spread of foreign noxious weeds into the United States. Amendments in 1990 established management programs for undesirable plants (including noxious weeds) on Federal lands. There are several plant species that are considered noxious and control is mandatory for those found on the Federal list. EO 13112 requires that Federal agencies prevent the introduction of invasive species, detect and control populations of invasive species, and restore native species and habitat conditions in ecosystems that have been invaded. Invasive species are alien species (not native to the ecosystem) whose introduction does, or is likely to, cause economic or environmental harm, or harm to human health. All of the invasive weeds listed on the Federal list are not necessarily found at NOLF IB.

The California Wildlife Action Plan has identified the growth and spread of floral and faunal invasive species in the state as a major concern to maintaining biodiversity in the state (CDFG 2007). As a result, NBC natural resources personnel on NOLF IB ensure that invasive species are not introduced on the installation, and have developed a program to control the spread of and the eradication of existing infestations of invasive species.

Problems associated with invasive non-native plants and animals are currently being addressed at many different levels in California, within the constraints of budgets and staffing resources. Examples include the California Invasive Plant Council (Cal-IPC) which supports coordination for activities addressing noxious weeds within the state. The NRCS also has a lead role in coordinating an aggressive state/Federal/private effort to eradicate, or at least stop, the spread of invasive species.

Invasive Plants

In 2006, Cal-IPC updated the 1999 *Exotic Pest Plants of Greatest Ecological Concern in California* inventory list (Cal-IPC 2006). The updated Cal-IPC inventory ranks invasive species using a *High*, *Moderate*, *Limited*, or *Evaluated but not listed* scale based on ecological impact of the species. Invasive species were ranked based on four criteria that included (1) ecological impact of the species on native California ecosystems, (2) potential for species to either be or become invasive, (3) species distribution, and (4) documented levels of the species within a region or ecosystem. A description of each ranking level based on these four criteria as defined by Cal-IPC, is presented below (Cal-IPC 2006):

High: These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. These species are usually widely distributed ecologically, both among and within ecosystems.

Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology is conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited: The ecological impacts of these species are minor or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasion. Ecological amplitude and distribution are generally limited (these species may be locally persistent and problematic).

Evaluated but not listed: In general, this designation is for plant species that did not have enough information to warrant a rating or the information available indicated that the plant species does not currently have significant impacts within California.

Alert: This is an additional designation for some species in either the high or moderate category, but whose evaluation is limited. The designation alerts managers to species that are capable of rapidly invading unexploited ecosystems, based on initial localized observations and on observed ecological behavior in similar ecosystems elsewhere.

Cal-IPC inventory species observed on NOLF IB and their associated Cal-IPC ranks are shown in **Table 7-5**. **Figure 7-7** illustrates locations of invasive floral and faunal species on or near NOLF IB. While Cal-IPC is a valuable resource, new infestations appear frequently, and the sheer number of invasive species in the state of California can make it difficult for one agency to track in a timely manner. Installation staff may be required to do independent research to ensure that a potentially invasive species are not introduced to an area. Additionally, some species that have not previously appeared to be invasive may quickly become invasive due to climatic or other factors (Pers. Comm. Munson 2012).

All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide/herbicides authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager. Chemical and manual exotic and invasive species treatments are required to be entered in the NAVFAC Online Pesticide Reporting System.

Table 7-5: Invasive Species Observed on Naval Outlying Landing Field Imperial Beach

Common Name	Scientific Name	Cal-IPC Rank
Acacia	*Acacia* sp.	Moderate or Limited
Giant reed	*Arundo donax*	High
Australian saltbush	*Atriplex semibaccata*	Moderate
Wild oat	*Avena fatua*	Moderate
Hottentot-fig, iceplant	*Carpobrotus edulis*	High
Malta starthistle, tocalote	*Centaurea melitensis*	Moderate
Crown Daisy, garland chrysanthemum	*Chrysanthemum coronarium*	Moderate
Bermuda grass	*Cynodon dactylon*	Moderate
African daisy	*Dimorphotheca sinuata*	Eval No List
Broadleaf filaree, longbeak stork's bill	*Erodium botrys*	Eval No List
Redstem filaree, redstem stork's bill	*Erodium cicutarium*	Limited
Fennel	*Foeniculum vulgare*	High
White horehound	*Marrubium vulgare*	Limited
Myoporum	*Myoporum laetum*	Moderate
Tree tobacco	*Nicotiana glauca*	Moderate
Rabbit foot grass, annual beard	*Polypogon monspeliensis*	Limited
Wild radish	*Raphanus sativus*	Limited
Castorbean	*Ricinus communis*	Limited
Curley dock	*Rumex crispus*	Limited
Pepper tree	*Schinus* sp.	Limited
Smallflower tamarisk	*Tamarix parviflora*	High

Source: NOLF IB 2004, Cal-IPC 2006

The giant reed covers 2.7 hectares (6.6 acres) of NOLF IB in an area southeast of the airfield area, generally in patches within the black willow and mixed willow (U.S. Navy 2006d). Two of the most prevalent invasive non-native species currently on NOLF IB are hoary cress (*Cardaria draba*) and prickly Russian thistle (*Salsola tragus*). Other primary invasives that were targeted in the 2008 *NOLF IB Natural Resource Management and Habitat Enhancement* project included mustards (*Hirschfeldia incana* and *Brassica nigra*), tamarisk, and tree tobacco (*Nicotiana glauca*) (U.S. Navy 2008h). Invasive non-native plant control was also conducted on NOLF IB in 2007. The main plant treated in this area was tamarisk along the border of the installation on Navy lands that are jointly managed by the Navy and the USFWS as part of the TSNWR (U.S. Navy 2008h).

Invasive Wildlife

Brown-headed Cowbirds. A trapping project for the control of Brown-headed Cowbirds (*Molothrus ater*) was initiated by the Navy in 2008 within the southern boundary of the NOLF IB. The purpose of this project is to control the size of the resident breeding population of Brown-headed Cowbirds on NOLF IB and thereby reduce nest parasitism on the federally endangered Least Bell's Vireo population, which nest on NOLF IB, within the Tijuana River Valley. Cowbird control through trapping has proven to be an effective method at reducing brood parasitism of sensitive songbirds throughout the United States. From 2008–2011, three traps were placed and activated each year within or adjacent to riparian habitat in the project area (see **Table 7-6** for results) (U.S. Navy 2011h).

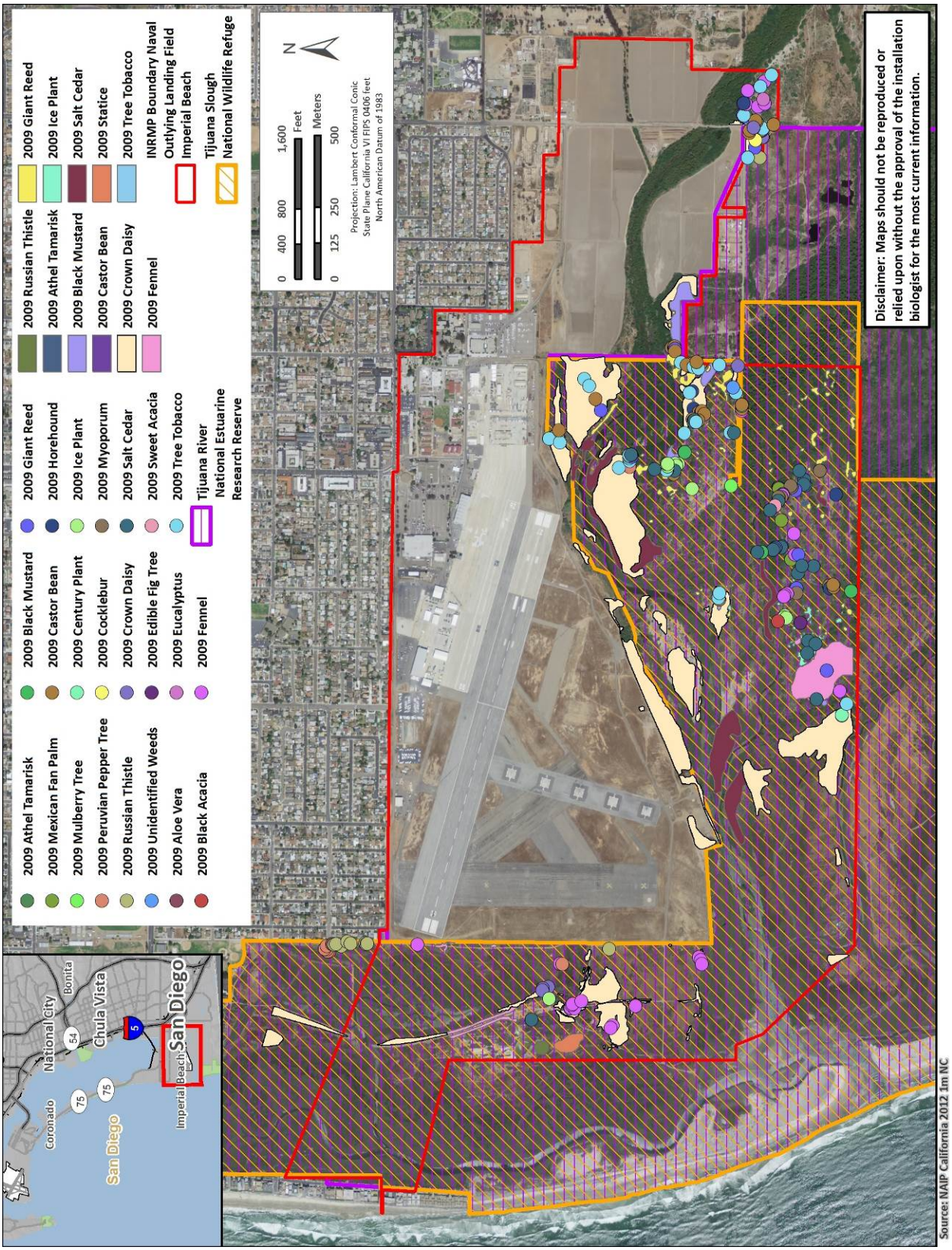


Figure 7-7: Naval Outlying Landing Field Imperial Beach Locations of Invasive Species

Table 7-6: Brown-headed Cowbirds Trapped at Naval Outlying Landing Field Imperial Beach from 2008-2011

Year	No. of Traps	Dates of Trap Period	No. of Days	Total Trap Days[1]	Number of Cowbirds Removed			
					Male	Female	Juvenile	Total
2008	3	2-31 July	30	90	1	2	1	4
2009	3	15 Apr.–30 Jul.	107	321	15	7	9	31
2010	3	1 Jun.- 30 Jul.	60	180	5	5	4	14
2011	3	12 Apr.-30 Jul.	110	306	8	16	0	24

Note: [1] Total trap days = (No. of traps x No. of days in operation) – (No. of days individual traps are inactive)

Specific Concerns

- Anthropogenic disturbances (e.g., foot traffic) can be a potential source of invasive species;
- Landscaping on and off the installation;
- Rapid spread of invasive non-native plants that displace native species and degrade habitat for native floral and faunal species;
- Climate change (e.g., changes in temperature or sea level rise) and
- Horseback riders bringing in invasive species and straying off trails.

Current Management

NOLF IB has developed a program to monitor and control the spread of existing infestations of invasive species, and to determine if new species populations have become established. Assessments of invasive species populations are conducted annually during the rainy season to determine extent of invasive species populations on NOLF IB. Once assessed, species are prioritized for treatment based on the extent of the infestation, and where the populations are located (e.g., next to listed species habitat). NOLF IB is actively monitoring for and controlling invasive species; however, there is no formal plan in place to ensure that control activities employed by NOLF IB are consistent and effective.

Management Objective and Strategy

Objective: Minimize non-native species encroachment in areas where severe to moderate encroachment occurs, and in new areas of encroachment where infestation might be spreading but is not yet severe.

Strategies:

1. Annually review and update the NBC recommended plant list.
2. Develop and implement an Invasive Species Management Plan to control the spread of invasive species on NOLF IB. The plan should include specific prescriptions to evaluate individual invasive species, to identify targeted species, to control further spread of targeted species, and to develop and implement a program to monitor species abundance.
3. Conduct annual surveys to determine whether controls on existing infestations of species have been effective, and whether new populations have become established.

4. Develop and implement a review process for all projects that include a landscaping component to ensure non-native species are not introduced.
5. Coordinate with the Natural History Museum to identify unknown species that may be invasive.
6. Develop outreach and education materials for distribution within the NOLF IB community.
7. Coordinate with the Southwest Wetlands Interpretive Association to participate in the invasive species eradication program.

Introduction and Spread of Invasive Species

Objective: Minimize non-native species encroachment in areas where severe to moderate encroachment occurs, and in new areas of encroachment where infestation might be spreading but is not yet severe.

Strategies:

1. Annually review and update the NBC recommended plant list.
2. Develop and implement an Invasive Species Management Plan to control the spread of invasive species on NOLF IB. The plan should include specific prescriptions to evaluate individual invasive species, to identify targeted species, to control further spread of targeted species, and to develop and implement a program to monitor species abundance.
3. Conduct annual surveys to determine whether controls on existing infestations of species have been effective, and whether new populations have become established.
4. Develop and implement a review process for all projects that include a landscaping component to ensure non-native species are not introduced.
5. Coordinate with the Natural History Museum to identify unknown species that may be invasive.
6. Develop outreach and education materials for distribution within the NOLF IB community.

Early Detection and Rapid Response

Objective: Enhance current early detection and rapid response management capabilities.

Strategies:

1. Ensure the bio-security plan establishes early detection protocol and rapid response options, to include the following:
    a. Establish adequate monitoring locations to detect invasive species introduction and spread.
    b. Develop a communication network as a rapid response tool to quarantine specific invaders and identify the pathway.
    c. Support rapid response by determining funding sources, contract vehicles, and cooperative mechanisms that can be accessed quickly.
    d. Prepare Instructions that include measures to prevent the introduction of invasive non-native species, detect early and respond rapidly to new introductions, and control and monitor established populations.
2. Prepare educational materials for NOLF IB military and civilian employees, contractors, and other visitors as a tool in early detection of non-native terrestrial species.

Project Planning

Objective: Ensure control and management of invasive species is included in project planning and maintenance projects.

Strategies:

1. Address non-native species in NEPA and other ground disturbing project plans.
    a. Ensure funding is secured for non-native removal during all phases (including post-project), if applicable.
    b. Monitor projects to ensure personnel are following BMPs, conservation measures, and other guidelines and requirements.
2. Manage roads, access routes, and new construction sites to minimize the spread of invasive non-native species and ensure that road or access routes are not created without authorization and project review approval.
    a. Require that maintenance or repair of existing roads stay within established footprints.
    b. Clean roadside mowing equipment of adhering dirt and vegetation between mowing cycles.
    c. Schedule roadside mowing to minimize weedy species seed distribution.
3. If applicable, project proponent must include invasive species treatments and revegetation of temporarily disturbed areas in project description.
4. Wash vehicles and personnel boots, bags, and clothes before coming on site; before moving to a different site on bases, as applicable; and before leaving base, as applicable. Implement standard operating procedures to ensure personnel are following guidelines.

Coordination with Regional Agencies

Objective: Promote cooperative interagency efforts to collect and analyze comprehensive monitoring data, including shared funding and staffing.

Strategies:

1. Coordinate with regional and local agencies on efforts undertaken by NOLF IB to control the spread of invasive and exotic species.

7.2.7 Grounds and Landscape Maintenance

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat. Planting windbreaks around buildings and parking areas, establishing wildflower areas, and reducing mowing are all ways to spend dollars more wisely, educate the public about the benefits of reduced maintenance, and become better stewards of the environment. In managing natural resources in the cantonment area, NOLF IB acknowledges its responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (1994). The memorandum's requirements include the following:

- Using regionally native plants for landscaping;

- Using construction practices that minimize adverse effects on the natural habitat;
- Reduce pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- Implementing water-efficient practices and
- Creating demonstrations of these practices to promote their use elsewhere.

Landscaping opportunities exist throughout NBC in association with administration buildings, training facilities, recreational areas, and housing. Normal grounds maintenance operations focus on lawn care, drainage ditch maintenance, road maintenance, landscaping maintenance, and pest management.

Specific Concerns

- Water use conservation requirements.

Current Management

The installation's representative biologist and NAVFAC SW landscape architect monitor landscaping and grounds projects to ensure that all projects follow the guidance contained in the NBCC recommended plant list (see **Appendix I**). This guidance includes:

1. Landscape designs and plant lists shall be reviewed and approved by the Installation Botanist, Installation Wildlife Biologist, and NAVFAC Landscape Architect in the planning stages of project design.
2. Ensuring that projects comply with the most recent version of the landscaping plant list.
3. It is vital that coordination with the U.S. Navy points of contact listed above occur early in the planning process to determine site-specific needs and constraints. Please note that not all species on this list are appropriate for all settings. For example, in some areas trees may not be approved due to the presence of federally listed species.
4. Additional species may be included in the landscape design contingent upon the approval of the Navy points of contact listed above. All plants shall be verified for availability in size and quantities needed for each project prior to specifying on plans or scopes of work.
5. The list is updated periodically. Prior to initiating a project, please obtain the most recent list from either of the U.S. Navy points of contact listed above.

Management Objective and Strategy

Objectives: Maintain an aesthetically pleasing landscape on NOLF IB that preserves natural ecosystem functions, conserves water in landscaped areas, and promotes pollinator species.

Strategies:

1. Provide professional advice to assist the grounds landscaping and maintenance program in the use of native species as identified in the NAVFAC SW recommended plant list.
2. Maintain and annually update the list of recommended plants that can be used in landscaping.

3. Develop and implement BMPs for grounds maintenance at NOLF IB (e.g., water conservation). Periodically review the Landscape Management Plan to ensure plan BMPs still meet installation needs.
4. Restore native plant communities and collect seeds of native species for submittal to Natural History Museum.
5. Develop monitoring metrics, and set targets to ensure management strategies are meeting goals and objectives.

7.2.8 Pest Management

Authority for pest management activities on NOLF IB is directed under the Federal Insecticide, Fungicide and Rodenticide Act as amended (7 U.S.C. 136r-1), DoD Instruction 4150.07, SDMAI IPMP, December 2009, and OPNAVINST 6250.4C, Pest Management Programs. IPM is a sustainable approach that incorporates the use of multiple techniques to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control might be an option used in conjunction with other methods. IPM strategies depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts. DoD Instruction 4150.07 establishes annual goals, or measures of merit, for IPM that include the following:

- All DoD installations will have current pest management plans;
- Maintain the 55 percent pesticide use reduction achieved from 1993-2003 (in pounds of active ingredient) and
- All installation and contract pesticide applicators will be appropriately certified or licensed.

In addition, OPNAVINST 6250.4C directs the U.S. Navy and Marine Corps to (DoN 2012):

a. Prevent pests from adversely affecting military operations and missions.
b. Safeguard human health and morale by controlling pests that transmit diseases, annoy personnel, or represent a hazard to public health or safety.
c. Maintain and extend the service life of facilities, structures, and materiel by preventing economic pest damage.
d. Enhance the natural environment through the careful protection and management of ecosystems, endangered and threatened species, wildlife, watersheds and water quality in order to maintain optimal biodiversity.
e. Ensure pesticide use is safe and consistent with label directions.
f. Use the principles of IPM to avoid and minimize the use of pesticides when nonchemical alternatives are available and cost effective.
g. Comply with quarantine laws and regulations as related to protecting plants, animals and human health.
h. Comply with laws and regulations concerning pesticide storage, application, disposal of hazardous wastes, and transport of hazardous materials and substances.

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations. The NBC Instruction 5100.2G (10 Jan 2006) regarding Animal Control on board Naval

Base Coronado Installations and Dog Beach and Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

1. Installation residents should keep and feed pet animals indoors and under close supervision.
2. Support programs to neuter or spay animals before they reach reproductive age.
3. Require routine vaccinations for rabies and other diseases.
4. Require microchipping registration of all pets brought onto installations.
5. Prohibit the feeding of feral animals on the installation.
6. Provide educational materials to pet owners regarding installation regulations and general pet management.
7. Never abandon animals.
8. Comply with all humane and animal control regulations at the Federal, state, and local level.
9. Except for guide and military working dogs, animals are not allowed in the barracks, work spaces, or recreational facilities at any time, and those in duty status are not permitted to bring animals on board.
10. All dogs must be properly vaccinated, on leash at all times, must not become a nuisance due to noise/odor, and must be picked up after.
11. No animals shall be left unattended or in a poorly ventilated vehicle.

Specific Concerns

- Water use conservation requirements and
- Overuse of fertilizers.

Current Management

The 2009 IPMP for SDMAI, which includes NOLF IB , describes pest management requirements, identifies pests for SDMAI, outlines roles and responsibility for IPM at each SDMAI, outlines procedures for pest control at each facility, and describes the administrative, safety, and environmental requirements of the program. Specific aspects of the program include pest identification, pesticide management (includes storage, transportation, and use and disposal), environmental health and safety, emergency pest management, and available program resources (U.S. Navy 2009a). All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager.

Threatened, endangered, or candidate species can be directly or indirectly affected by pest control activities. The following pest management operations require natural resource manager review:

- Weed and outdoor pest control in endangered/threatened species habitats and natural areas;
- Outdoor large area insecticide fogging;
- Pesticide applications to, over or adjacent to water bodies, waterways, or wetlands;
- Installation of bird barriers, exclusion devices, or repelling devices;
- Wildlife and feral animal control and
- Invasive species control.

Natural resources managers will obtain any necessary approvals, consultations, or permits. No pest management activities will violate the practices described for threatened, endangered, or candidate species by the California Department of Pesticide Regulation. NOLF IB will use the California Department of Pesticide Regulation Endangered Species Project website (*http://www.cdpr.ca.gov/docs/es/index.htm*) to determine the best chemicals to control pest species and their use limitation.

In addition, management of feral animals is a component of pest management at NOLF IB. Feral animals, especially feral cats and dogs, pose a potential threat to public health and safety. They also pose a threat to wildlife, especially federally listed species and migratory birds. Existing U.S. Navy policy included in SECNAVINST 6401.1A of 16 August 1994 regarding veterinary health services prohibits dogs, cats, and other privately owned or stray animals from running free on military installations. The CNO issued a policy letter on 10 January 2002 that clarifies the application of SECNAVINST 6401-1A. An objective of the existing policy is to control feral animals in a humane manner to prevent injury or disease to Navy personnel and eliminate adverse impacts on native wildlife. The instruction requires Navy commands to institute proactive pet management procedures in order to prevent establishment of free-roaming cat and dog populations.

The 2009 SDMAI IPMP identifies a number of strategies to conduct pest management at Navy installations in the San Diego Metro area.

Management Objective and Strategy

Implementation of the Pest Management Plan

Objective: Ensure compliance with environmental legislation, regulations, and guidelines.

Strategies:

1. Update the SDMAI as necessary to ensure that the plan reflects changes in pest populations and current management issues. Incremental updates to the plan will be conducted annually.
2. Implement pest management controls from the SDMAI and other pest-related guidance and plans.
3. Conduct surveys of pests that pose a potential health risk to humans or natural resources.
4. Implement the control of wildlife and the effective elimination of concentrated and diseased populations.
5. Monitor pest and invasive species populations. Track usage of pesticide active ingredients and man-hours spent controlling pest and invasive species during implementation to ensure that the management strategies are sufficient.

Management of Feral Animals

Objective:

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations.

Strategies:

1. Develop and implement a program to control feral animals on NOLF IB. Control populations of feral animals on NOLF IB.
2. Conduct surveys when appropriate to determine impact of feral animals on native species on NOLF IB.
3. Support programs to neuter or spay animals before they reach reproductive age.
4. Require routine vaccinations for rabies and other diseases.
5. Require microchipping registration of all pets brought onto installations.
6. Prohibit the feeding of feral animals on the installation.
7. Provide educational materials to pet owners regarding installation regulations and general pet management.
8. Comply with all humane and animal control regulations at the Federal, state, and local level.

7.2.9 Outdoor Recreation and Public Access

A portion of NOLF IB lands are managed as part of the TRNERR. Fostering an appreciation of the TRNERR is dependent upon providing opportunities for the public to experience the estuary. While the primary uses of the TRNERR are for wildlife habitat conservation, preservation, and research, the TRNERR provides opportunities for the public to access and use the estuary for compatible recreational purposes. Outdoor recreation opportunities include hiking, horseback riding, fishing and beach use. Fishing is permitted along the beach, in accordance with state regulations. Fishing is not authorized within the tidal channels. Seasonal fishing closures may be enacted for the protection of endangered species. Horseback riding is permitted on the beaches south of the Tijuana River mouth to the Mexican border and several other authorized equestrian trails occur along the river and are subject to flooding. Hunting, shooting, off-road vehicle operation, and overnight camping are not authorized. Dogs, where permitted, must be kept on leashes 6-feet long or less at all times to reduce disturbing wildlife and habitat (TRNERR 2010).

Specific Concerns

- Overuse of recreational areas on NOLF IB and
- Erosion and sedimentation.

Current Management

Recreational access should be compliant with the requirements associated with the provisions of the American with Disabilities Act of 1990 as amended and the Disabled Sportsman Access Act as amended.

The USFWS and NBC have an MOU relating to the protection of natural resources within the Tijuana Marsh on NOLF IB. Under this agreement, the 245.4 hectares (606.42 acres) of the Tijuana Marsh occurring on NOLF IB will be managed as part of the TSNWR. Specifically, the USFWS agrees to prepare an inventory and management plan for fish and wildlife resources on Navy lands within the Tijuana Marsh and administer relative biological programs; to be responsible for the preservation and recovery of threatened and endangered species, and to enforce Federal and state laws on NOLF IB consistent with the operation of the TSNWR. Under the MOU, Naval Base Coronado agrees to permit USFWS to conduct management and research activities within the Tijuana Marsh, assist in preservation

and management, and permit the USFWS to enforce all rules, regulations, and laws within its power which will assist in the operation of the Tijuana Marsh as part of the National Wildlife Refuge System (U.S. Navy and USFWS 1992). As a part of this agreement the USFWS holds the right to enter into other agreements with educational, research, scientific organizations, and government agencies in carrying out its responsibilities for management of this area (U.S. Navy and USFWS 1992).

Management Objective and Strategy

Objective: Provide quality outdoor recreation experiences while sustaining ecosystem integrity, and not conflicting with mission priorities.

Strategies:

1. Continue to limit public access and outdoor recreation for reasons that include general security and liability issues, the presence of federally endangered and threatened species, and fire safety.
2. Develop an outdoor recreation plan for NOLF IB. Identify and evaluate suitable outdoor recreation opportunities for installation personnel in undeveloped areas that do not contain or have the potential to impact sensitive species.
3. Develop and distribute outreach and education materials for recreational users of NOLF IB.
4. Develop and implement signage that encourages recreational users to remain on trails.

7.2.10 Law Enforcement of Natural Resources Laws and Regulations

A portion of NOLF IB lands are managed as part of the TRNERR. Law enforcement is necessary at TRNERR to protect natural resources, ensure public safety, and protect private and public property. Enforcement is a critical part of TRNERR management. Law enforcement at the TRNERR is a joint responsibility of the landowning agencies and the political jurisdictions in which the TRNERR is located. A number of agencies have varying jurisdictions, authorities, and responsibilities related to law enforcement within the TRNERR including California Department of Parks and Recreation, USFWS, CDFW, San Diego County Sheriff and San Diego Police, U.S. Border Patrol, and the San Diego County Department of Parks and Recreation (TRNERR 2010).

Specific Concerns

- Unauthorized access or activities in natural areas, or areas used by nesting birds or marine mammals, may disrupt and limit the availability of native populations or habitats.
- Gaps in communication between NBC Environmental Division and NBC Force Protection, related to enforcement of closure areas or other areas requiring special protection, could result in mismanagement of natural resources, or non-compliance with Federal environmental regulations.

Current Management

NOLF IB has established the following objectives for enforcement: (1) Enforce laws and regulations pertaining to the implementation of the natural resources program; (2) Integrate natural resources enforcement into the overall natural resources program; and (3) Use enforcement personnel to enhance the natural resources program at NOLF IB.

There are no game wardens stationed at NOLF IB. The DoD police have the authority of the Commander (exclusive jurisdiction) and of the Sikes Act to enforce all Federal laws relating to the management of natural resources at NOLF IB, including the ESA, CWA and MBTA.

Management Objective and Strategy

Objective: Ensure compliance with state and Federal natural resources laws and regulations.

Strategies:

1. Provide training to personnel responsible for enforcement of applicable laws and regulations.
2. Continue to protect special status species and the natural communities.
3. Cooperate with other agencies, particularly the USFWS and CDFW, to ensure that natural resources laws are adequately enforced.
4. Periodically review Federal and state laws and regulations to ensure natural resources laws and regulations are adequately enforced.

7.2.11 Environmental Awareness and Outreach

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The NBC approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about the unique and valuable natural resources on the installation, the more responsibly they act toward using them.

Education also promotes awareness of environmental projects and the rationale behind them. Activities such as fish stocking, land rehabilitation, and wildfire suppression can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public support these easily understood efforts. However, such issues as protection of sensitive areas for little known plant and wildlife species, prescribed burning, and permit fees and their uses require effective communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

Specific Concerns

- Communication about the natural resources of NBC, environmental regulations, and protocols for situations where wildlife is trapped or injured, or birds are nesting or roosting in unwanted areas, may not be effectively conveyed due to staff turnover;
- Public access restricted in certain areas due to security and military training and
- Lack of outreach facilitator.

Current Management

Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program.

Management Objective and Strategy

Objective: Provide people on the installation and in the surrounding community with an understanding of the NOLF IB natural resources program. Promote environmental stewardship through training and awareness.

Strategies:

1. Provide decision makers with the information they need to make decisions about installation natural resources.
2. Provide general conservation education to the NOLF IB community, including the means to attend training.
3. Periodically review outreach and education materials to ensure that each is still current and meeting the goals of the outreach and education program.
4. Reach out to local community groups for volunteers.
5. Establish a watchable wildlife program.
6. Educate the local community, as well as installation personnel and tenants, about the installation natural resources program. Develop and distribute educational materials about the NOLF IB natural resources program to stakeholders near NOLF IB (e.g., neighborhoods, county, etc.).

7.2.12 Geographic Information Systems Management, Data Integration, Access and Reporting

GIS is a computer system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface. GIS is used to create information layers used to develop and manipulate maps. GIS data are represented as different layers each containing data on a particular kind of feature (e.g., soils, wetlands, roads) from surveys, inventories, and other projects with spatial information. Each feature is linked to a position on the graphical image of a map. The data layers are organized to create maps and to perform statistical analysis.

GIS will also provide support for the entire environmental program and the training community. NBC will use GIS for complex analyses such as project siting, data interpolations, and risk assessments.

GIS software enables installation staff to capture, store, update, manipulate, analyze, and display all forms of geographically referenced data and tabular information about NBC. The management of reports in one central database enables users to quickly respond to data calls and identify gaps in natural resources management. The training of the NBC Environmental, Facilities Management, and Training staff and the allocation of their time to data entry, mapmaking, analysis of data, and interpretation of the results will determine the success of the installation GIS.

Once fully developed, the installation central databases can be used for the following:

- Providing maps;
- Selecting suitable areas for construction activities;
- Planning land rehabilitation projects;
- Providing special maps for Environmental Awareness materials;

- Ensuring avoidance of cultural resources during ground-disturbing projects;
- Ensuring avoidance of rare species habitats and other areas of special concern during construction projects;
- Identifying site options for use during NEPA evaluation of alternative sites;
- Calculating drainages and water flows;
- Determining Neotropical bird habitat preferences and
- Reviewing contract deliverables.

Specific Concerns

- GIS maps and shapefiles may not have appropriate metadata that identifies who, when, and for what purposes the data were collected and
- Natural resource management decisions could be misguided if there are information gaps in the natural resources database, or if the database is not kept current.

Current Management

Currently, there is no central repository for GIS data and reports, research, and other documentation. GIS data is submitted to Navy Assessment Management or the GIS IDIQ contractor. CNIC and NAVFAC guidance on metadata is being developed, but has not yet been finalized.

Management Objective and Strategy

Objective: Collect, store, develop, and maintain data about historical conditions, trends, and current status for critical indicators of ecological integrity and sustainability.

Strategies:

1. Use GIS and other natural resources data as benchmarks for developing future natural resources management goals and objectives.
2. Ensure that central database information is available to biologists, planners, contractors, and others in a quick and timely manner.
3. Annually review GIS data to advise resource managers of needs to update data sets during budget planning and programming.
4. Develop specific language that will be included in all contracts to ensure all spatial data produced are fully compatible with the installation GIS database.
5. Develop a standardized system for recording and mapping significant resource observations (e.g., plants, wildlife, erosion, damage) when incidentally encountered.
6. Provide annual funding for one person to be responsible for updating and maintaining the GIS database. This should include the necessary hardware, software, and training for the use of GIS.
7. Deliver all reports and other GIS data and incorporate them into the Navy GIS database.

8. Camp Michael Monsoor and Camp Morena

8.1 Purpose, Approach and Rationale

Natural resources management at Naval Base Coronado (NBC) strives to integrate biodiversity conservation and an ecosystem-based approach into an adaptive management framework compatible with the military mission. As a result, the natural resources program consists of multiple resource disciplines that are frequently interconnected and share similar objectives. Management projects and plans often consist of multiple program elements with several different resource experts collaborating together.

A number of items have been identified in subject areas that affect the natural resources present on and immediately adjacent to NBC. The purpose of this section is to identify goals, objectives, and strategies for natural resources management on Camp Michael Monsoor (CMM) and Camp Morena (CM).

The goal for management of natural resources at NBC **is to provide an adaptive ecosystem-based conservation program that will efficiently support the NBC mission and provide for sustainability of natural resources.**

Specific concerns, current management, and the management strategy for each natural resources area are described below. A summary of the strategies as well as the estimated time frame for completion is presented in **Appendix C, Tables C-1** and **C-6 (Project Table).**

Some of the strategies described in this section will be accomplished through interactive partnerships with other Federal, state, and local organizations. Natural resources staff at NBC will initiate partnerships based on the benefits to the regional ecosystem and the local environment.

8.2 Natural Resources Current Conditions and Management

8.2.1 Topography, Geology and Seismicity

8.2.1.1 Camp Michael Monsoor

CMM lies within the geologic feature known as the Peninsular Ranges Batholith, which rises in elevation from the Coastal Plain to the east. The Peninsular Ranges Batholith includes a series of north-northwest-trending mountain ranges (plutons) formed during subduction of the Farallon oceanic plate beneath the western margin of North America. The topography in CMM consists of rugged, mountainous terrain with steep slopes, sheer rock cliffs, and frequent rock outcroppings. Elevations range between 975 and 1,219 meters (3,200 and 4,000 feet) above mean sea level (AMSL). Drainage from the intermontane valleys ultimately flows into Campo Creek to the south (U.S. Navy 2008b).

This portion of the batholith is characterized by large concentrically zoned plutons of immediate composition with deep levels of emplacement and associated high grade metamorphic rocks. The La Posta pluton is the largest of these plutons, consisting of leucocratic hornblende-biotite tonalite in the outer zones to granodioriate inward, and has experienced little deformation or alteration (U.S. Navy 2008b).

San Diego County lies within an active seismic region capable of subjecting the area to earthquakes of Seismic Zone 4 rating, as defined in *Naval Facilities Engineering Command Design Manual Two* (U.S. Navy 2008b). The seismic zone rating establishes building requirements for an area based on the probability of a high seismic event occurring in that region. Seismic Zone 4 is the highest rating, indicating the strictest building requirements. The seismic shaking hazard rating for the Proposed Action

area is 20 to 30 percent peak ground acceleration. Major fault lines in the San Diego area tend to run northwest, although a secondary pattern of northeast-trending faults exists. There are no faults near CMM, but faults that may affect it are the Elsinore and Earthquake Valley faults, which are located approximately 14.9 kilometers and 25.0 kilometers (9.3 miles and 15.5 miles), respectively, to the northeast. These all have been historically active, and a major seismic event (6.2 or greater on the Richter scale) can reasonably be expected in San Diego County every 100 years (U.S. Navy 2008b). Three unnamed faults run north-to-south over 4,000 meters (2.5 miles) north of CMM and the associated parcels (see **Figure 8-1a**). The three faults occur north of the La Posta Indian Reservation in valleys of the Cleveland National Forest.

8.2.1.2 Camp Morena

CM is situated in the foothills of the southern portion of the Cleveland National Forest. The majority of the site is relatively flat and slopes from north to south. The elevation on CM is approximately 3,080 meters (10,104 feet) AMSL and the property generally slopes up to a 3,840-meter (12,598-feet) peak located just off the property to the east. The northern undeveloped portion of CM is rocky and consists of several small hills. The southern section is less rocky (U.S. Navy 2009b).

San Diego County lies within an active seismic region capable of subjecting the area to earthquakes of Seismic Zone 4 rating, as defined in *Naval Facilities Engineering Command Design Manual Two* (U.S. Navy 1989). The seismic zone rating establishes building requirements for an area based on the probability of a high seismic event occurring in that region. Seismic Zone 4 is the highest rating, indicating the strictest building requirements. The seismic shaking hazard rating for the Proposed Action area is 20 to 30 percent peak ground acceleration. Major fault lines in the San Diego area tend to run northwest, although a secondary pattern of northeast-trending faults exists. There are no faults near CM, but faults that may affect it are the Elsinore and Earthquake Valley faults, which are located approximately 14.5 to 24.1 kilometers (9 miles and 15 miles), respectively, to the northeast. These all have been historically active, and a major seismic event (6.2 or greater on the Richter scale) can reasonably be expected in San Diego County every 100 years (U.S. Navy 2008b). The only geologically active fault near CM occurs northeast of the area. The unnamed fault runs north-to-south along the eastern edge of Cottonwood Valley over 6,000 meters (3 miles) from the northeastern edge of CM (see **Figure 8-1b**).

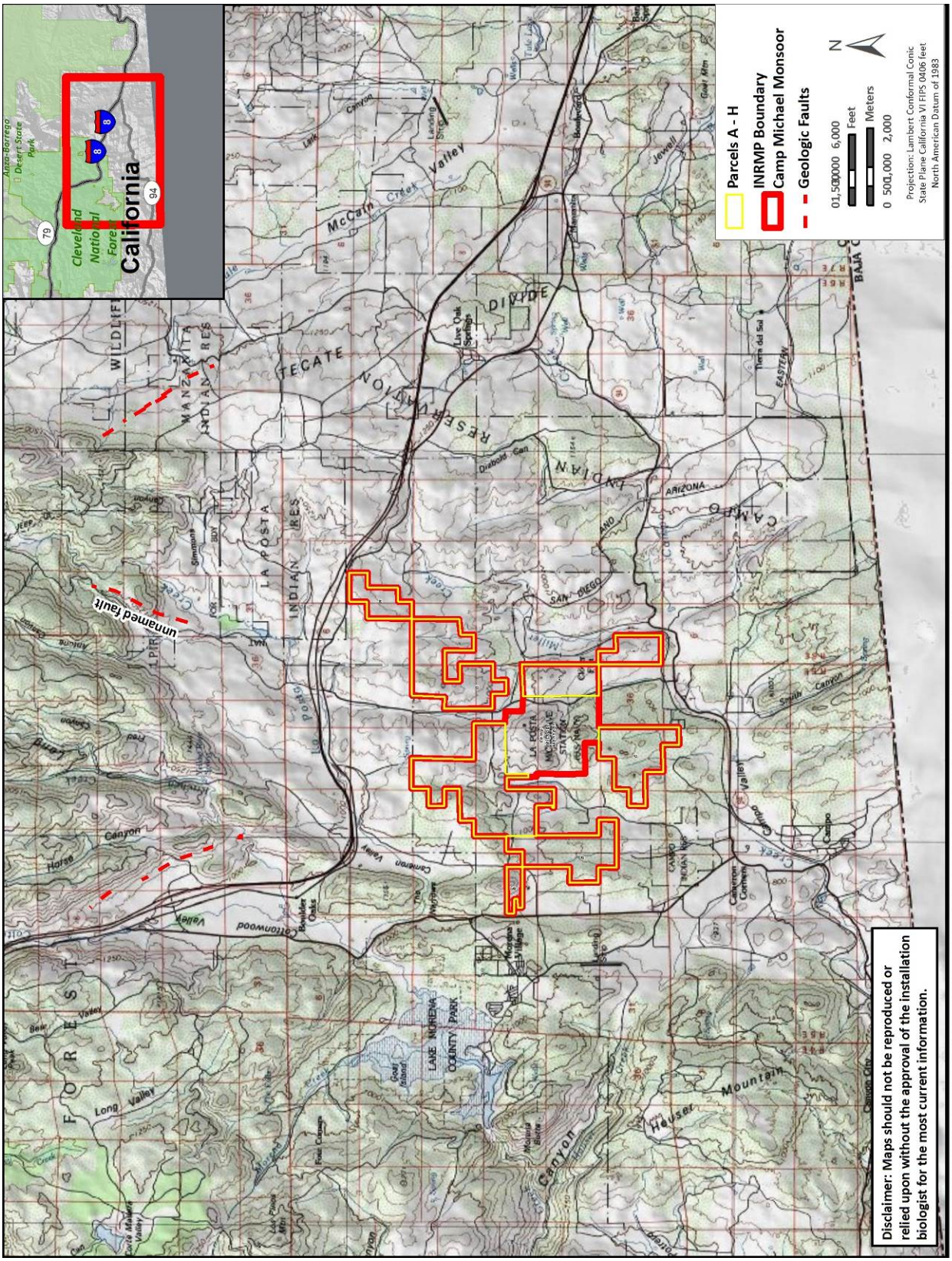
8.2.2 Watershed Management Camp Michael Monsoor and Camp Morena

Watershed management is important to natural resources management because it directly affects both surface water and groundwater quality and is critical to maintain aquatic habitats.

Healthy, stable soils are the foundation of a healthy ecosystem. Some soil types took centuries to develop and are not easily replaced or repaired if lost or damaged. Inherent in the clay and sandy nature of CMM and CM's soils is a risk of significant erosion when vegetation is removed or, soil structures are disturbed. The nature of these soils make the protection of CMM and CM’s soils vital for maintaining many of the functional systems that make up a healthy ecosystem.

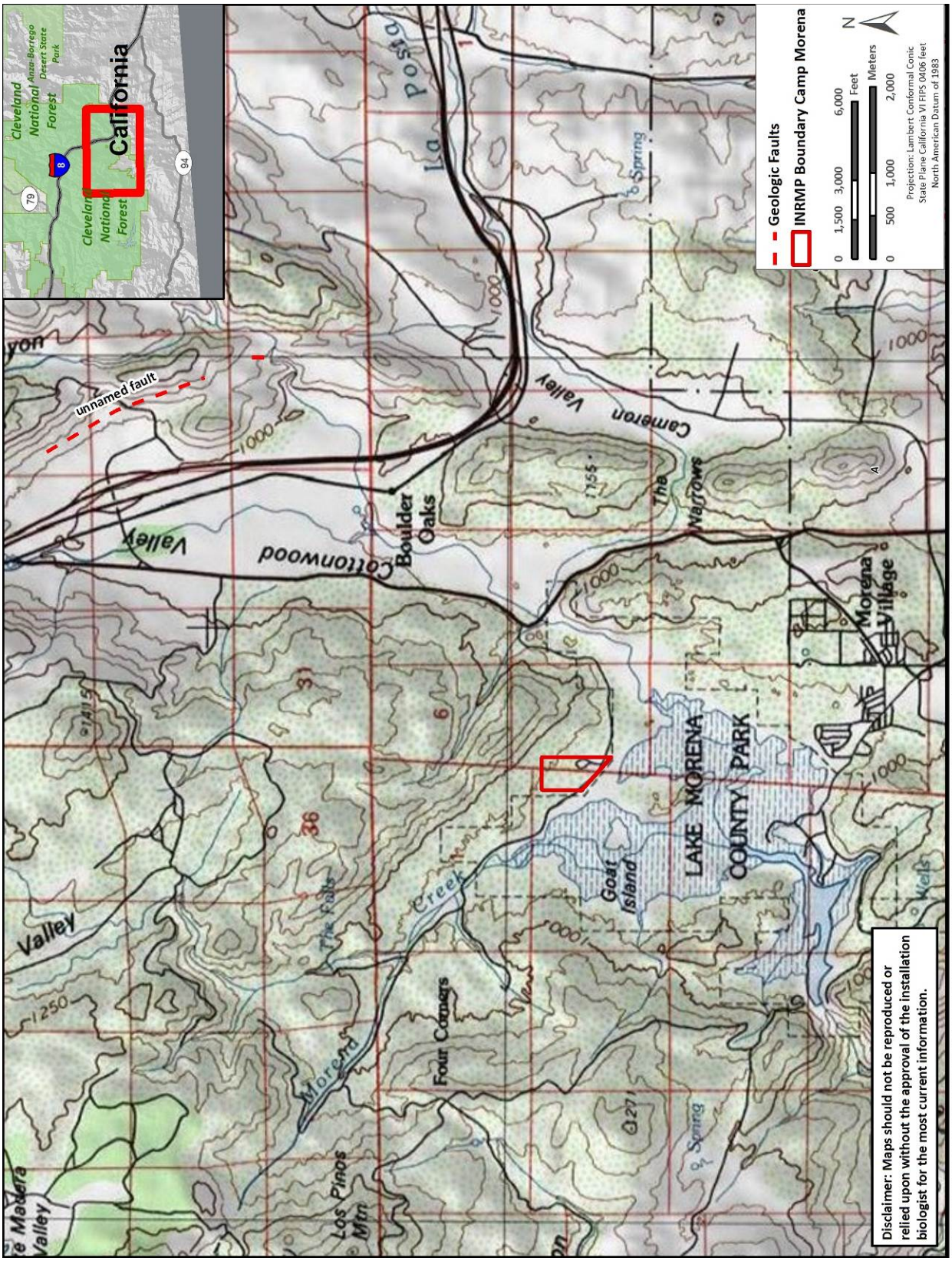
8.2.2.1 Soils Camp Michael Monsoor

Soils in CMM consist of Mottsville-Calpine and the Tollhouse-La Posta Rock land association. The Mottsville series consists of deep, loamy, coarse sands, occurring in valleys and on alluvial fans. The Calpine series is also granitic and occurs on alluvial fans, but consists of very deep coarse, sandy loams. Tollhouse soils are excessively drained, shallow or very shallow coarse sandy loams. About 10 percent of the surface in this series is typically covered with rock outcrops and 20 percent with boulders.



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 8-1a: Camp Michael Monsoor Topography and Faults



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 8-1b: Camp Morena Topography and Faults

Permeability of these soils is rapid, runoff is medium to rapid, and the erosion hazard is moderate to high. The La Posta series consists of somewhat excessively drained loamy coarse sands. Rock outcrops cover 5 to 10 percent of the surface in some areas. The La Posta rocky loamy coarse sand is moderately sloping to moderately steep and is 0.4 to 0.8 meters (16 to 32 inches) deep. Permeability is rapid, runoff is medium, and the erosion hazard is moderate (U.S. Navy 2008b). Soils on CMM are shown in **Figure 8-2a**. Currently the access road from the Microwave Space Relay Station through the development footprint of Parcel C is experiencing erosion and requires road improvements. Proposed road enhancements that will improve this area include; widening the existing dirt access road, install engineering features along the road, such as rock-lined swales and rip rap; and installing culverts and low-water crossings.

8.2.2.2 Soils Camp Morena

Two soil types are mapped within CM: Bancas stony loam and Mottsville loamy course sand. Both of these soils are well-drained, stony or coarse, and are formed from weathered granite and quartz. Soils on CM are shown in **Figure 8-2b**.

Bancas Stony Loam, 5 to 30 percent slopes. The Bancas soil series is characterized by moderately deep, well-drained, stony loams formed in residuum weathered from rock (e.g., granite and quartz). Bancas soils are usually found on slopes ranging from 5 to 65 percent. The Bancas soil series occurs on steep uplands at elevations ranging from 609.6 to 1,524.0 meters (2,000 to 5,000 feet). Runoff is medium to very rapid and permeability is moderate. Within CM, this soil type is found in the northern corner of the property and primarily supports southern mixed chaparral.

Mottsville Loamy Coarse Sand, 2 to 9 percent slopes. The Mottsville soil series is characterized by excessively drained, very deep, loamy course sands formed in alluvium derived from granitic rocks. These soils are usually found on slopes ranging from 0 to 15 percent. Mottsville soils are found in valleys and on alluvial fans at elevations ranging from 762.0 to 1,371.6 meters (2,500 to 4,500 feet). This is the dominant soil type found on CM and it supports all vegetation communities found within CM (U.S. Navy 2009b).

Specific Concerns

- Invasive species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

OPNAVINST 5090.1C CH-1 requires that installation sources of dust, runoff, silt, and erosion debris be controlled to prevent damage to land, water resources, equipment, and facilities, including adjacent properties. An erosion-and-sediment-control plan should be implemented where appropriate. Maintenance of vegetative cover is consistent with ecosystem management goals expressed earlier. Other materials can be used including bio-engineered bank stabilization techniques, gravel, fabrics, riprap, and recycled concrete and pavement that are environmentally safe and compatible with the site. Where bare ground is necessary, other measures for dust, sedimentation, and erosion control should be implemented (e.g., check dams, wind breaks, diversions). To minimize land maintenance expenditures and help ensure environmental compliance, physically intensive activities should be located on those areas least susceptible to erosion. The erosion potential of a site and adjacent water resources need to be identified and analyzed in preparing development, training, and land use plans.

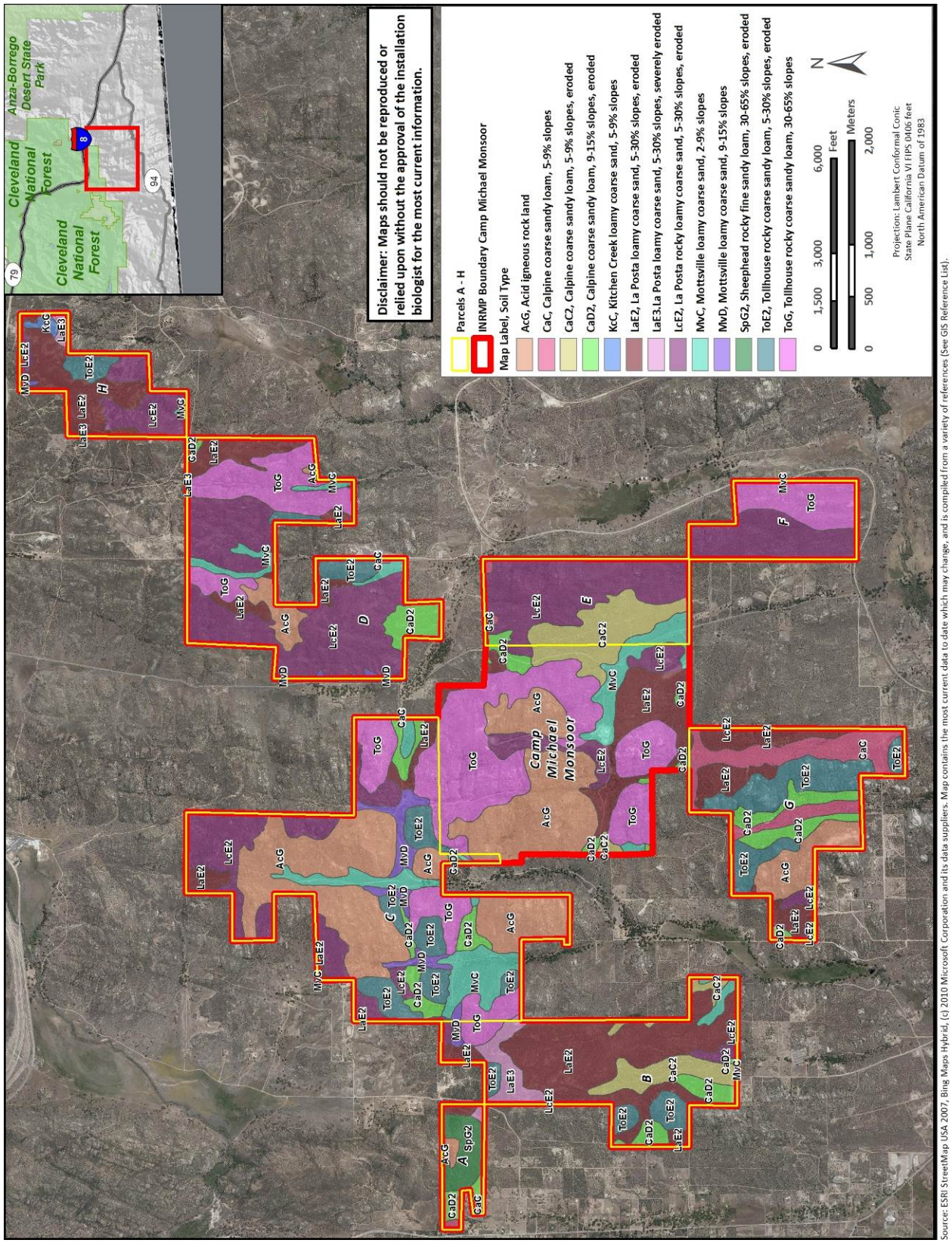


Figure 8-2a: Camp Michael Monsoor Soils Map

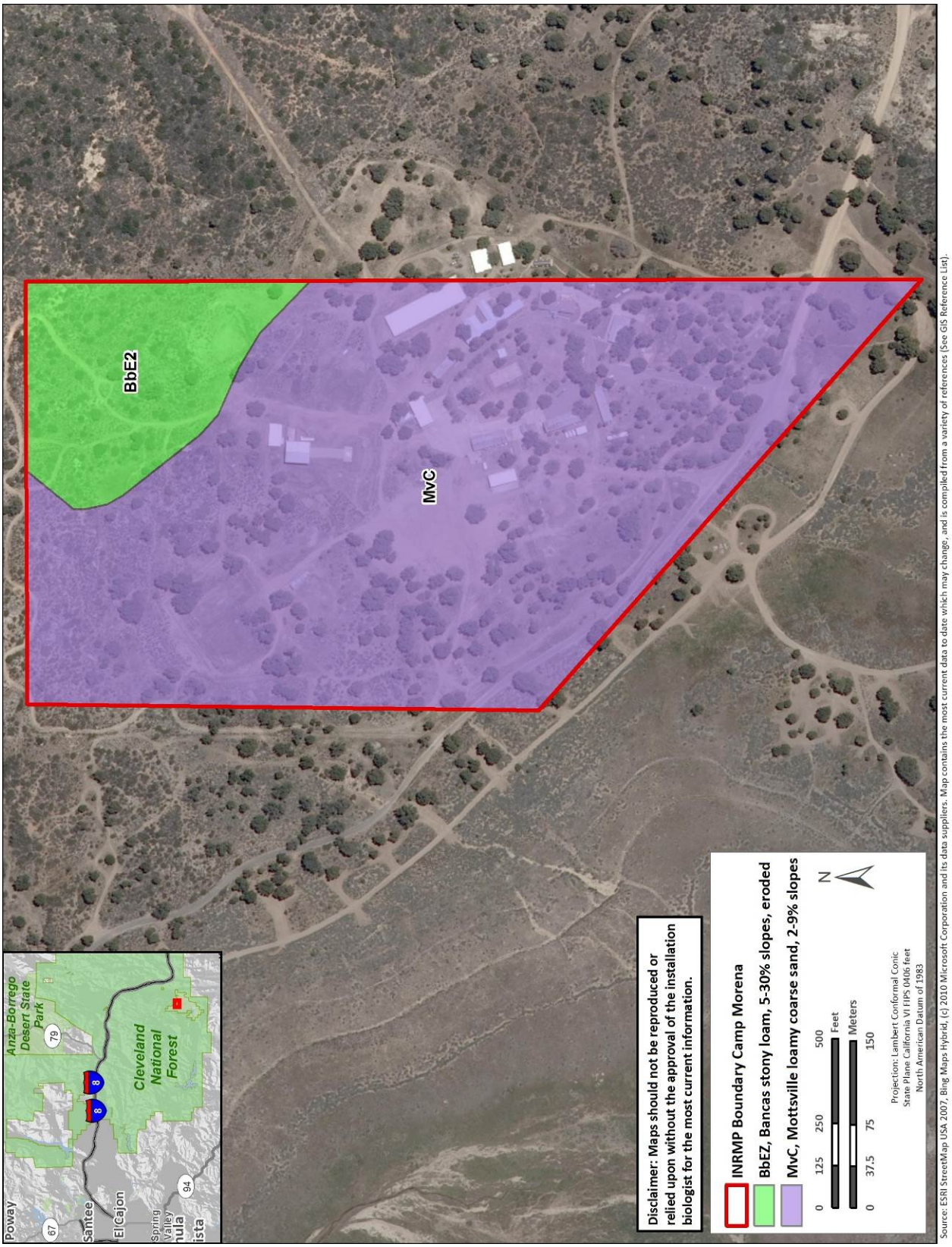


Figure 8-2b: Camp Morena Soils Map

Management Objective and Strategy

Objective: Minimize soil compaction and restore erosion sites.

Strategies:

1. Tailor land uses to appropriate soil types.
2. Continue to implement plans for eroded site rehabilitation.
3. Identify additional sites for land rehabilitation planning.
4. Survey areas where soil erosion and compaction might occur to ensure that BMPs within the erosion control plan are implemented and are effective.

8.2.2.3 Water and Sediment Quality Camp Michael Monsoor

CMM's hydrology is influenced by several factors, including those that are natural (e.g., topographic, geologic, climatic) and human influenced (e.g., land use) (U.S. Navy 2008b). CMM is within the Tijuana Hydrologic Unit. The Tijuana Hydrologic Unit is drained by Cottonwood and Campo creeks, which are tributaries of the Tijuana River. Runoff is primarily captured by Morena Reservoir and Barrett Lake on Cottonwood Creek. The Campo and Cameron Hydrologic Areas are two of eight hydrologic areas in the Tijuana Hydrologic Unit. The majority of CMM is in the Campo Hydrologic Area with a small portion of the exclusive use area in the Cameron Hydrologic Area (U.S. Navy 2008b).

There are no perennial surface water resources within CMM. The installation drains via ephemeral channels, primarily to the south and west and is part of the Tijuana River drainage basin (U.S. Navy 2008b).

The quantity of groundwater available in CMM is unknown. Groundwater quality in CMM is generally good (U.S. Navy 2008c). The primary water source for CMM comes from a well located near the main gate. The well is approximately 167 meters (550 feet) in depth and produces 22.5 liters (6 gallons) of water per minute. Approximately 1,499 liters (396 gallons) per day of water are used at CMM (U.S. Navy 2008b).

CMM is part of NBC and thus covered by existing storm water permits. NBC operates under National Pollutant Discharge Elimination System (NPDES) Permit CA0109185, Order R9-2003-0008 and has submitted a Report of Waste Discharge as part of the requirements for this permit (U.S. Navy 2008b).

Storm water discharges from CMM are nonindustrial and are not regulated pursuant to the General Industrial Storm Water Permit. There are no point source discharges at CMM. California Regional Water Quality Control Board Order R9-2009-0081 for NBC does not regulate any discharges from the exclusive use area of CMM (RWQCB 2009). The remainder of CMM (i.e., the right-of-way [ROW] parcels) is currently under the jurisdiction of the BLM and does not operate under any NPDES permit (U.S. Navy 2008b).

8.2.2.4 Water and Sediment Quality Camp Morena

CM is situated within the Tijuana River Watershed, specifically within the Morena Hydrologic Area (911.50) within the Tijuana Hydrologic Unit (911.00). There are no major drainages flowing through CM. Runoff from the foothills in the northern portion of the property dissipates into several flat sandy areas or is carried off site through two small (less than 3-foot-wide) ephemeral drainages to Morena Reservoir (U.S. Navy 2009b). These ephemeral drainages were determined to be non-wetland waters of

the United States and jurisdictional under the USACE. See **Section 8.2.3.4** for further details on these drainages.

Three wastewater evaporation ponds exist on the northwest and northeast areas of CM. Ponds 1 and 2 were once tied directly to the septic tanks in the middle of the camp and were intended to replace the original leach field and possibly increase capacity of the overall system. The sewer lift station with wet well was installed subsequent to the operation of ponds 1 and 2 and appears to intercept the effluent prior to dumping into ponds 1 and 2. Now the sewer lift pump must be run to push the sewage up the hill to pond 3 (Perez 2007). None of these ponds have been permitted through the Regional Water Quality Control Board (Perez 2007).

CM contains a drinking water system consisting of three wells and five tanks. This system was permitted through the Department of Homeland Security (#04-14-95P-024) by the California Army National Guard. The permit was issued in 1995. According to the Camp Morena Master Plan, a Small Water Supply System Permit is required by the California Department of Health Services to reactivate the system because the previous operators filed an application to register the system as inactive (Perez 2007).

Two groundwater monitoring wells are present on CM. These monitoring wells were installed in March 2001 after the discovery of a diesel fuel release during the removal of two underground storage tanks. The wells need to be properly closed in accordance with a permit from the County of San Diego Department of Environmental Health (Perez 2007).

Specific Concerns

- Fire;
- Erosion and sedimentation and
- Development/anthropogenic disturbances.

Current Management

The U.S. Navy currently manages water quality, primarily hazardous materials handling and waste disposal practices, based on requirements in OPNAVINST 5090.1. Those requirements, in turn, are developed primarily to comply with Federal environmental regulations.

Planning and Monitoring: Erosion of soils above NBC facilities and roadways is a factor to consider during construction planning. If natural erosion is occurring on a higher elevation terrace, the inputs of sediment can be drastic and pose a threat to facilities or traffic on roads. If the project is planned for an area below undeveloped land, one simple assessment involves making visual scans of the surrounding habitat.

Stabilization techniques: More often than not on NBC, development yields areas that require long-term soil stabilization because of their characteristics. Cut and fill slopes, dirt roads, and drainages are examples of situations found on NBC that need a permanent erosion control strategy. Occasionally, construction projects are in areas where future erosion is not particularly a factor. Examples of this include island zones planned for landscaping in parking areas or as medians, or, relatively level areas in developed zones that are planned for landscaping only. Often, only temporary soil stabilization is required in these areas. Techniques for permanent soil stabilization in areas of high and low erosion potential and temporary erosion control include installing structures that act as a soil blockage to prevent earth movement and soil degradation (e.g., gabion-type retaining walls, soil-nail walls, crib walls, and gunite facings).

Landscape design: Construction projects will almost always include landscaping in the overall plan, but there is limited to no landscaping at CMM. Decisions about plant types (native vs. non-native) used in revegetation/restoration segments of construction projects can be affected by budget issues. There are major advantages to planting native plants in bare areas resulting from construction projects. Sensitive wildlife species have more habitats available for use, irrigation is not required for ongoing maintenance, and landscaped areas merge with undeveloped adjacent native habitat zones. If native vegetation coverage is successfully established, it can provide the best, most cost-effective, long-term erosion control because the plants have evolved to grow in this particular area of southern California. Revegetation/restoration and landscaping activities follow the Landscaping and Installation Appearance Plan Approved Plant List (see **Appendix H**).

Water control measures: Practically all forms of development require installations that will control the flow of water during storms and work related tasks. There are many different forms of water control installations made up of different materials. Wood, metal, plastic, rock, rubber, concrete, and plant material are all utilized when runoff must be controlled. On NBC, natural drainages/slopes, parking lots, and roads are the primary generators of mass amounts of runoff. In natural resource situations, measures are usually taken to simply slow the rate at which sheetflow is traveling. When construction projects result in cut and fill slopes, water flow will be heavier with lack of vegetation cover, consequently requiring an installation that will direct large amounts of water to adequate drainage systems.

Management Objective and Strategy

Erosion and Sedimentation

Objective: Protect soils by maintaining soils and reducing runoff, erosion, and gully formation.

Strategies:

1. Monitor and rehabilitate degraded soil resources. Soil resources will be monitored, evaluated, and rehabilitated. Survey results will be analyzed to assist with identification of degraded soil or eroded areas.
2. Update and include the Erosion Control Plan as a component plan to this INRMP when it is completed.
3. Develop and disseminate informational materials and a short seminar on the erosion control BMPs and watershed protection issues.
4. Educate personnel who are likely to impact the watersheds on erosion and sedimentation best management practices (BMPs) and watershed protection issues.
5. Develop and use an erosion and sedimentation questionnaire designed to gauge the effectiveness of the informational materials and short seminar.
6. Periodically review erosion control BMPs to ensure that they are still adequate to control adverse erosion and sedimentation on NBC. Conduct surveys to determine whether activities on NBC are adversely impacting soil and water resources on NBC as a result of erosion and sedimentation.

Surface Water

Objective: Protect waterways from adverse effects of storm water runoff from development sites to the maximum extent feasible.

Strategies:

1. Conduct surveys of all drainages within the installation to identify erosion, sediment accumulations, or other threats to stability.
2. Develop actions specific to each unstable reach that can be undertaken to assist with recovery.
3. As funding allows, undertake natural channel design principles to restore channels with highly unstable conditions.
4. Periodically evaluate drainages streams to ensure that channels are not adversely impacted by installation activities.

8.2.3 Habitat Management

8.2.3.1 Terrestrial Habitats, Vegetation Communities and Land Cover on Camp Michael Monsoor

Of all the parcels on CMM, only the withdrawal parcels proposed for exclusive use (i.e., the existing withdrawal and Parcels C, E, and G) were surveyed for habitat assessments, and vegetation mapping April, May, and June of 2004. Vegetation and habitat assessments have only been conducted for the portions of CMM. Biological features of the ROW parcels have been assessed in general terms by reviewing existing regional data, interpreting aerial photographs, and by extrapolating from the survey data collected for the exclusive use parcels (U.S. Navy 2008b).

CMM occurs within a known corridor area designated as the La Posta Linkage planning area by the Conservation Biology Institute, an organization working to preserve regional habitat linkages within San Diego County (CBI 2003). CMM currently acts as a local migration corridor linking adjacent open space land, including public lands along the United States-Mexico border to the south, with National Forest lands to the north and west. CMM lies between high elevation habitats in the Laguna Mountains and lower elevation habitats in Campo Valley with a high capacity to support wildlife movement between these two areas. For example, this linkage is used as a corridor by Golden Eagles (*Aquila chrystaeos*) and as a movement corridor by wildlife species such as the coyote, mountain lion (*Puma concolor*), and mule deer (*Odocoileus hemionus)*, which have all been detected by sign or direct observation CMM (U.S. Navy 2008b).

Wildlife migration corridors are essential in geographically diverse settings for the sustenance of healthy and genetically diverse animal communities. Corridors promote colonization of habitat and genetic variability by connecting fragments of like habitat; and help sustain individual species distributed in and among habitat fragments. Habitat linkages are vital in dispersal of young animals and in obtaining sufficient resources for animals with very large territory requirements. Habitat fragments, by definition, are separated by otherwise foreign or inhospitable habitats, such as urban/suburban tracts. Isolation of populations can have many harmful effects and may contribute significantly to local species extinction. A viable wildlife migration corridor consists of more than a path between habitat areas. To provide food and cover for transient species as well as resident populations of less mobile animals, a wildlife migration corridor must also include pockets of vegetation. Habitat linkages consist of naturally vegetated open space areas that allow wildlife movement between larger, more contiguous blocks of adequate habitat (U.S. Navy 2008b).

Exclusive Use Area

Nineteen vegetation communities and land cover types were mapped within the exclusive use area of CMM in 2004 (see **Table 8-1** and **Figure 8-3a**). The exclusive use area of Camp Michael Monsoor is dominated by chamise series, with approximately 59 percent of the installation being covered by this vegetation community. Other major vegetation communities on Camp Michael Monsoor include birchleaf mountain-mahogany series (4 percent), chamise-bigberry manzanita series (4 percent), chaparral whitethorn series (6 percent) holly-leaf cherry series (9 percent), and scrub oak-chamise series (6 percent) (U.S. Navy 2008b). The vegetation communities are based on the 1995 A Manual of California Vegetation which does not meet standards of the National Vegetation Classification System as required by the Federal Geographic Data Committee; therefore, they will not match the NatureServe vegetation types listed on the Navy Conservation Website.

Table 8-1: Vegetation Communities and Land Cover Types on Camp Michael Monsoor

Vegetation/Land Cover Type	Acreage
Big sagebrush series	22.3
Birchleaf mountain-mahogany series	137.4
California annual grassland series	64.6
California buckwheat-white sage series	27.5
California buckwheat series	123.0
Chamise series	2,011.7
Chamise-bigberry manzanita series	120.4
Chamise-Eastwood manzanita series	6.5
Chaparral whitethorn series	190.9
Coast live oak series	13.4
Holly-leaf cherry series	310.3
Mixed scrub oak series	1.9
Needlegrass series	1.1
Scrub oak-chamise series	217.5
Scrub oak series	39.0
Scrub oak-birchleaf mountain-mahogany series	15.9
Scrub oak-chaparral whitethorn series	2.7
Yellow bush penstemon series	44.6
Unvegetated/Disturbed	20.7
Developed	13.8
Total	**3,385.2**

Big Sagebrush Series. This series occurs along the upper edges of the valley floor, typically adjacent to dirt roads and other areas that had some prior disturbance. Big sagebrush (*Artemisia tridentata*) is the dominant species, but other species such as chamise (*Adenostoma fasciculatum*), white sage (*Salvia apiana*), and California buckwheat may also be present. Big sagebrush is conspicuously absent from adjacent undisturbed communities, suggesting that this is a disturbance-related species (U.S. Navy 2008b).

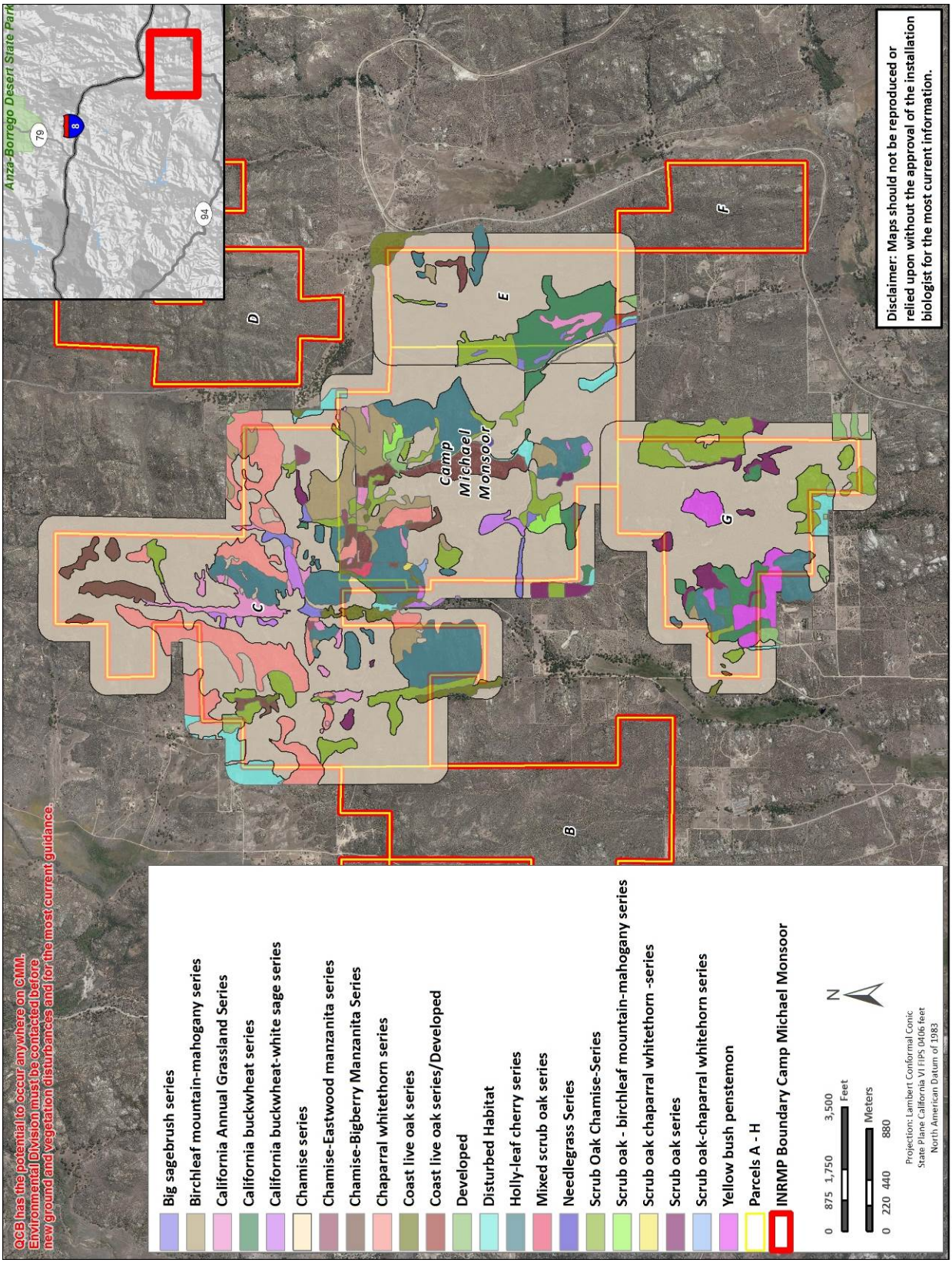


Figure 8-3a: Camp Michael Monsoor Vegetation Communities and Land Cover Types

Birchleaf Mountain-mahogany Series. This series occurs on some of the lower and upper slopes within CMM. This series is relatively open and dominated by birchleaf mountain-mahogany (*Cercocarpus betuloides*) though scattered chamise, chaparral whitethorn (*Ceanothus leucodermis*), and holly-leaf cherry are also present. Because this series is so open, ripgut brome and red brome (*Bromus madritensis* ssp. *rubens*) are present in high numbers (U.S. Navy 2008b).

California Annual Grassland Series. Annual grasses and herbs are dominant in the ground layer of this series. Within CMM, this series is present in the valleys and some of the slopes of adjacent hillsides. Ripgut brome and red brome are the two dominant species within this series. Cheat grass (*Bromus tectorum*), filaree, fiddleneck (*Amsinkia* sp.), and popcorn flower (*Plagiobothrys* sp.) are also present. The present species composition in these areas is likely the result of previous grazing activities. Ripgut brome and red brome are conspicuous components of other series in the CMM, again probably due to prior grazing activities. California buckwheat is scattered throughout the areas of this series, suggesting that in the absence of disturbance these areas may develop into scrub or chaparral communities (U.S. Navy 2008b).

California Buckwheat-White Sage Series. California buckwheat and white sage are the two dominant species within this series. This series occurs on lower slopes and is relatively open allowing for the occurrence of annual grasses and herbs such as ripgut brome, red brome, popcorn flower, and white pincushion-flower (*Chaenactis artemisiaefolia*) (U.S. Navy 2008b).

California Buckwheat Series. In the region of CMM this series is a disturbance- community. Several of the areas within CMM where California Buckwheat is the dominant species are alongside dirt roads. Other areas occur on some of the higher slopes that may be periodically burned. Ripgut brome and red brome are also present (U.S. Navy 2008b).

Chamise Series. Chamise is the most common shrub within CMM and occurs on a variety of topographic features from the flat valleys to steep slopes. This series is used to describe those areas where chamise is the primary dominant species though other shrub species may also be present and locally common. Generally, California peony (*Paeonia californica*) is the primary component of the understory. On the valley floors, big sagebrush, scrub oak (*Quercus berberidifolia*), and sugar bush (*Rhus ovata*) may be associates. On the adjacent slopes, eastwood manzanita (*Arctostaphylos glandulosa*), bigberry manzanita (*Arctostaphylos glauca*), holly-leaf cherry, and chaparral whitethorn are associates. Openings in this series may support such species as chia (*Salvia columbariae*), white pincushion-flower, and several spineflower species (*Chorizanthe* spp.) (U.S. Navy 2008b).

Chamise-Bigberry Manzanita Series. This series is similar to the chamise series. The difference is that bigberry manzanita is much more conspicuous in these stands. This series appears to be more prevalent in areas of decomposing granite. Undisturbed stands of this series are usually very dense and have low plant species diversity, supporting very little understory species. Disturbed areas have a higher component of introduced grasses and forbs (U.S. Navy 2008b).

Chamise-Eastwood Manzanita Series. This series is very similar in appearance to the chamise-bigberry series, only Eastwood manzanita replaces the bigberry manzanita as the major associate of chamise. This series is also very dense with little understory components. Understory species are only present in sandy openings, where chia, white pincushion-flower, and several spineflower species may be present or in areas of disturbance where ripgut brome and red brome are present (U.S. Navy 2008b).

Chaparral Whitethorn Series. This series occurs on the slopes within CMM. Chaparral whitethorn is the dominant species, but chamise, holly-leaf cherry, California buckwheat, and birchleaf mountain-mahogany may also be present. This series intergrades with the holly-leaf cherry series in rockier areas. Open areas support a dense cover of ripgut brome and red brome. Small islands of this

community are also present on rock outcrops within the chamise series. On these rock outcrops, species such as monkeyflower (*Mimulus aurianticus*), onion grass (*Melica imperfecta*), and fringed spineflower (*Chorizanthe fimbriata* var. *laciniata*) may be present (U.S. Navy 2008b).

Coast Live Oak Series. This series is best represented along the major north-south-oriented valleys within CMM. Smaller, isolated stands are present along some of the narrower lateral canyons. Coast live oak is the dominant species. Arroyo willow is a minor component. Shrub species such as chamise, big sagebrush, and poison oak (*Toxicodendron diversilobum*) are infrequent within this series, generally occurring along the outer edges of the canopy. Dirt roads and some structures are present beneath some of the larger stands. In these instances, the disturbance has eliminated all but the most weedy understory species, such as ripgut grass, red brome, and horehound (*Marrubium vulgare*) (U.S. Navy 2008b).

Holly-leaf Cherry Series. This series occurs on slopes and intergrades with the chaparral whitethorn and chamise series. Holly-leaf cherry is the dominant species but chaparral whitethorn is a common associate. Chamise, California buckwheat, and birchleaf mountain-mahogany may also be present. Similar to the chaparral whitethorn series, open areas support a dense cover of ripgut brome and red brome. Small islands of this community are also present on rock outcrops within the chamise series. On these rock outcrops, species such as monkeyflower, onion grass, silverleaf lotus, and fringed spineflower may be present (U.S. Navy 2008b).

Mixed Scrub Oak Series. This series describes areas where scrub oak, bigberry manzanita, chaparral whitethorn, and chamise are all very common. This dense series does not have a conspicuous understory component (U.S. Navy 2008b).

Needlegrass Series. Giant stipa was the dominant species with California broom (*Acmispon glaber*) and California buckwheat as the common associates of this series. This series is likely a disturbance-related, early seral series that will develop into one of the shrub-dominated series over time with the absence of regular disturbances (U.S. Navy 2008b).

Scrub Oak-Chamise Series. This series occurs on some of the lower slopes within CMM. Though chamise is still the most common species, scrub oak is such a co-dominant that it is much more conspicuous than the chamise. Sugar bush and California peony are fairly common, but because this is a relatively dense community, species diversity is low (U.S. Navy 2008b).

Scrub Oak Series. This series is most common along some of the washes and mesic north-facing slopes within CMM. Though scrub oak is present within and co-dominant in several series, areas dominated solely by scrub oak are uncommon within the camp and are represented by relatively small stands. Scrub oak is the dominant species and its dense cover precludes the presence of many understory species, though individuals of chamise and chaparral whitethorn may be present (U.S. Navy 2008b).

Scrub Oak-Birchleaf Mountain-mahogany Series. This series is very similar to the scrub oak series, only Birchleaf Mountain-mahogany is more common within this series. Similarly, this series is represented by small stands that are uncommon within CMM. The high cover and density of the overstory shrubs in this series preclude the presence of many understory species, except for the aforementioned non-native annual grasses, and thus this series has a low diversity of species (U.S. Navy 2008b).

Scrub Oak-Chaparral Whitethorn Series. This series is very similar to the scrub oak series, only chaparral whitethorn is more common within this series. Similarly, this series is represented by small stands that are uncommon within CMM. The high cover and density of the overstory shrub species of this series preclude the presence of many understory species and thus this series has a low diversity of species (U.S. Navy 2008b).

Yellow Bush Penstemon Series. Yellow bush penstemon is the dominant or co-dominant species within this series. In some areas California buckwheat is a co-dominant. Sugar bush and holly-leaf cherry are common associates. This series was restricted to Parcel G occurring on the rock outcrops or saddles of the higher slopes (U.S. Navy 2008b).

Unvegetated/Disturbed and Developed Areas. Areas mapped as unvegetated/disturbed do not support permanent structures but have been recently cleared and do not currently support vegetation. Some of the larger dirt roads have been included within the unvegetated habitat designation. Developed areas within CMM support permanent structures (U.S. Navy 2008b).

ROW Parcels

No habitat assessments were conducted for the ROW parcels (i.e., Parcels A, B, D, F, and H). However, a review of aerial photographs indicates that the ROW supports similar vegetation communities and topographic features as the exclusive use area. The chamise series is expected to be the most common vegetation series within the ROW area, occupying large contiguous areas, with the holly-leaf cherry series and chaparral whitethorn series the most common series occurring in the areas of rock outcrops (U.S. Navy 2008b).

8.2.3.2 Terrestrial Habitats,Vegetation Communities, and Land Cover on Camp Morena

The northern undeveloped portion of the property is rocky and consists of several small hills vegetated mostly with shrubs. The southern section is less rocky and vegetated with oak and ornamental trees with a shrub or non-native grassland understory (U.S. Navy 2009b). Eight vegetation community/land cover types were identified on CM during the 2008 vegetation mapping survey (see **Figure 8-3b** and **Table 8-2**) (U.S. Navy 2009b). CM vegetation mapping were classified using Terrestrial Vegetation Communities in San Diego County Based on Holland's Description (Holland 1986 as modified by Oberbauer 2005). This classification system does not meet the current standards of the National Geographic Data Committee; therefore, the CM vegetation communities differ from the NatureServe types listed on the Navy Conservation Website.

Table 8-2: Vegetation Communities and Land Cover Types on Camp Morena

Vegetation/Land Cover Type	Acreage
Southern mixed chaparral	16.7
Big sagebrush scrub	3.5
Disturbed big sagebrush scrub	5.4
Red shank chaparral	1.0
Coast live oak woodland	13.7
Non-native grassland	7.4
Non-native woodland	6.5
Developed land	17.1
Total	**71.3**

Source: U.S. Navy 2009b

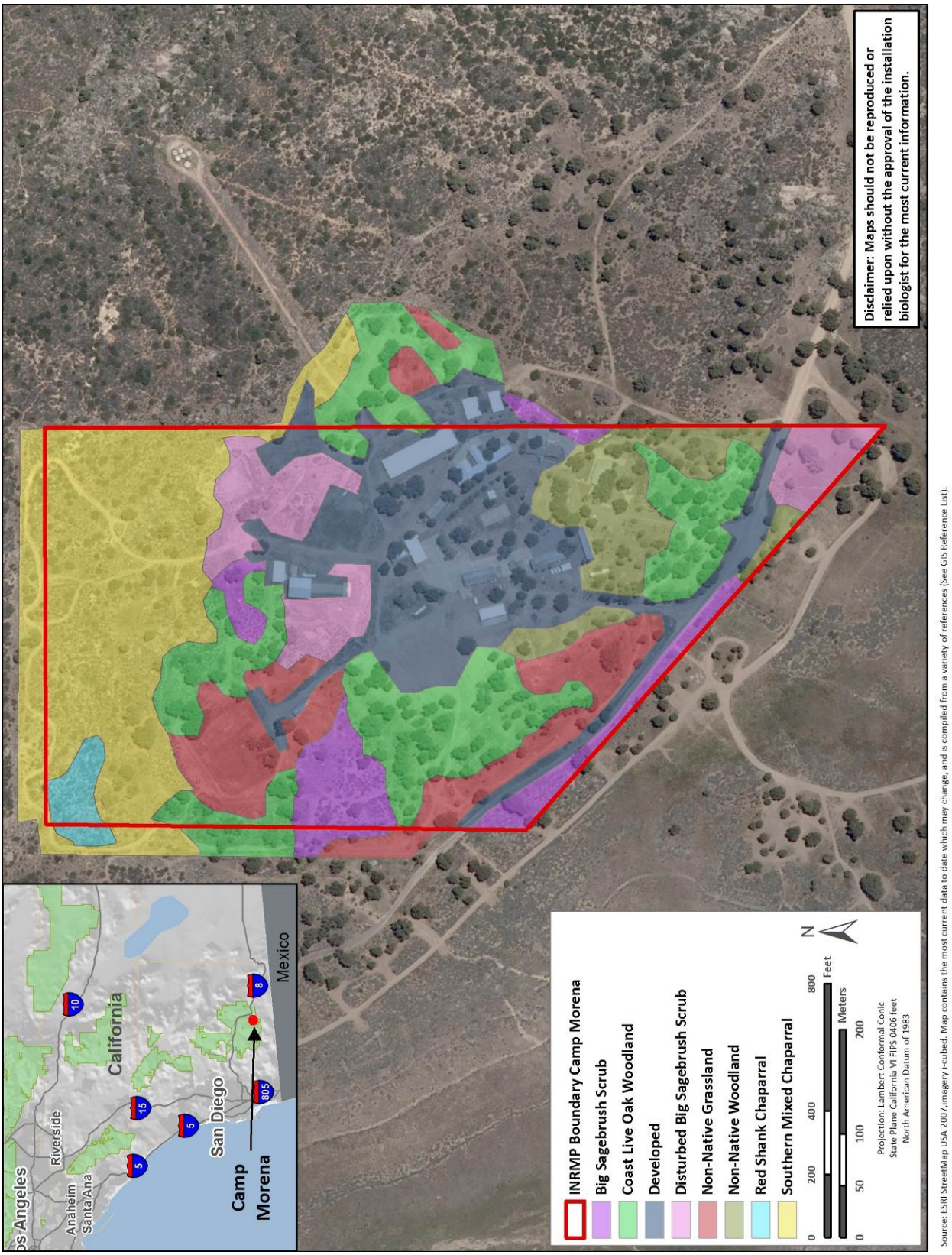


Figure 8-3b: Camp Morena Vegetation Communities and Land Cover Types

Southern Mixed Chaparral. Southern mixed chaparral is a broad-leaved sclerophyll shrub community forming dense often impenetrable vegetation dominated by chamise, California buckwheat, scrub oak, and point-leaf manzanita (*Arctostaphylos pungens*). Other species observed during the field surveys included Ramona lilac (*Ceanothus tomentosus*), laurel sumac, sugar bush, chaparral yucca (*Hesperoyucca whipplei*), sacapellote (*Acourtia microcephala*), and valley cholla (*Cylindropuntia californica* var. *parkeri*). This community occurs in the undeveloped northern portion of CM and encompasses the greatest area (6.7 hectares [16.68 acres]) of all vegetation types on site (U.S. Navy 2009b).

Big Sagebrush Scrub. Big sagebrush scrub consists of mostly soft-woody shrubs with bare ground underneath and between shrubs, typically at higher elevations (1,219.2 meters to 2,743.1 meters [4,000 to 9,000 feet]). Dominant species include big sagebrush, California buckwheat, and California matchweed (*Gutierrezia californica*). This community exists in scattered patches throughout CM (U.S. Navy 2009b).

Red Shank Chaparral. Red shank chaparral is a tall, somewhat open chaparral dominated by Red Shank (*Adenostoma sparsifolium*), sugar bush, and point-leaf manzanita. This community exists in a small patch (1.02 acres) surrounded by southern mixed chaparral in the northeast corner of CM.

Coast Live Oak Woodland. Coast live oak woodland is typically dominated by coast live oak trees that reach 30 to 80 feet in height. The shrub layer within this habitat is usually poorly developed but may include laurel sumac or Mexican elderberry (*Sambucus mexicanus*) while the herb layer is continuous and typically dominated by non-native grasses. This community typically occurs on north-facing slopes and shaded ravines in southern California. On site this community is fairly open with scattered shrubs and non-native grassland in the understory and between trees. This community is scattered throughout CM.

Non-Native Grassland. Non-native grassland is characterized by a dense to sparse cover of annual grasses reaching up to 3 feet, which may include numerous native wildflowers, particularly in years of high rainfall. These annuals germinate with the onset of the rainy season and set seeds in the late spring or summer. This community is usually found on fine-textured soils that proceed from moist or waterlogged in the winter to very dry during the summer and fall. Non-native grasslands, in many circumstances, have replaced native grasslands as a result of disturbance (directly manmade [e.g., mechanical disturbance, grazing] or natural [i.e., altered fire cycles]). Dominant plants observed within this vegetation community included brome grasses, fescue (*Vulpia myuros*), filaree, and Mediterranean schismus (*Schismus barbatus*). This community exists scattered throughout the site, especially in areas that have been disturbed and are adjacent to development.

Non-Native Woodland. The non-native woodland on CM consists of planted non-native trees scattered throughout the park/picnic areas in the southern portion of the site. The trees are mature reaching heights up to 15.2 meters (50 feet) and in some areas form a continuous canopy. Species include pine (*Pinus* spp.) and cypress (*Cupressus* spp.).

Developed Land. Developed land within the CM consists of existing roads, buildings, and other infrastructure.

Specific Concerns

- Invasive species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Overuse, or improper use, of fertilizers.

Current Management

Management of native habitats at CMM and CM includes their enhancement by the removal of invasive exotic plant species and planting of native species, as well as habitat restoration of disturbed areas. Removing invasive exotic plants, planting native species, and restoring habitat activities are conducted through coordination with the NBC biologist.

Management Objective and Strategy

Objective: Develop and implement a program for natural land and habitat restoration and rehabilitation.

Strategies:

1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue invasive and noxious weed identification and control as necessary.
3. Complete evaluation and prioritization of active erosion sites.
4. Update vegetation mapping.
5. Ensure that natural resources staff responsible for plant community conservation update training regarding management of these resources on a military installation on an annual basis.
6. Develop specifications and standards for reseeding/revegetation of disturbed sites for use in contracts, maintenance, and other projects.
7. Periodically review management to ensure it still meets ecosystem management goals.

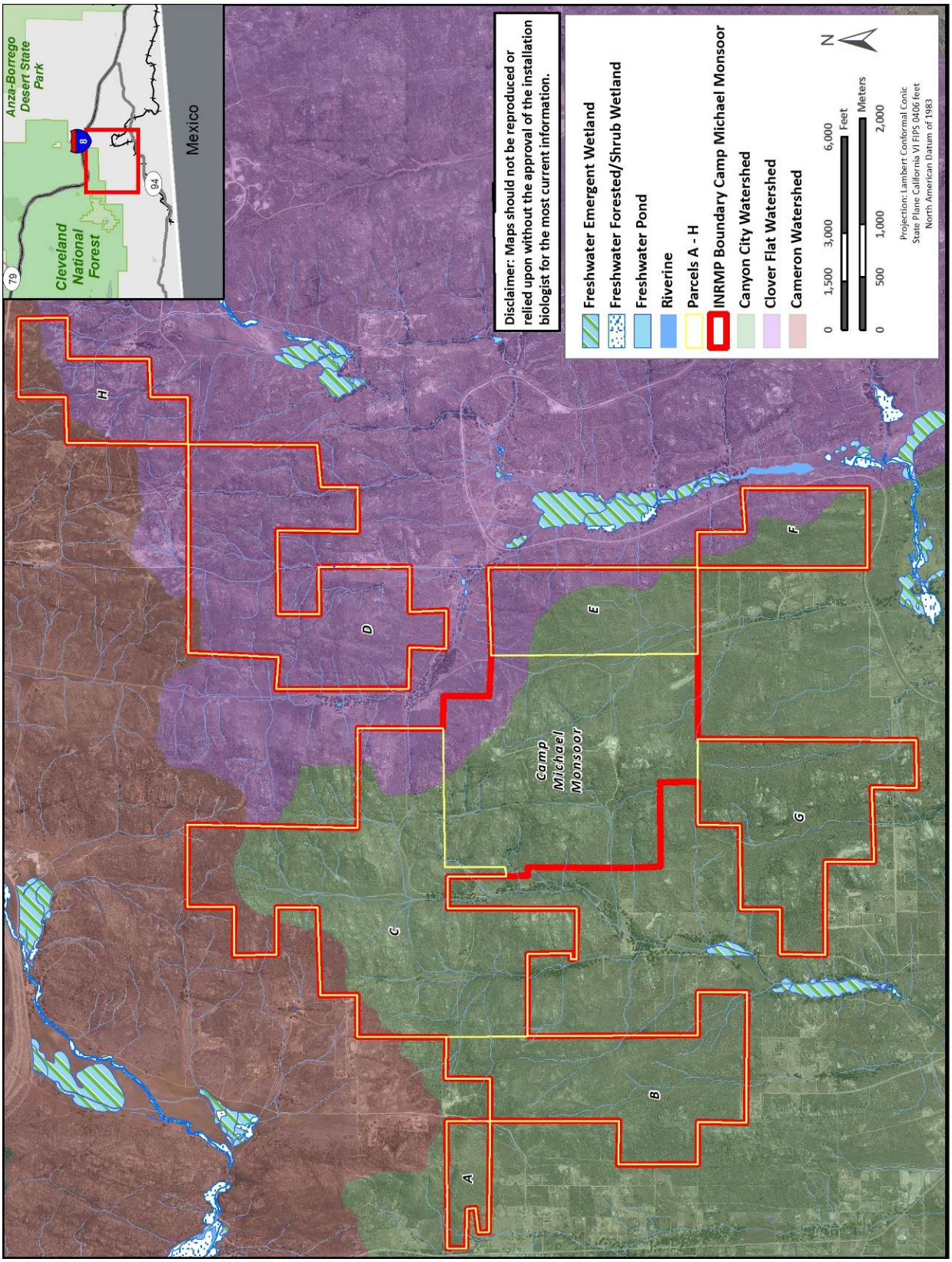
8.2.3.3 Wetlands and Floodplains Camp Michael Monsoor

A jurisdictional delineation was conducted on CMM Parcel C in July 2004. No wetlands were identified. Unnamed ephemeral drainages (i.e., likely to contain water only after a storm event) were identified but, due to a lack of downstream connection to navigable waters, the drainages were determined to be isolated. Subsequently, a project specific delineation was conducted in 2010 on Parcel C for the proposed upgrades that required construction of a new training facility and the related infrastructure, and the repair existing roads on C. During the 2010 survey, no jurisdictional wetlands were identified, however, approximately 903 square feet (<0.1 acre) of potential USACE jurisdictional waterways were delineated. Seven non-wetland drainages were identified (see **Figure 8-4a**). Two drainages were identified as potential non-wetland waters of the U.S. that drain toward Campo Creek, which is located approximately 4 kilometers (2.5 miles) from the site. The five principal ephemeral drainages were determined to be isolated (U.S. Navy 2012).

The most recent USACE jurisdictional waters of the U.S. delineations have been planning level documents and future projects require separate delineations. Although Federal Insurance Rate Maps for the area were not available, due to the elevation and topography it can be assumed that there are no 100-year floodplains within CMM (U.S. Navy 2008b).

8.2.3.4 Wetlands and Floodplains Camp Morena

Drainages determined to be non-wetland waters of the United States and regulated by the USACE were identified at CM (see **Figure 8-4b**). These drainages did not contain water during the time of the survey and were determined to be ephemeral. The drainages ranged from 0.3 to 0.9 meters (1 to 3 feet) in width and 0.15 to 0.9 meters (0.5 feet to 3 feet) in depth. These drainages are located in the middle and southern portions of CM and are supported by seasonal runoff from the slopes to the north. The drainages



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 8-4a: Camp Michael Monsoor Watersheds and Wetlands

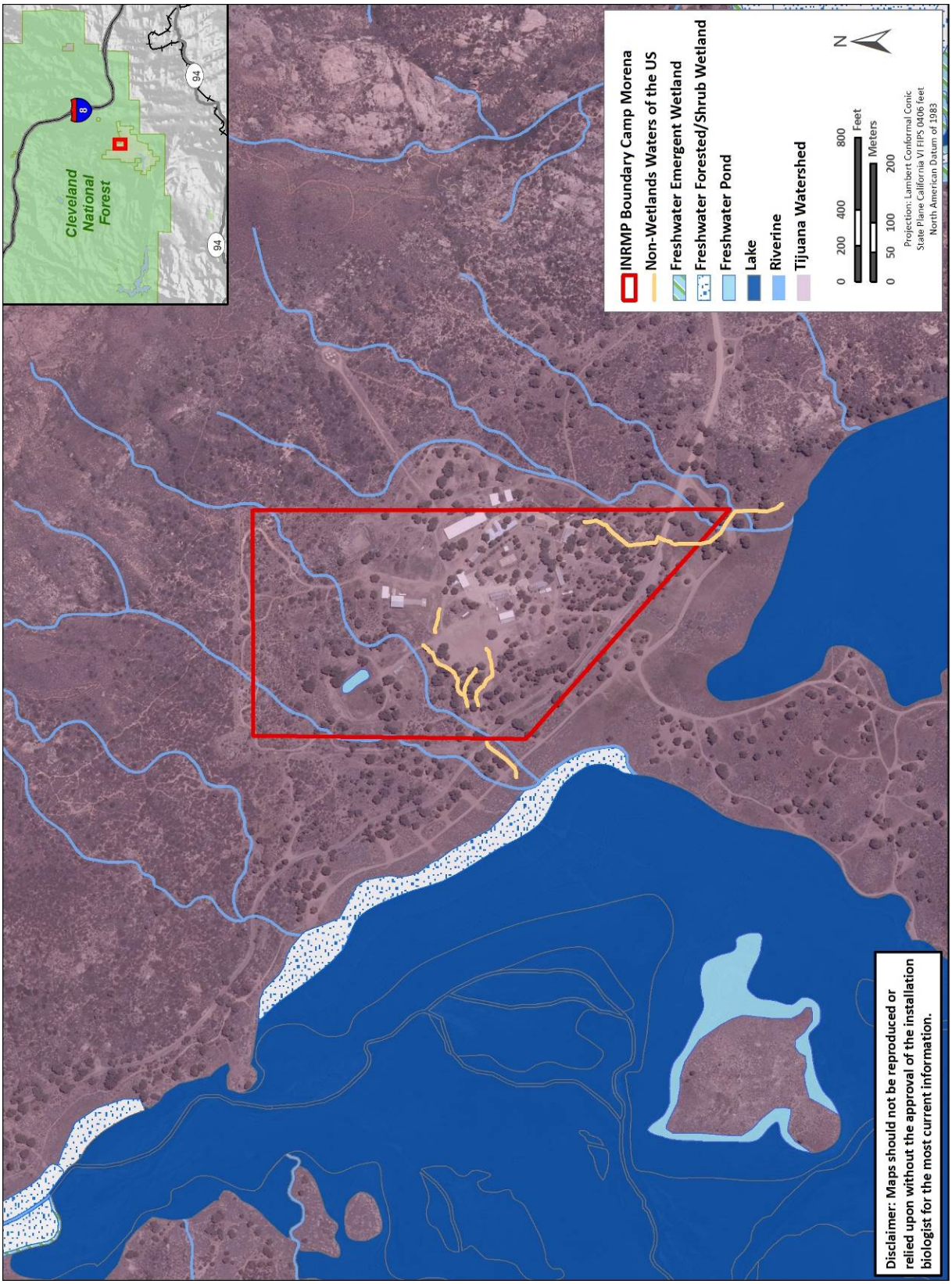


Figure 8-4b: Camp Morena Watersheds and Wetlands

on the western and middle portion of CM are segmented with areas of sheet flow (i.e., unconfined surface flow) in between defined channels. This is displayed by gaps between jurisdictional features in **Figure 8-4b**. All drainages were surface channels except for a 10.4-meter (34-foot)-long section that is culverted under Corral Canyon Road in the southeastern portion of CM. The underground culvert would also be considered jurisdictional by USACE. For the purposes of determining jurisdiction, the Morena Reservoir is assumed to be a Traditional Navigable Water. A significant nexus to a Traditional Navigable Water is assumed for all potential jurisdictional features observed, given the close proximity to the reservoir. The total length of all drainages on CM is 559.3 meters (1,835 feet) and the total area is 0.02 hectares (0.05 acres) (U.S. Navy 2009b).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species encroaching into wetland habitat;
- Climate change (e.g., changes in temperature or sea level rise);
- Erosion and sedimentation from either anthropogenic or natural causes and
- Pollution.

Current Management

Future delineations will be conducted on a project-by-project basis. The major goal in wetland and floodplain management is to minimize the impact that CMM and CM has on wetlands and floodplains. The natural resources staff strives to enhance healthy, functional wetlands. When possible, it is the goal to avoid impacts, direct and indirect; enhancing waters of the United States to increase functions and services provided by waters of the U.S. including wetlands. It is also the goal to maximize floral diversity of wetland communities, which, in turn, maximizes the faunal diversity of the ecosystem. Through achieving these goals, and through mitigating for unavoidable impacts to wetlands, CMM and CM can manage for no net loss of wetland and floodplain acreage, functions, and services.

According to OPNAVINST 5090.1C CH-1, the U.S. Navy will comply with the national goal of no net loss of wetlands, and will avoid loss of size, function and value of wetlands.

Management Objective and Strategy

Objective: Maintain healthy, functional waters of the United States on CMM and CM, including wetlands and non-wetland waters of the United States, and prevent indirect or unplanned encroachments.

Strategies:

1. Update the wetland inventory data, including wetland distribution and categories.
2. Conduct Environmental Review for activities that could affect directly and indirectly, waters of the U.S. including wetlands.
3. Plan development and training activities to avoid wetland impacts to the maximum extent possible and mitigate unavoidable impacts on waters of the U.S. including wetlands.
4. Maintain water quality to protect surface waters and wetlands from excessive sediment-laden runoff. Prevent erosion, scour to maintain water quality.
5. Remain in compliance with the Clean Water Act (CWA), Rivers and Harbors Act (RHA), etc., and implement procedures to manage for a no net loss of wetland and floodplain acreage, functions, and services.

6. Reduce habitat fragmentation and control the spread of invasive species.
7. Periodically review the natural resources management program to ensure that management actions do not adversely impact waters of the United States including wetlands.
8. Implement erosion control BMPs to ensure adverse environmental impacts to wetlands do not occur.

8.2.3.5 Marine Habitats

Not applicable to CMM and CM.

8.2.3.6 Wildland Fire Camp Michael Monsoor and Camp Morena

Federal wildland fire policy requires that all Federal lands with burnable vegetation have a fire plan and resources to safely mitigate losses. This policy was adopted by the DoD Wildland Fire Policy Working Group in 1996. DoD fire policy was developed by DoD Instruction 6055.06 Fire and Emergency Services Program. CMM and CM have not completed a Fire Management Plan. A draft Fire Management Plan for CMM will be finalized in the future.

Specific Concerns

- Loss of special status species habitat due to large uncontrolled fires that promote the spread and introduction of invasive species, species include the Quino checkerspot butterfly and
- Loss of training land and facilities, as well as personnel safety.

Current Management

A draft Fire Management Plan was developed for CMM in September 2009 and completed in 2012; the final Fire Management Plan is expected to be available early 2013. The purpose of the draft Fire Management Plan as stated in the Introduction is to reduce wildfire potential, protect Navy assets, protect and enhance natural resources, and implement goals and objectives for the wildland fire management program (U.S. Navy 2009e). The draft Fire Management Plan also outlines fire attributes and fuels for lands on and surrounding CMM, facilities and structures on CMM at risk for fire, and guidance for managing fire at CMM. A Fire Management Plan has not been developed for CM.

Management Objective and Strategy

Objective: Support a Wildland Fire Management Program to protect high-value natural resources areas from catastrophic wildfire while conserving resources and military operational flexibility.

Strategies:

1. Conduct an Annual Preparedness Meeting prior to each fire season with the Federal Fire Department and U.S. Navy personnel to discuss the Fire Management Plan and wildland fire management guidelines.
2. Use hand tools to prune, cut, and thin vegetation within 20.2 meters (50 feet) of buildings. Vegetation management will be conducted outside the breeding season for migratory birds, or the vegetation will be searched in advance for nests.

3. Educate the CMM and CM community about wildland fire. This can be accomplished through posting fire prevention signs around CMM and CM, and developing fire prevention messages and handouts for Navy personnel.
4. Review the CMM Fire Management Plan at least annually and update the plan according to DoD Instruction 6055.06.

8.2.4 Fish and Wildlife Management

For the purposes of this INRMP, wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. The primary goal of wildlife management at CMM and CM is to maintain wildlife populations at levels compatible with land use objectives while promoting the existence, importance, and benefits of nongame species.

The basis of managing a rich assemblage of nongame wildlife is to provide a mosaic of habitats that are structurally and biologically diverse. In managing for a diversity of habitats and diversity within those habitats, the potential exists for numerous species to be found. CMM and CM should employ these basic techniques for managing wildlife. No fish species occur on CMM or CM.

- ***Monitoring Wildlife.*** Creating, monitoring, and updating GIS data on wildlife species will allow CMM and CM to store, retrieve, present, and analyze the data to make informed management decisions.
- ***Managing for Migratory Birds.*** The Migratory Bird Treaty Act (MBTA) provides for a year-round closed season for nongame birds and prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service (USFWS). Impacts on birds protected under the MBTA will be avoided through surveying for nesting birds in areas proposed for disturbance and, if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends that conducting activities outside of nesting areas or outside of the general migratory bird-nesting season can help avoid direct impacts.
- ***Protecting Sensitive Areas.*** CMM and CM should maintain biological diversity by protecting, to the extent practical, sensitive areas that provide unique habitat niches. Protection measures might include restricting vehicle movement, and protecting habitats of exceptional biological value by establishing protective buffers and maintaining healthy and diverse ecosystems.

8.2.4.1 Invertebrates Camp Michael Monsoor

Terrestrial invertebrates were documented throughout the various plant communities in the exclusive use area during the 2004 biological surveys, including 34 species of butterflies; harvester ant (*Pogonomyrmex* sp.); Jerusalem cricket (*Stenopelmatus fuscus*); dentate stink beetle (*Eleodes dentipes*); and species of tick, dragonfly, and grasshopper. Representative invertebrates observed within the biological study area during the 2004 surveys include the common buckeye butterfly (*Junonia coenia*), painted lady butterfly, cabbage white butterfly (*Pieris rapae*), and Sara orangetip butterfly (*Anthocharis sara*). The Quino checkerspot butterfly, federally listed as endangered, was also documented within the exclusive use area. More detail on Quino checkerspot butterfly detections is provided in **Section 8.2.5.1** (U.S. Navy 2008b).

8.2.4.2 Invertebrates Camp Morena

A total of 21 butterflies have been documented on CM, 17 species of which were observed during the 2009 Quino checkerspot butterfly surveys (see **Appendix F**). No adult or immature Quino checkerspot butterflies were detected. CM has low potential to support resident or dispersing Quino checkerspot

butterfly. This assessment is based on the lack of primary host plants, the lack of habitat connectivity to known Quino checkerspot butterfly populations, and the overall condition and topography of the property. The butterfly survey was the only invertebrate survey conducted on CM to date (U.S. Navy 2009b).

Specific Concerns

- Pollution and oil spills;
- Improper use of pesticides;
- Increase and spread of invasive species and
- Habitat modification.

Current Management

Opportunities for the management of invertebrate species on CMM and CM are primarily accomplished by managing habitats. CMM and CM natural resources personnel coordinate with the California Department of Fish and Wildlife (CDFW) and USFWS to identify, prioritize, and implement habitat enhancement projects targeted for particular species or groups of species (i.e., migratory birds). Projects to manage wildlife habitat include invasive plant control, enhancing and protecting wetlands, and conducting surveys (e.g., migratory nesting bird survey).

Habitat loss has a direct correlation to a decline or loss of invertebrate populations. Installation INRMPs are meant to be used as tools in operational, training, and construction planning endeavors to minimize or prevent loss of habitat, thus preserving species diversity and populations at respective installations.

Management Objective and Strategy

Objective: Increase biodiversity of the invertebrate community at CMM and CM.

Strategies:

1. Develop and implement a strategy for pollution management.
2. Conduct regular surveys for invertebrates that may be present within CMM and CM boundaries.
3. Develop and distribute outreach and education materials on invertebrates to personnel, operators and visitors on CMM and CM.

8.2.4.3 Pollinators Camp Michael Monsoor and Camp Morena

A pollinator is an animal or insect that transfers pollen grains from flower to flower (DoD Legacy 2010a). Pollinators are responsible for pollinating 80 percent of the crops we consume, as well as the majority of plants and fruits consumed by wildlife. Examples of pollinators in the San Diego region include bees, butterflies, moths, beetles, flies, and birds. Several potential invertebrate and avian pollinator species occur on CMM and CM. Invertebrate species include monarch (*Danaus plexippus*), funereal duskywing (*Erynnis funeralis*), pearly marble (*Euchloe hyantis*), chalcedon checkerspot (*Euphydryas chalcedona chalcedona*), Quino checkerspot butterfly (*Euphydryas editha quino*), sleepy orange (*Eurema nicippe*), western tailed-blue (*Everes amyntula*), silvery blue (*Glaucopsyche lygdamus*), southern (silvery) blue (*Glaucopsyche lygdamus australis*), northern white skipper (*Heliopetes ericetorum*), Edward's blue (*Hemiargus ceraunus gyas*), acmon blue (*Plebejus acmon*), lupine blue (*Plebejus lupini*), common buckeye (*Junonia coenia grisea*), marine blue (*Leptotes marina*), gorgon copper (*Lycaena gorgon*), pale swallowtail (*Papilio eurymedon*), western tiger swallowtail (*Papilio rutulus*), anise swallowtail (*Papilio zelicaon*), cloudless (senna) sulphur (*Phoebus sennae marcellina*), checkered white (*Pontia protodice*),

spring white (*Pontia sisymbrii*), small-checkered skipper (*Pyrgus scriptura*), Wright's checkerspot (*Thessalia leanira wrighti*), west coast lady (*Vanessa annabella*), painted lady (*Vanessa cardui*), and dogface butterfly (*Zerene* sp.). In addition, two avian species that are known pollinators including Anna's Hummingbird (*Calypte anna*) and Costa's Hummingbird (*Calypte costae*) are common on CMM and CM. The relationship between the fate of pollinators and the ability of installations to meet readiness and stewardship obligations has been a focus of the DoD Legacy Resources Management Program (DoD Legacy) for the past several years.

Pollinators can help ensure that native landscapes on installations do not become barren, or overrun with invasive species. The DoD acknowledges that habitat restoration and invasive species removal go hand in hand. Through enhancing and restoring pollinator habitat by restoring native plant communities and removing and controlling invasive species, DoD installations can save money, protect threatened and endangered species, and contribute to biodiversity (DoD Legacy 2010a).

Table 8-2 provides details of vegetation traits that attract the various pollinators that may be encountered at CMM and CM. For more information on DoD's work to support pollinators, visit *http://www.DoDpollinators.org*. Another good source for information on enhancing pollinator populations can be found within The Pollinator Partnership™/ NAPPC publication *Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners in the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast* available online at:

http://www.pollinator.org/PDFs/Calif.Coastal.Chaparral.rx2.pdf

Specific Concerns

- Improper use of pesticides;
- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Fire.

Current Management

CMM and CM are currently managing for pollinator species through implementation of many programs; such as landscaping, invasive species control, and restoration efforts that indirectly benefit pollinators.

Management Objective and Strategy

Objectives: Maintain and enhance pollinator populations and their habitat when not in conflict with health and safety, or the military mission.

Strategies:

1. Inventory and monitor populations and habitat composition of pollinators.
2. Develop BMPs to ensure that pollinator species are not adversely impacted.
3. Identify and develop pollinator friendly landscapes.

4. Develop and distribute outreach and education materials on pollinators to personnel, operators and visitors on CMM and CM.
5. Revegetate and restore land with plants that attract pollinators, and include pollinator-friendly plants with native species contained on the NAVFAC SW recommended plant list.
6. Control the spread of invasive species.
7. Review existing literature on pollinators.
8. Work with San Diego County Agricultural Department to explore feasibility of developing and implementing a management program that supports bee relocation as opposed to bee eradication.
9. Provide connectivity between vegetation areas by creating corridors of perennials, shrubs, and trees that provide pollinators shelter and food as they move through the landscape.
10. Provide windbreakers and nesting areas, such as bat boxes or sites without high vegetation for bee nests.
11. Inventory and become knowledgeable of local pollinators
12. Maintain a minimum of lawn areas that support recreational needs.
13. Restrict the use of pesticides; including herbicides, and insecticides when possible.
14. Provide water sources in large open areas.
15. Maintain natural meadows and openings that provide habitats for sun-loving wildflowers and grasses.

8.2.4.4 Fish Camp Michael Monsoor and Camp Morena

Not applicable to CMM and CM.

8.2.4.5 Reptiles and Amphibians Camp Michael Monsoor

No amphibian species were documented during the 2004 biological surveys in the exclusive use area. Reptile species observed within the exclusive use area include relatively common species such as the garter snake (*Thamnophis* sp.), northern red diamond rattlesnake (*Crotalus ruber ruber*), western fence lizard, alligator lizard, and side-blotched lizard (*Uta stansburiana*). Also occurring onsite were the common kingsnake (*Lampropeltis getulus*), coast patch-nosed snake (*Salvadora hexalepis virgultea*), coastal rosy boa (*Lichanura trivirgata roseofusca*), western whiptail (*Cnemidophorus tigris*), granite spiny lizard (*Sceloporus orcutti*), and San Diego horned lizard (*Phrynosoma coronatum blainvillii*). Other amphibians and reptiles expected to occur onsite include San Diego gopher snake, California tree frog (*Pseudacris cadaverina*), and Pacific Tree Frog (U.S. Navy 2008b).

8.2.4.6 Reptiles and Amphibians Camp Morena

For a complete listing of reptile and amphibian species observed on CM, see **Appendix F.**

During the 2008/2009 survey season, there was no running or standing water at CM. This influenced the results for detection of amphibians. Reptiles were active on CM; however, abundance and diversity was less than expected in some areas given the lack of development around the installation. A total of 11 reptile species were detected during the 2009 herpetofauna surveys, including three special status species. The herpetofauna on CM was not as diverse as expected given the lack of development surrounding the site. The understory within the developed portion of the camp is mowed/removed

annually for fire suppression. This may lead to lower numbers of herpetiles within the developed portion of CM (U.S. Navy 2009b).

In total, seven lizard species and four snake species were detected. Of the seven lizard species observed, five are commonly seen around San Diego County: western fence lizard, granite spiny lizard, side-blotched lizard, and western whiptail. Coronado Island skink (*Plestiodon skiltonianus interparietalis*), San Diego horned lizard, and California legless lizard are still found in San Diego County, but their intolerance to development and open habitats has led to their decline. These three special status lizard species are discussed in further detail in **Section 8.2.5.2**. Of the four snake species detected, three are found around San Diego County: striped racer (*Masticophis lateralis*), gopher snake (*Pituophis catenifer*), and western rattlesnake (*Crotalus oregonus*). The Baja California coachwhip (*Masticophis fuliginosus*), also detected on CM, is only found in the extreme southern portion of San Diego County, typically within 9.7 kilometers (6 miles) of the international border (U.S. Navy 2009b).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Fire.

Current Management

Opportunities for the management of reptile and amphibian species on CMM and CM are primarily accomplished by managing habitats. CMM and CM natural resources personnel coordinate with CDFW and USFWS to identify, prioritize, and implement habitat enhancement projects targeted for particular species or groups of species (i.e., migratory birds). Projects to manage reptile and amphibian habitat include invasive plant control, enhancing and protecting wetlands, and conducting surveys (e.g., migratory nesting bird survey).

Habitat loss has a direct correlation to a decline or loss of reptile and amphibian populations. Installation INRMPs are meant to be used as tools in operational, training, and construction planning endeavors to minimize or prevent loss of habitat, thus preserving species diversity and populations at respective installations.

Management Objective and Strategy

Objective: Employ a systematic approach to managing reptile and amphibian resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting species that are incidentally observed during special status species surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals

4. Survey for and monitor herpetofauna populations using guidelines recommended by Partners in Amphibian and Reptile Conservation (PARC).
5. Once finalized, implement DoD PARC Strategic Plan.
6. Revegetate areas on base with native species using species on the Naval Facilities Engineers Command, Southwest (NAVFAC SW) recommended plant list.
7. Control the spread of invasive species.
8. Evaluate predator control and develop strategies to control invasive predators (e.g., bullfrogs).
9. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

8.2.4.7 Birds and Migratory Bird Management Camp Michael Monsoor

For a complete listing of avian species observed on CMM see **Appendix F**. Other special status bird species are known to occur on CMM and are discussed in **Section 8.2.5**.

CMM supports a variety of resident and migratory bird species, with 48 species documented within the exclusive use area during the 2004 biological surveys. Resident species include the Spotted Towhee (*Pipilo maculatus*), Western Scrub Jay (*Aphelocoma californica*), Red-tailed Hawk, Common Raven, and Song Sparrow. Migratory bird species on CMM use the natural open space within the exclusive use area as a temporary stopover point during the winter or summer seasons, while other migratory species, such as the Western Wood-Pewee (*Contopus sordidulus*), likely nest within the exclusive use area. Representative bird species observed within the exclusive use area during the 2004 wildlife surveys include the Wrentit (*Chamaea fasciata*), Bushtit (*Psaltriparus minimus*), and California Towhee (*Pipilo crissalis*) in the chaparral and sage scrub vegetation communities; the Song Sparrow, Yellow-rumped Warbler, and Acorn Woodpecker (*Melanerpes formicivorus*) in the oak woodland habitat; and the Red-tailed Hawk and Common Raven within the grassland communities (U.S. Navy 2008b).

8.2.4.8 Birds and Migratory Bird Management Camp Morena

For a complete listing of avian species observed on CM, see **Appendix F**. Other special status bird species are known to occur on CM and are discussed in **Section 8.2.5**.

Avian species richness (i.e., total species detected) was found to be moderate at CM. In total, 49 bird species were detected within CM or the immediate vicinity during the 2008 and 2009 bird surveys. These included year round residents, winter-only species, breeding species, and species that are strictly migratory through the area. None of the species detected have a special status (U.S. Navy 2009b).

The avifauna is a mixture of species that reflect the habitat types found on CM. These species include Anna's Hummingbird, Costa's Hummingbird (*Calypte costae*), Acorn Woodpecker, Nuttall's Woodpecker (*Picoides nuttallii*), Black Phoebe, Ash-throated Flycatcher (*Myiarchus cinerascens*), Bushtit, Oak Titmouse (*Baeolophus inornatus*), White-breasted Nuthatch (*Sitta carolinensis*), Bewick's Wren, House Wren (*Troglodytes aedon*), Western Bluebird (*Sialia mexicana)*, Spotted Towhee, California Towhee, Black-chinned Sparrow (*Spizella atrogularis*), Lark Sparrow (*Chondestes grammacus*), Black-headed Grosbeak (*Pheucticus melanocephalus*), House Finch, and Lesser Goldfinch (*Spinus psaltria*). There are several graineries on site that are used by the Acorn Woodpeckers for storing large numbers of acorns and other seeds for survival in the winter (U.S. Navy 2009b).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise);
- Fire and
- Predation.

Current Management

The MBTA (16 U.S.C. 703-712) protects almost all migratory birds and prohibits the taking of birds, their young, nests, and eggs, except as permitted by the USFWS. The USFWS recommends that CMM and CM avoid impacting birds protected under the MBTA by surveying for nesting birds in areas proposed for disturbance and if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends conducting activities outside of nesting areas or outside of the general migratory bird-nesting season that extends from mid-February through the end of August, to help avoid direct impacts.

Prohibited Acts: Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not.

On March 15, 2005, the USFWS published in the Federal Register (FR 70(49):12710-12716) a final list of the bird species to which the MBTA does not apply. The list is required by the Migratory Bird Treaty Reform Act of 2004. The actual list of migratory birds protected by the MBTA is published in the CFR (Title 50, Part 10.13). When it became law in 2004, the Reform Act excluded any species not specifically included on the Title 50, Part 10 list from protection.

The 2003 National Defense Authorization 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.
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 February 28, 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.

In addition, DoD and the USFWS entered into a Memorandum of Understanding (MOU) in July 2006, to Promote the Conservation of Migratory Birds, in accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (DoD 2007). This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations other than military readiness activities are consistent with the MBTA. The MOU also describes how the USFWS and DoD will work together cooperatively to achieve these ends. The MOU does not authorize the take of migratory birds; the USFWS, however, may develop incidental take authorization for Federal agencies that complete an Executive Order MOU.

Current management of migratory birds also includes habitat restoration, implementation of the DoD CBM, and general bird surveys approximately every 5 years (during natural resource inventory surveys).

Management Objective and Strategy

Objective: Maintain and enhance populations, and nesting and foraging habitats of migratory birds on CMM and CM.

Strategies:

1. Assess the effects of all projects on migratory birds during NEPA process. Ensure compliance with MOU between USFWS/DoD on the Conservation of Migratory Birds and the "Migratory Bird Rule."
2. Identify any actions that require an MBTA permit and, if necessary, obtain appropriate permit for intentional take of migratory birds.
3. Develop effective management for minimizing the unintentional take of migratory birds.
4. Conduct regular surveys to determine what species of migratory birds may have potential to be on NBC.
5. Once finalized, implement monitoring protocols contained within the DoD Coordinated Bird Monitoring Plan. Contribute data to the Coordinated Bird Monitoring Database.
6. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed.
7. Develop migratory bird specific BMPs and ensure these BMPs are included in project plans (e.g., plan all tree trimming during the non-nesting season).
8. Develop and enhance partnerships with agencies and groups involved (e.g., USFWS and CDFW) in migratory bird management.
9. Develop and distribute outreach and education materials on migratory birds to personnel, operators and visitors on CMM and CM.
10. Revegetate with native species contained on the NAVFAC SW recommended plant list.
11. Control the spread of invasive species.
12. Participate in DoD Partners in Flight initiative.
13. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).
14. When feasible pick up sick and injured migratory birds and take to wildlife rehab facility.

8.2.4.9 Bird/Wildlife Aircraft Strike Hazard Camp Michael Monsoor and Camp Morena

A full BASH program is not in place at CMM and CM due to the limited air operations but may be considered if air operations increase in the future.

Natural resource managers are responsible for ensuring BASH programs are addressed in this INRMP and is compliant with all applicable state and Federal natural resource laws and regulations as well as all applicable DoD, DoN, and U.S. Navy environmental policies, directives, and instructions.

8.2.4.10 Mammals Camp Michael Monsoor

Representative mammal species observed directly or detected indirectly by sign (e.g., tracks, scat, or fur) within the exclusive use area during the 2004 biological surveys include the mountain lion, bobcat (*Felis rufus*), coyote, and mule deer (U.S. Navy 2008b).

8.2.4.11 Mammals Camp Morena

In total, 12 mammal species were detected at CM during the 2009 ocular and small mammal trapping surveys (see **Table 8-3**). Two of these species, the Dulzura pocket mouse (*Chaetodipus californicus femoralis*) and western mastiff bat (*Eumops perotis*), are considered CDFW species of special concern. Eight mammal species were observed or recorded during the ocular survey of Camp Morena. All are common and widespread species associated with the habitats occurring on and adjacent to CM. In total, five mammal species were captured at CM during the small mammal trapping surveys. The trapping results indicate that the CM has low abundance and species diversity of small mammals with 42 captures of five species. The species captured are commonly found in the habitats occurring on and adjacent to CM (U.S. Navy 2009b).

Table 8-3: Mammals Observed on Camp Morena

Common Name	Scientific Name	Survey Type
Big brown bat	*Eptesicus fuscus*	Ocular
Western mastiff bat	*Eumops perotis*	Ocular
Desert cottontail	*Sylvilagus audubonii*	Ocular and trapping
California ground squirrel	*Spermophilus beecheyi*	Ocular
Botta's pocket gopher	*Thomomys bottae*	Ocular
Coyote	*Canis latrans*	Ocular
Bobcat	*Lynx rufus*	Ocular
Southern mule deer	*Odocoileus hemionus*	Ocular
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	Trapping
Dulzura kangaroo rat	*Dipodomys simulans*	Trapping
California mouse	*Peromyscus californicus*	Trapping
Deer mouse	*Peromyscus maniculatus*	Trapping

Source: U.S. Navy 2009b

Species with potential to occur but not observed or detected during the surveys include: southern grasshopper mouse (*Onychomys torridus*), gray fox, raccoon, long-tailed weasel (*Mustela fuenata*), striped skunk, spotted skunk (*Spilogale putorius*), and mountain lion. Although several species of bats

are known to occur within the vicinity of CM, no roosts were located in the buildings or structures. However, the coast live oak trees may provide potential roost habitat. This was evident by the early evening observations of big brown bats foraging in and around the oaks and street lights, indicating a roost might be close. Several species of *Myotis* are also known to roost in hollows of trees, such as oaks, but were not detected or observed during the nocturnal surveys (U.S. Navy 2009b).

Specific Concerns

- Improper use of pesticides;
- Habitat loss;
- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Predators and
- Fire.

Current Management

Opportunities for the management of mammal species on CMM and CM are primarily accomplished by managing habitats. CMM and CM natural resources personnel coordinate with CDFW and USFWS to identify, prioritize, and implement habitat enhancement projects targeted for particular species or groups of species (i.e., migratory birds). Projects to manage mammal habitat include invasive plant control, enhancing and protecting wetlands, and conducting surveys (e.g., migratory nesting bird survey).

Habitat loss has a direct correlation to a decline or loss of mammal populations. Installation INRMPs are meant to be used as tools in operational, training, and construction planning endeavors to minimize or prevent loss of habitat, thus preserving species diversity and populations at respective installations.

Management Objective and Strategy

Objective: Employ a systematic approach to managing terrestrial mammals, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation, as needed.

Strategies:

1. Continue documenting mammal species during Natural Resources inventory efforts and those that are incidentally observed during special status species surveys.
2. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
3. Install bat boxes where appropriate.
4. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

8.2.4.12 Marine Mammals

Not applicable to CMM and CM.

8.2.5 Special Status Species (Federally Listed and Other Special Status Species)

Special status species include those species that are federally or state listed endangered, threatened, candidate, or California species of special concern (SSC) and California fully protected species (CFP);

birds on the Federal Birds of Conservation Concern (BCC) list (see **Figure 8-5** for Special status Species on CM); and plants identified by the California Native Plant Society (CNPS) as belonging to the Rare Plant Rank list of 1B. In addition, those migratory bird species that have been determined to be of the highest "concern" to the DoD and that have been identified on the DoD Partners in Flight (PIF) Priority Species list have been included. **Table 8-4** includes species either observed on CMM and CM during the 2005 natural resources survey, or species with the potential to occur on the installation.

Table 8-4: Special Status Species Observed and Listed Species with Potential to Occur on Camp Michael Monsoor and Camp Morena

Common Name	Scientific Name	Federal Status	State Status	Other Status
Invertebrates				
Quino checkerspot butterfly [1 & 2]	*Euphydryas editha quino*	FE	–	–
Amphibians and Reptiles				
Silvery legless lizard	*Anniella pulchra pulchra*	–	SSC	–
Coronado Island skink	*Plestiodon skiltonianus interparietalis*	–	SSC	–
San Diego horned lizard	*Phrynosoma coronatum blainvillii*	–	SSC	–
Birds[3]				
Golden Eagle [1]	*Aquila chrysaetos*	BGEPA, BCC	CFP	DoD PIF
Northern Harrier	*Circus cyaneus*	–	SSC	–
Nuttall's Woodpecker	*Picoides albolarvatus*	BCC		
Loggerhead Shrike [1]	*Lanius ludovicianus*	BCC	SSC	DoD PIF
Lawrence's Goldfinch	*Spinus lawrencei*	BCC	–	–
Black-chinned Sparrow [1 & 2]	*Spizella atrogularis*	BCC		DoD PIF
Gray Vireo[1 & 2]	*Vireo vicinior*	BCC	SSC	DoD PIF
Mammals				
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	–	SSC	–
Western mastiff bat	*Eumops perotis*	–	SSC	–

Source: U.S. Navy 2008b, U.S. Navy 2009b, USFWS 2010a, CDFG 2010b

Notes: [1] This species occurs on CMM and CM, all other species occur only on CM. [2] Special Status Species with focused management. [3] Birds are named using the American Ornithologists' Union nomenclature.

Key:

SSC = California Species of Special Concern
FP = California Fully Protected Species
BGEPA = Bald and Golden Eagle Protection Act
FE = Federally Endangered
SE = State Endangered
DoD PIF = DoD Partner in Flight Priority Species

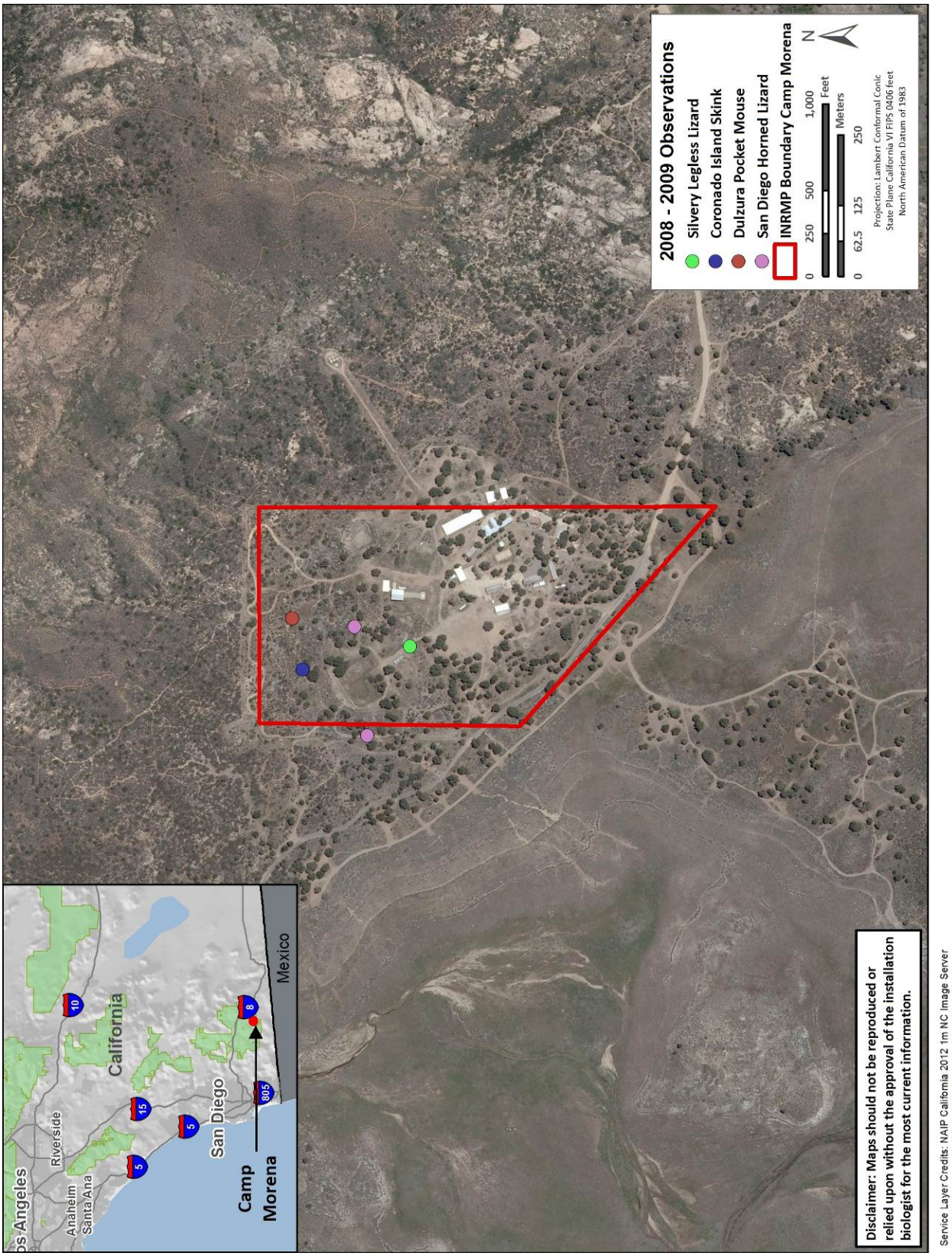


Figure 8-5: Camp Morena Special Status Species

An installation's overall ecosystem management strategy must provide for protection and recovery of federally listed species. Under the Endangered Species Act (ESA), an "endangered species" is defined as any species that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The USFWS has also presented an updated list of species that are regarded as candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and could warrant protection under the ESA. General management actions for listed species include the following:

- Preparation and implementation of specific management actions for listed species that include protocols for monitoring surveys and for site marking of sensitive areas;
- Maintaining GIS data on the distribution and habitat availability for listed species and sharing this information with the CNDDB;
- Implement Environmental Review requirements in accordance with OPNAVINST 5090.1C CH-1;
- Conduct Environmental Awareness briefings (e.g., natural resource training) as necessary;
- Minimization and conservation measures aimed at reducing the potential for accidental take;
- Investigating and implementing research projects to better understand ecological requirements of listed species and
- Investigation and implementation of habitat improvement and non-native species control to conserve listed species.

If threatened, endangered, or candidate species are discovered on the installation during a biotic inventory, species information and management actions should be incorporated into the INRMP.

No rare plants, as listed by the California Native Plant Society (CNPS), were documented on CMM and CM during the periodic natural resources surveys.

The intent of this section is to identify objectives and strategies to manage CMM and CM using a regional ecosystem-based approach that manages special status species while protecting the operational functionality of the mission. While single-species management is not promoted as a general philosophical management approach on the installation, specific controls are used to protect special status species beyond management of the ecosystem. Other procedures in place for management of special status species are modifying the ecosystem and human interactions within this environment. The following sections include brief descriptions of those species actively managed by natural resources personnel at CMM and CM. Note that all wildlife species are considered for management and managed as needed for aircraft safety under the NBC Bird Animal Aircraft Strike Hazard (BASH) program, including Special Status Species.

For a complete description, background and species account including distribution, range, habitat and biology, of the Special Status Species described below, see **Appendix F**.

8.2.5.1 Federally Listed and Candidate Species Camp Michael Monsoor and Camp Morena

One federally listed species, the endangered Quino checkerspot butterfly (*Euphydryas editha quino*), is known to occur on CMM. This has no state status. The Quino checkerspot butterfly has been observed within the exclusive use area of CMM. The Quino checkerspot butterfly was observed during the April

2004 surveys within a 202.3 hectares (500 acres) survey area. Specifically, the Quino checkerspot butterfly was observed within the development footprint of CMM. Larval host plants are known to occur within the Camp. The primary host plant detected within CMM was Coulter's snapdragon (*Antirrhinum coulterianum*) (U.S. Navy 2008b).

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Fire;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

Management needs of threatened, endangered, and candidate species and their habitats are based on results contained within surveys performed regularly on CMM and CM. Listed species that occur on CMM and CM include the Quino checkerspot butterfly. CMM and CM will continue to conduct species surveys as deemed necessary and subject to available funding. Management strategies will be developed or revised based on the recommendations of those surveys.

The Navy currently conducts management of listed species at CMM in accordance with the Quino checkerspot butterfly Biological Opinion and QCB habitat management plan that is discussed in detail in the below appropriate section. Examples of management strategies include annual surveys and assessment of species status on the installation, minimization of disturbances, and site preparation where necessary.

There is no critical habitat for any of the listed species in NBC. This is, in part, due to U.S. Navy environmental planning through INRMPs. ***Appendix D*** *identifies within the INRMP all management and conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.*

Management Objective and Strategy

Objective: Maximize effectiveness and efficiency of the NBC Endangered Species Program to achieve the best conservation possible while maintaining and improving training activities at the desired level.

Strategies:

1. Investigate the need for implementing research projects to better understand ecological requirements of listed species.
2. Continue use of the established Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists to reflect presence of threatened, endangered, and other sensitive species.

5. Conduct regular surveys for threatened, endangered, and candidate species that may be present on NBC.
6. Continue monitoring sensitive species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
8. Establish an education program for military personnel who might have contact with sensitive species or their habitats.
    a. Develop a demonstration garden and
    b. Maintain updated educational materials.
9. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats. Reduce habitat fragmentation.
10. Implement erosion control BMPs to ensure adverse environmental impacts to threatened, endangered, and candidate species habitat do not occur.
11. Revegetate with native species included on the NBC recommended plant list. Include sensitive plant species in the recommended plant list.
12. Periodically review the natural resources management program to ensure that management actions do not adversely impact special status species habitat.
13. Continue to protect existing native plant communities whenever possible.

Quino Checkerspot Butterfly

One federally listed species, the Quino checkerspot butterfly, is known to occur on CMM. This species is federally listed as endangered and has no state status. The Quino checkerspot butterfly has been observed within the exclusive use area of CMM. The Quino checkerspot butterfly was observed during the April 2004 surveys within a 202.3 hectares (500 acres) survey area. Specifically, the Quino checkerspot butterfly was observed within the development footprint of CMM. Larval host plants are known to occur within the Camp. The primary host plant detected within CMM was Coulter's snapdragon (*Antirrhinum coulterianum*) (U.S. Navy 2008b). During subsequent surveys conducted in 2006, 2007, and 2008, no individuals were observed. However, three Quino checkerspot butterflies were observed in a location they had not previously been detected during surveys conducted in 2010. During the 2010 protocol surveys three Quino individuals were observed in the southwest corner of CMM near the La Posta Truck Trail in Parcel C and the Existing Withdrawal. Two potential host plants species, Chinese houses (*Collinsia concolor*) and Coulter's snapdragon (*Antirrhinum coulterianum*) were documented within the surveys along with several potential nectar sources (U.S. Navy 2010h).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise);
- Invasive species;
- Habitat degradation through training;
- Facilities projects (e.g., construction and maintenance, including roads);
- Other natural resources management (e.g., erosion control and invasive species control);
- Fire management (both positive and negative) and
- Fire regime.

Current Management

The 2007 Biological Opinion (FWS-SDG-4452.1) and the 2011 Amendment to the Biological Opinion (FWS-SDG-4452) for the Land Withdrawal, Facilities Construction, and Operations at Naval Special Warfare, La Posta Mountain Training Facility that only includes P-781 (a.k.a. CMM) (FWS-SD-11B0338-11F0507) discuss the management of Quino checkerspot butterfly and at CMM. Among the numerous conditions, these BOs required: (1) The presence of a biological monitor during the initial phases of clearing for construction projects to ensure that construction sites are marked and to assure adequate communication regarding conversation measures and Quino checkerspot butterfly habitat; (2) surveys for larva and host plants of the Quino checkerspot butterfly during spring for one to three years preceding construction; (3) salvage of larva conducted by qualified personnel; and (4) seed collections of Quino host plants, performed by qualified personnel. For a complete list of Terms and Conditions and Conservation measures, see **Appendix I.**

Management Objective and Strategy

Objective: Promote recovery and maintain populations of the Quino checkerspot butterfly on CMM and CM.

Strategies:

1. Invasive species control to reduce threats to Quino checkerspot butterfly habitat.
2. Perform periodic monitoring for Quino checkerspot butterfly (recommend at least every 3 years).
3. Complete a vulnerability assessment to identify threats to Quino checkerspot butterfly populations.
4. NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats). Location and timing.
5. Coordination with other elements of the natural resources program.
6. Develop comprehensive road maintenance plan that included consideration for Quino checkerspot butterfly habitat needs. Review plan annually.
7. Perform outreach and education to installation, workforce, military members, and improve understanding of population dynamics of Quino checkerspot butterfly.
8. Minimize adverse fire management impacts.
9. Implement fire management strategies that benefit species.
10. Improve understanding of population dynamics of Quino checkerspot butterfly.
11. Implement Quino checkerspot butterfly enhancement plan.
12. Adhere to provisions in USFWS biological opinion and related management plans for managing the Quino checkerspot butterfly at CMM and CM.

8.2.5.2 Other Special Status Species Camp Michael Monsoor and Camp Morena

In addition to federally threatened and endangered species, CMM and CM recognize species that occur at a level of rarity that currently does not warrant Federal listing. **Table 8-4** lists other special status species and their corresponding CDFW or other Federal status. No focused management or surveys currently takes place on CMM and CM for most of the other special status species.

Other Special Status Species with Focused Management

Black-chinned Sparrow

The Black-chinned Sparrow has been documented and is known to occur on both CMM and CM.

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Habitat loss and fragmentation;
- Facilities maintenance;
- Predation and
- Invasive species.

Current Management

Opportunities for the management of migratory bird species on CMM and CM are primarily accomplished by managing habitats. CMM and CM natural resources personnel coordinate with the CDFW and USFWS to identify, prioritize, and implement habitat enhancement projects targeted for particular species or groups of species (i.e., migratory birds). Projects to manage migratory bird habitat include invasive plant control, enhancing and protecting wetlands, and conducting surveys (e.g., migratory nesting bird survey).

Habitat loss has a direct correlation to a decline or loss of mammal populations. Installation INRMPs are meant to be used as tools in operational, training, and construction planning endeavors to minimize or prevent loss of habitat, thus preserving species diversity and populations at respective installations.

Management Objective and Strategy

Objective: Maintain suitable chaparral habitat for the Black-chinned Sparrow on CMM.

Strategies:

1. Implement site approval process and NEPA to avoid and minimize impacts to chaparral habitat.
2. As necessary, control and remove invasive species in Black-chinned Sparrow habitat.
3. Determine presence/absence of Black-chinned Sparrow within suitable habitat.
4. Contribute to regional vulnerability assessments.
5. Coordinate with regional efforts (e.g., Partners in Flight) and working groups to determine appropriate management responses to climate change.
6. Work with regional recovery groups to address threats on wintering grounds.
7. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).
8. Coordination with other elements of the natural resources program to avoid impacts.
9. Ensure fire management activities are conducted outside of the breeding season.

Gray Vireo

The Gray Vireo has been documented in the immediate vicinity of CMM and is likely to occur on the installation.

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Habitat loss and fragmentation;
- Facilities maintenance;
- Predation;
- Invasive species and
- Cowbird parasitism.

Current Management

Opportunities for the management of migratory bird species on CMM and CM are primarily accomplished by managing habitats. CMM and CM natural resources personnel coordinate with the CDFW and USFWS to identify, prioritize, and implement habitat enhancement projects targeted for particular species or groups of species (i.e., migratory birds). Projects to manage migratory bird habitat include invasive plant control, enhancing and protecting wetlands, and conducting surveys (e.g., migratory nesting bird survey).

Habitat loss has a direct correlation to a decline or loss of mammal populations. Installation INRMPs are meant to be used as tools in operational, training, and construction planning endeavors to minimize or prevent loss of habitat, thus preserving species diversity and populations at respective installations.

Management Objective and Strategy

Objectives: Maintain suitable chaparral habitat for the Gray Vireo on CMM.

Strategies:

1. Implement site approval process and NEPA to avoid and minimize impacts to chaparral habitat. Gray Vireo prefers dense chaparral on south-facing slopes.
2. As necessary, control and remove invasive species in Gray Vireo habitat.
3. Determine presence/absence of Gray Vireo within suitable habitat.
4. Contribute to regional vulnerability assessments.
5. Coordinate with regional efforts (e.g., Partners in Flight) and working groups to determine appropriate management responses to climate change.
6. Work with regional recovery groups to address threats on wintering grounds.
7. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).
8. Coordination with other elements of the natural resources program.
9. Ensure fire management activities are conducted outside of the Gray Vireo breeding season.

Other Special Status Species with General Management

In addition to special status species detected during the periodic natural resources surveys, several other special status species have been observed and are known to occur on CMM and CM (see **Table 8-5** in **Section 8.2.6** for a complete list). No focused management or surveys currently take place on CMM and CM for these other special status species.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Fire;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. Plans are developed collaboratively with the USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded. A broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship.

All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Minimize the potential for adverse effects on special status species and their associated ecosystems while protecting the operational functionality of the installation mission by using an ecosystem-based management approach.

Strategies:

1. Investigate the need for implementing research projects to understand ecological requirements of special status species.
2. Continue use of the established NBC Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.
3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists and constraints maps to reflect presence of threatened, endangered, and other special status species.
5. Conduct regular surveys for threatened, endangered, and candidate species that may be present on CMM and CM.

6. Continue monitoring special status species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Augment education currently conducted at CMM and CM program for military personnel who might have contact with sensitive species or their habitats.
8. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats.
9. Implement erosion control BMPs to ensure adverse environmental impacts to sensitive habitat do not occur.
10. Revegetate with native species that are indicative of the vegetation that was present prior to impact.
11. Periodically review the natural resources management program to ensure that management actions do not adversely impact special status species habitat.
12. Maintain accurate, usable, and informative GIS data for ease in management planning and documentation.
13. Continue to protect existing native plant communities whenever possible.

8.2.6 Invasive Species Management Camp Michael Monsoor and Camp Morena

In 2006 the California Invasive Plant Council (Cal-IPC) updated the 1999 *Exotic Pest Plants of Greatest Ecological Concern in California* inventory list (Cal-IPC 2006). The updated Cal-IPC inventory ranks invasive species using a *High*, *Moderate*, *Limited*, or *Evaluated but not listed* scale based on ecological impact of the species. Invasive species were ranked based on four criteria that included (1) ecological impact of the species on native California ecosystems, (2) potential for species to either be or become invasive, (3) species distribution, and (4) documented levels of the species within a region or ecosystem. A description of each ranking level based on these four criteria as defined by Cal-IPC, is presented below (Cal-IPC 2006):

High: These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. These species are usually widely distributed ecologically, both among and within ecosystems.

Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on ecosystems, plant and animal communities, and vegetation structure. Their reproductive biology is conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited: The ecological impacts of these species are minor or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasion. Ecological amplitude and distribution are generally limited (these species may be locally persistent and problematic).

Evaluated but not listed: In general, this designation is for plant species that did not have enough information to warrant a rating or the information available indicated that the plant species does not currently have significant impacts within California.

Alert: This is an additional designation for some species in either the high or moderate category, but whose evaluation is limited. The designation alerts managers to species that are capable of rapidly invading unexploited ecosystems, based on initial localized observations and on observed ecological behavior in similar ecosystems elsewhere.

Cal-IPC inventory species observed on CMM and CM, and their associated Cal-IPC ranks are shown in **Table 8-5**. While Cal-IPC is a valuable resource, new infestations appear frequently, and the sheer number of invasive species in the state of California can make it difficult for one agency to track in a timely manner. Installation staff may be required to do independent research to ensure that a potentially invasive species are not introduced to an area. Additionally, some species that have not previously appeared to be invasive may quickly become invasive due to climatic or other factors (Pers. Comm. Munson 2012).

Table 8-5: Invasive Species Observed on Camp Michael Monsoor and Camp Morena

Common Name	Scientific Name	Cal-IPC Rank	Location	
			Camp Morena	Camp Michael Monsoor
Wild oat	*Avena fatua*	Moderate	X	X
Black mustard	*Brassica nigra*	Moderate		X
Ripgut brome	*Bromus diandrus*	Moderate	X	X
Soft chess, soft brome	*Bromus hordeaceus*	Limited		X
Compact brome, red brome	*Bromus madritensis* ssp. *rubens*	High	X	X
Cheat grass, downy brome	*Bromus tectorum*	High	X	X
Yellow starthistle	*Centaurea solstitialis*	High		X
Wild carrot, Queen Anne's lace	*Daucus carota*	Eval No List		X
Broadleaf filaree, longbeak filaree/Stork's-bill	*Erodium botrys*	Eval No List		X
Redstem filaree, redstem stork's-bill	*Erodium cicutarium*	Limited		X
Whitestem filaree	*Erodium moschatum*	Eval No List	X	
Shortpod mustard, summer mustard	*Hirschfeldia incana*	Moderate		X
White horehound	*Marrubium vulgare*	Limited	X	X
Annual beard grass, rabbit-foot polypogon	*Polypogon monspeliensis*	Limited		X
Sheep sorrel	*Rumex* sp.	Moderate		X
Mediterranean grass	*Schismus barbatus*	Limited		X
London rocket	*Sisymbrium irio*	Moderate		X
Tamarisk/salt-cedar	*Tamarix* sp.	High		X
Big periwinkle, greater periwinkle	*Vinca major*	Moderate		X
Rattail fescue	*Vulpia myuros*	Moderate		X

Source: U.S. Navy 2009b, Cal-IPC 2006

Invasive species management is a large part of pest management activities. The Federal Noxious Weed Act and EO 13112 require Federal agencies to control noxious and invasive species on Federal lands. The Federal Noxious Weed Act, enacted January 3, 1975, established a Federal program to control the introduction and spread of foreign noxious weeds into the United States. Amendments in 1990 established management programs for undesirable plants (including noxious weeds) on Federal lands. There are several plant species that are considered noxious and control is mandatory for those found on the Federal list. EO 13112 requires that Federal agencies prevent the introduction of invasive species (see **Appendix F** for list of species), detect and control populations of invasive species, and restore native species and habitat conditions in ecosystems that have been invaded. Invasive species are alien species (not native to the ecosystem) whose introduction does, or is likely to, cause economic or environmental harm, or harm to human health. All of the invasive weeds listed on the Federal list are not necessarily found at CMM and CM.

The California Wildlife Action Plan has identified the growth and spread of floral and faunal invasive species in the state as a major concern to maintaining biodiversity in the state (CDFG 2007). As a result, NBC natural resources personnel on CMM and CM and NAVFAC SW ensure that invasive species are not introduced on the installation, and have developed a program to control the spread of and the eradication of existing infestations of invasive species.

Problems associated with invasive non-native plants and animals are currently being addressed at many different levels in California, within the constraints of budgets and staffing resources. Examples include the Cal-IPC which supports the coordination for activities addressing noxious weeds within the state. The NRCS also has a lead role in coordinating an aggressive state/Federal/private effort to eradicate, or at least stop, the spread of invasive species.

All installation pest management activities are coordinated by the installation Integrated Pest Management (IPM) Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide/herbicides authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager. Chemical and manual exotic and invasive species treatments are required to be entered in the NAVFAC Online Pesticide Reporting System.

Specific Concerns

- Anthropogenic disturbances (e.g., foot traffic) can be a potential source of invasive species;
- Landscaping on and off base;
- Rapid spread of invasive non-native plants that displace native species and degrade habitat for native floral and faunal species and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

CMM and CM have developed a program to monitor and control the spread of existing infestations of invasive species, and to determine if new species populations have become established. Assessments of invasive species populations are conducted annually during the rainy season to determine extent of invasive species populations on CMM and CM. Once assessed, species are prioritized for treatment based on the extent of the infestation, and where the populations are located (e.g., next to listed species habitat). CMM and CM is actively monitoring for and controlling invasive species; however, there is no

formal plan in place to ensure that control activities employed by CMM and CM are consistent and effective.

Management Objective and Strategy

Introduction and Spread of Invasive Species

Objective: Minimize non-native species encroachment in areas where severe to moderate encroachment occurs, and in new areas of encroachment where infestation might be spreading but is not yet severe.

Strategies:

1. Annually review and update NBC recommended plant list.
2. Develop and implement an Invasive Species Management Plan to control the spread of invasive species on CMM and CM. The plan should include specific prescriptions to evaluate individual invasive species, to identify targeted species, to control further spread of targeted species, and to develop and implement a program to monitor species abundance.
3. Conduct annual surveys to determine whether controls on existing infestations of species have been effective, and whether new populations have become established.
4. Develop and implement a review process for all projects that include a landscaping component to ensure non-native species are not introduced.
5. Coordinate with the Natural History Museum to identify unknown species that may be invasive.
6. Develop outreach and education materials for distribution within the CMM and CM community.

Early Detection and Rapid Response

Objective: Enhance current early detection and rapid response management capabilities.

Strategies:

1. Ensure the bio-security plan establishes early detection protocol and rapid response options, to include the following:
    a. Establish adequate monitoring locations to detect invasive species introduction and spread.
    b. Develop a communication network as a rapid response tool to quarantine specific invaders and identify the pathway.
    c. Support rapid response by determining funding sources, contract vehicles, and cooperative mechanisms that can be accessed quickly.
    d. Prepare Instructions that includes measures to prevent the introduction of invasive non-native species, detect early and respond rapidly to new introductions, and control and monitor established populations.
2. Prepare educational materials for CMM and CM military and civilian employees, contractors, and other visitors as a tool in early detection of non-native terrestrial species.

Project Planning

Objective: Ensure control and management of invasive species is included in project planning and maintenance projects.

Strategies:

1. Address non-native species in NEPA and other ground disturbing project plans.
    a. Ensure funding is secured for non-native removal during all phases (including post-project), if applicable.
    b. Monitor projects to ensure personnel are following BMPs, conservation measures, and other guidelines and requirements.
2. Manage roads, access routes, and new construction sites to minimize the spread of invasive non-native species and ensure that road or access routes are not created without authorization and project review approval.
    a. Require that maintenance or repair of existing roads stay within established footprints.
    b. Clean roadside mowing equipment of adhering dirt and vegetation between mowing cycles.
    c. Schedule roadside mowing to minimize weedy species seed distribution.
3. If applicable, project proponent must include invasive species treatments and revegetation of temporarily disturbed areas in project description. Implement standard operating procedures to ensure personnel are following guidelines.
4. Wash vehicles and personnel boots, bags, and clothes before coming on site; before moving to a different site on bases, as applicable; and before leaving base, as applicable.

Coordination with Regional Agencies

Objective: Promote cooperative interagency efforts to collect and analyze comprehensive monitoring data, including shared funding and staffing.

Strategies:

1. Coordinate with regional and local agencies on efforts undertaken by CMM and CM to control the spread of invasive and exotic species.

8.2.7 Grounds and Landscape Maintenance Camp Michael Monsoor and Camp Morena

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat. Planting windbreaks around buildings and parking areas, establishing wildflower areas, and reducing mowing are all ways to spend dollars more wisely, educate the public about the benefits of reduced maintenance, and become better stewards of the environment. In managing natural resources in the cantonment area, CMM and CM acknowledge their responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (1994). The memorandum's requirements include the following:

- Using regionally native plants for landscaping;

- Using construction practices that minimize adverse effects on the natural habitat;
- Reduce pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- Implementing water-efficient practices and
- Creating demonstrations of these practices to promote their use elsewhere.

Landscaping opportunities exist throughout NBC in association with administration buildings, training facilities, recreational areas, and housing. Normal grounds maintenance operations focus on lawn care, drainage ditch maintenance, road maintenance, landscaping maintenance, and pest management.

Specific Concerns

- Water use conservation requirements.

Current Management

CMM and CM do not currently have a landscape plant list. Landscape projects are generally managed using the Landscaping Guidelines established for RTSWS (U.S. Navy 2011i). The specific guidelines include:

- Landscaping will not interfere in military activities and will be designed to prevent blocking the "line of sight" around the perimeters of the facility;
- Utilize indigenous species that are appropriate for the site being landscaped;
- Do not us non-native invasive species;
- Utilize drought tolerant native species;
- Utilize species that will provide soil stabilization, particularly on slopes;
- Incorporate appropriate management strategies to allow for reduced water, pesticides, and herbicide use;
- Utilize evergreen species to provide year round structure and annual and perennial sub-shrubs to provide color and
- Maintenance needs of individual species should be taken into account when designing a landscape to ensure plants grouped together have similar maintenance needs.

Management Objective and Strategy

Objectives: Maintain an aesthetically pleasing landscape on CMM and CM that preserves natural ecosystem functions, conserves water in landscaped areas, and promotes pollinator species.

Strategies:

1. Provide professional advice to assist the grounds landscaping and maintenance program in the use of native species as identified in the NBC recommended plant list.
2. Maintain and annually update the list of recommended plants that can be used in landscaping.

3. Develop and implement BMPs for grounds maintenance at CMM and CM (e.g., water conservation). Periodically review the Landscape Management Plan to ensure plan BMPs still meet installation needs.
4. Restore native plant communities and collect seeds of native species for submittal to Natural History Museum.
5. Develop monitoring metrics, and set targets to ensure management strategies are meeting goals and objectives.

8.2.8 Pest Management Camp Michael Monsoor and Camp Morena

Authority for pest management activities on CMM and CM is directed under the Federal Insecticide, Fungicide and Rodenticide Act as amended (7 U.S.C. 136r-1), DoD Instruction 4150.07, SDMAI IPMP, December 2009, and OPNAVINST 6250.4C, Pest Management Programs, OPNAVINST 5090.1C CH-1, Chapter 17. IPM is a sustainable approach that incorporates the use of multiple techniques to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control might be an option used in conjunction with other methods. IPM strategies depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts. DoD Instruction 4150.07 establishes annual goals, or measures of merit, for IPM that include the following:

- All DoD installations will have current pest management plans;
- Maintain the 55 percent pesticide use reduction achieved from 1993-2003 (in pounds of active ingredient) and
- All installation DoD and contract pesticide applicators will be appropriately certified or licensed.

In addition, OPNAVINST 6250.4C directs the Navy and Marine Corps to (DoN 2012):

a. Prevent pests from adversely affecting military operations and missions.
b. Safeguard human health and morale by controlling pests that transmit diseases, annoy personnel, or represent a hazard to public health or safety.
c. Maintain and extend the service life of facilities, structures, and materiel by preventing economic pest damage.
d. Enhance the natural environment through the careful protection and management of ecosystems, endangered and threatened species, wildlife, watersheds and water quality in order to maintain optimal biodiversity.
e. Ensure pesticide use is safe and consistent with label directions.
f. Use the principles of IPM to avoid and minimize the use of pesticides when nonchemical alternatives are available and cost effective.
g. Comply with quarantine laws and regulations as related to protecting plants, animals and human health.
h. Comply with laws and regulations concerning pesticide storage, application, disposal of hazardous wastes, and transport of hazardous materials and substances.

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog

populations. The NBC Instruction 5100.2G (10 Jan 2006) regarding Animal Control on board Naval Base Coronado Installations and Dog Beach and Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

1. Installation residents should keep and feed pet animals indoors and under close supervision.
2. Support programs to neuter or spay animals before they reach reproductive age.
3. Require routine vaccinations for rabies and other diseases.
4. Require microchipping registration of all pets brought onto installations.
5. Prohibit the feeding of feral animals on the installation.
6. Provide educational materials to pet owners regarding installation regulations and general pet management.
7. Never abandon animals.
8. Comply with all humane and animal control regulations at the Federal, state, and local level.
9. Except for guide and military working dogs, animals are not allowed in the barracks, work spaces, or recreational facilities at any time, and those in duty status are not permitted to bring animals on board.
10. All dogs must be properly vaccinated, on leash at all times, must not become a nuisance due to noise/odor, and must be picked up after.
11. No animals shall be left unattended or in a poorly ventilated vehicle.

Specific Concerns

- Water use conservation requirements and
- Overuse of fertilizers.

Current Management

The 2009 Integrated Pest Management Plan (IPMP) for SDMAI, which includes CMM and CM, describes pest management requirements, identifies pests for SDMAI, outlines roles and responsibility for IPM at each SDMAI, outlines procedures for pest control at each facility, and describes the administrative, safety, and environmental requirements of the program. Specific aspects of the program include pest identification, pesticide management (includes storage, transportation, and use and disposal), environmental health and safety, emergency pest management, and available program resources (U.S. Navy 2009a). All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager.

Threatened, endangered, or candidate species can be directly or indirectly affected by pest control activities. The following pest management operations require natural resource manager review:

- Weed and outdoor pest control in endangered/threatened species habitats and natural areas;
- Outdoor large area insecticide fogging;
- Pesticide applications to, over or adjacent to water bodies, waterways, or wetlands;
- Installation of bird barriers, exclusion devices, or repelling devices;

- Wildlife and feral animal control and
- Invasive species control.

Natural resources managers will obtain any necessary approvals, consultations, or permits. No pest management activities will violate the practices described for threatened, endangered, or candidate species by the California Department of Pesticide Regulation. CMM and CM will use the California Department of Pesticide Regulation Endangered Species Project website (*http://www.cdpr.ca.gov/docs/es/index.htm*) to determine the best chemicals to control pest species and their use limitation.

In addition, management of feral animals is a component of pest management at CMM and CM. Feral animals, especially feral cats and dogs, pose a potential threat to public health and safety. They also pose a threat to wildlife, especially federally listed species and migratory birds. Existing Navy policy included in SECNAVINST 6401.1A of 16 August 1994 regarding veterinary health services prohibits dogs, cats, and other privately owned or stray animals from running free on military installations. The CNO issued a policy letter on January 10, 2002 that clarifies the application of SECNAVINST 6401-1A. An objective of the existing policy is to control feral animals in a humane manner to prevent injury or disease to Navy personnel and eliminate adverse impacts on native wildlife. The instruction requires Navy commands to institute proactive pet management procedures in order to prevent establishment of free-roaming cat and dog populations.

Management Objective and Strategy

Implementation of the Pest Management Plan

Objective: Ensure compliance with environmental legislation, regulations, and guidelines.

Strategies:

1. Update the SDMAI as necessary to ensure that the plan reflects changes in pest populations and current management issues. Incremental updates to the plan will be conducted annually.
2. Implement pest management controls from the SDMAI and other pest-related guidance and plans.
3. Conduct surveys of pests that pose a potential health risk to humans or natural resources.
4. Implement the control of wildlife and the effective elimination of concentrated and diseased populations.
5. Monitor pest and invasive species populations. Track usage of pesticide active ingredients and man-hours spent controlling pest and invasive species during implementation to ensure that the management strategies are sufficient.

Management of Feral Animals

Objective:

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations.

Strategies:

1. Develop and implement a program to control feral animals on CMM and CM. Control populations of feral animals on CMM and CM.
2. Conduct surveys when appropriate to determine impact of feral animals on native species on CMM and CM.
3. Support programs to neuter or spay animals before they reach reproductive age.
4. Require routine vaccinations for rabies and other diseases.
5. Require microchipping registration of all pets brought onto installations.
6. Prohibit the feeding of feral animals on the installation.
7. Provide educational materials to pet owners regarding installation regulations and general pet management.
8. Comply with all humane and animal control regulations at the Federal, state, and local level.

8.2.9 Outdoor Recreation and Public Access Camp Michael Monsoor and Camp Morena

CMM and CM provide some outdoor recreation opportunities for military personnel and their families, and DoD civilian employees. Recreational use of natural resources is an integral part of ecosystem management. The outdoor recreation program is based on providing quality experiences while sustaining ecosystem integrity. Among the outdoor recreation activities provided are hunting, camping, hiking, horseback riding, and general outdoor use.

Specific Concerns

- Overuse of recreational areas on CMM and CM;
- Erosion and sedimentation and
- Fire.

Current Management

The outdoor recreation activities provided at CMM and CM includes hunting, camping, hiking, horseback riding, and general outdoor use. In addition, recreational access is compliant with the requirements associated with the provisions of the American with Disabilities Act of 1990 as amended and the Disabled Sportsman Access Act as amended.

Management Objective and Strategy

Objective: Provide quality outdoor recreation experiences while sustaining ecosystem integrity, and not conflicting with mission priorities.

Strategies:

1. Continue to limit public access and outdoor recreation for reasons that include general security and liability issues, the presence of federally endangered and threatened species, and fire safety.
2. Develop an outdoor recreation plan for CMM and CM. Identify and evaluate suitable outdoor recreation opportunities for installation personnel in undeveloped areas that do not contain or have the potential to impact sensitive species.

3. Develop and distribute outreach and education materials for recreational users of CMM and CM.

8.2.10 Law Enforcement of Natural Resources Laws and Regulations Camp Michael Monsoor and Camp Morena

CMM and CM have established the following objectives for enforcement: (1) Enforce laws and regulations pertaining to the implementation of the natural resources program; (2) Integrate natural resources enforcement into the overall natural resources program; and (3) Use enforcement personnel to enhance the natural resources program at CMM and CM.

There are no game wardens stationed at CMM and CM. The DoD police have the authority of the Commander (exclusive jurisdiction) and of the Sikes Act to enforce all Federal laws relating to the management of natural resources at CMM and CM, including the ESA, CWA, and MBTA.

Specific Concerns

- Unauthorized access or activities in natural areas, or areas used by nesting birds or marine mammals, may disrupt and limit the viability of native populations or habitats.
- Gaps in communication between NBC Environmental Division and NBC Force Protection, related to enforcement of closure areas or other areas requiring special protection, could result in mismanagement of natural resources, or non-compliance with Federal environmental regulations.

Current Management

Law enforcement is provided by the San Diego Sheriff's Department. If there is a problem, the installation will contact the local sheriff's office or dial 9-1-1. Due to the proximity to the U.S.-Mexico border, there is also a presence by the U.S. Border Patrol at CMM and CM.

Management Objective and Strategy

Objective: Ensure compliance with state and Federal natural resources laws and regulations.

Strategies:

1. Provide training to personnel responsible for enforcement of applicable laws and regulations.
2. Continue to protect special status species and the natural communities.
3. Cooperate with other agencies, particularly the USFWS and CDFW, to ensure that natural resources laws are adequately enforced.
4. Periodically review Federal and state laws and regulations to ensure natural resources laws and regulations are adequately enforced.

8.2.11 Environmental Awareness and Outreach at Camp Michael Monsoor and Camp Morena

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The NBC approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about

the unique and valuable natural resources on the installation, the more responsibly they act toward using them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Activities such as fish stocking, land rehabilitation, and wildfire suppression can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public support these easily understood efforts. However, such issues as protection of sensitive areas for little known plant and wildlife species, prescribed burning, and permit fees and their uses require effective communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

Specific Concerns

- Communication about the natural resources of NBC, environmental regulations, and protocols for situations where wildlife is trapped or injured, or birds are nesting or roosting in unwanted areas, may not be effectively conveyed due to staff turnover;
- Public access restricted in certain areas due to security and military training and
- Lack of outreach facilitator.

Current Management

The Sikes Act requires each military service to support environmental education for personnel and for the public where and when it is compatible with military safety and security needs. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program. The conservation effort on site will continue to expand as this INRMP and subsequent natural resource management programs are undertaken to ensure efficient and thorough management of the natural resources on base. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program.

Management Objective and Strategy

Objective: Provide people on the installation and in the surrounding community with an understanding of the CMM and CM natural resources program. Promote environmental stewardship through training and awareness.

Strategies:

1. Periodically review outreach and education materials to ensure that each is still current and meeting the goals of the outreach and education program.
2. Reach out to local community groups for volunteers.
3. Establish a watchable wildlife program potentially within the Nature Conservancy Managed property.
4. Educate the local community, as well as installation personnel and tenants, about the installation natural resources program. Develop and distribute educational materials about the CMM and CM natural resources program to stakeholders near CMM and CM (e.g., BLM, VID, and USFS.).

5. Provide decision makers with the information they need to make educated decisions about installation natural resources.
6. Provide general conservation education to the CMM and CM community, including the means to attend training.

8.2.12 Geographic Information Systems Management, Data Integration, Access and Reporting Camp Michael Monsoor and Camp Morena

GIS is a computer system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface. GIS is used to create information layers used to develop and manipulate maps. GIS data are represented as different layers each containing data on a particular kind of feature (e.g., soils, wetlands, roads) from surveys, inventories, and other projects with spatial information. Each feature is linked to a position on the graphical image of a map. The data layers are organized to create maps and to perform statistical analysis.

GIS will also provide support for the entire environmental program and the training community. NBC will use GIS for complex analyses such as project siting, data interpolations, and risk assessments.

GIS software enables installation staff to capture, store, update, manipulate, analyze, and display all forms of geographically referenced data and tabular information about NBC. The management of reports in one central database enables users to quickly respond to data calls and identify gaps in natural resources management. The training of the NBC Environmental, Facilities Management, and Training staff and the allocation of their time to data entry, mapmaking, analysis of data, and interpretation of the results will determine the success of the installation GIS.

Once fully developed, the installation central databases can be used for the following:

- Providing maps;
- Selecting suitable areas for construction activities;
- Planning land rehabilitation projects;
- Providing special maps for Environmental Awareness materials;
- Ensuring avoidance of cultural resources during ground-disturbing projects;
- Ensuring avoidance of rare species habitats and other areas of special concern during construction projects;
- Identifying site options for use during NEPA evaluation of alternative sites;
- Calculating drainages and water flows and
- Determining Neotropical bird habitat preferences.

Specific Concerns

- GIS maps and shapefiles may not have appropriate metadata that identifies who, when, and for what purposes the data were collected and
- Natural resource management decisions could be misguided if there are information gaps in the natural resources database, or if the database is not kept current.

Current Management

Currently, there is no central repository for GIS data and reports, research, and other documentation. GIS data is submitted to Navy Assessment Management or the GIS IDIQ contractor. CNIC and NAVFAC guidance on metadata is being developed, but has not yet been finalized.

Management Objective and Strategy

Objective: Collect, store, develop, and maintain data about historical conditions, trends, and current status for critical indicators of ecological integrity and sustainability.

Strategies:

1. Use GIS and other natural resources data as benchmarks for developing future natural resources management goals and objectives.
2. Ensure that central database information is available to biologists, planners, contractors, and others in a quick and timely manner.
3. Annually review GIS data to advise resource managers of needs to update data sets during budget planning and programming.
4. Develop specific language that will be included in all contracts to ensure all spatial data produced are fully compatible with the installation GIS database.
5. Develop a standardized system for recording and mapping significant resource observations (e.g., plants, wildlife, erosion, damage) when incidentally encountered.
6. Provide annual funding for one person to be responsible for updating and maintaining the GIS database. This should include the necessary hardware, software, and training for the use of GIS.
7. Deliver all reports and other GIS data and incorporate it into the Navy GIS database.
8. Evaluate natural resource contractors' deliverables.

9. Remote Training Site Warner Springs

9.1 Purpose, Approach and Rationale

Natural resources management at Naval Base Coronado (NBC) strives to integrate biodiversity conservation and an ecosystem-based approach into an adaptive management framework compatible with the military mission. As a result, the natural resources program consists of multiple resource disciplines that are frequently interconnected and share similar objectives. Management projects and plans often consist of multiple program elements with several different resource experts collaborating together.

A number of items have been identified in subject areas that affect the natural resources present on and immediately adjacent to NBC. The purpose of this section is to identify goals, objectives, and strategies for natural resources management on Remote Training Site Warner Springs.

The goal for management of natural resources at NBC **is to provide an adaptive ecosystem-based conservation program that will efficiently support the NBC mission and provide for sustainability of natural resources.**

Specific concerns, current management, and the management strategy for each natural resources area are described below. A summary of the strategies as well as the estimated time frame for completion is presented in **Appendix C, Tables C-1** and **C-7 (Project Table).**

Some of the strategies described in this section will be accomplished through interactive partnerships with other Federal, state, and local organizations. Natural resources staff at NBC will initiate partnerships based on the benefits to the regional ecosystem and the local environment.

RTSWS is comprised of land owned by the Bureau of Land Management, Vista Irrigation District, and U.S. Forest Service. All current natural resources management is coordinated with the appropriate landowners, depending on location, and all proposed work must be reviewed and approved by the landowners. For lands owned by the U.S. Forest Service the Land Management Plan is the primary governing plan and is the principal document (along with the special use permit) directing natural resource management on the Survival, Evasion, Resistance, and Escape (SERE) compound.

9.2 Natural Resources Current Conditions and Management

9.2.1 Topography, Geology and Seismicity

Remote Training Site Warner Springs (RTSWS) is situated within the Peninsular Ranges of Southern California, which is one of the largest geologic units in western North America. This is a group of mountain ranges that stretch approximately 1,448 kilometers (900 miles) from southern California in the United States to the southern tip of Mexico's Baja California peninsula. The northwest-trending Peninsula Ranges are cut off on the north by the Transverse Ranges, which have an east-west orientation. Steep, elongated valleys that trend northwest are characteristic of the Peninsula Ranges. These continue offshore under ocean waters, while to the south they form the backbone of Baja California (U.S. Navy 2007). The Peninsular Ranges include Santa Ana Peak, San Jacinto Peak, Santa Rosa Mountain, Palomar Mountain, Cuyamaca Peak, and Laguna Peak, with San Jacinto Peak the highest in the U.S. at 10,800 feet. RTSWS includes the Aguanga Ridge, which is one of a three-part range including Palomar Mountain and Agua Tibia Mountain to the northwest (U.S. Navy 2007).

The RTSWS installation is located on the eastern side of a trending valley bounded by a broad ridge to the east and the eastern foothills of Palomar Mountain to the west. The ridge behind the facility rises to elevations of 1,280 to 1,341 meters (4,200 to 4,400 feet). Many small canyons cut by intermittent streams dot the hillside to the north and east of the installation (U.S. Navy 2009c).

Geologically, the Peninsular Ranges Region is underlain primarily by granitic rocks that formed from the cooling of molten magmas deep within the earth's crust. Over a long period of time, masses of granitic rocks accumulated at depth to form the Southern California Batholith. Intense heat associated with the magmas metamorphosed the ancient sedimentary rocks into which the plutons intruded. These metasediments are now preserved in the Peninsular Range Region as marbles, slates, schist, quartzites, and gneiss. Young sedimentary rocks occur in isolated districts in various regions of the Peninsular Ranges Region, such as in Warner Valley (U.S. Navy 2007).

One fault occurs southeast of the RTSWS. The Elsinore fault zone branches slightly, with one section, Elisnore-Julian section running through Lake Henshaw and the other section running southwest of Lake Henshaw (see **Figure 9-1**). The Elsinore fault zone extends south-southeastward 240 kilometers (149 miles) from along the northeastern flank of the Santa Ana Mountains to the southwestern flank of the Coyote Mountain, then crosses the international border and is called the Laguna Salada fault in Mexico (MACTEC 2010).

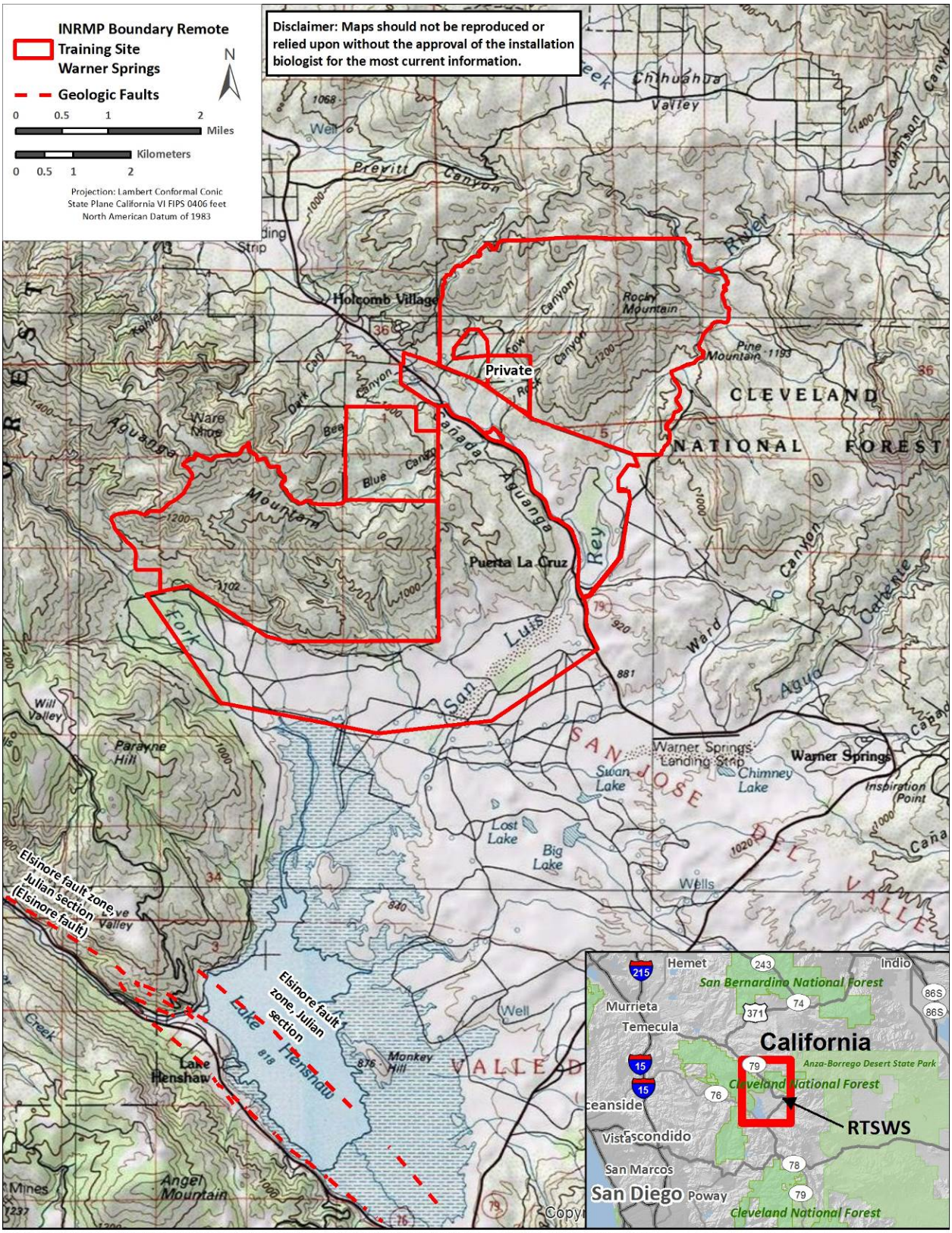
9.2.2 Watershed Management

Watershed management is important to natural resources management because it directly affects both surface water and groundwater quality and is critical to maintain valuable aquatic habitats. RTSWS is in the San Luis Rey River watershed, which is approximately 560 square miles in size (see **Figure 9-2**) (CDFG 2010c). Draining into the Pacific Ocean to the west, this watershed is comprised of three Hydrological Areas (HAs): Lower San Luis, Monserate, and Warner Valley (RWQCB 2008). The RTSWS is situated within the Warner Valley HA, which at elevations of over 1,219 meters (4,000 feet), provides the headwaters for the San Luis Rey River, the primary stream system in the watershed (RWQCB 2008). The San Luis Rey River and other waters in this HA, including those that flow through RTSWS, drain into Lake Henshaw (RWQCB 2008). Most watercourses throughout RTSWS are ephemeral, intermittent watercourses that are dry for much of the year except in the spring. There are two perennial streams on RTSWS, the San Luis Rey River and the West Fork of the San Luis Rey River (see **Figure 9-2**). The watersheds of these streams, composed of the main perennial streams and several ephemeral tributaries, flow into nearby Lake Henshaw.

Healthy, stable soils are the foundation of a healthy ecosystem. As soils lose their structure and begin to erode, other systems also begin to fail. Vegetation and wildlife decline in numbers and diversity, and the quality of surface water declines as it becomes loaded with eroded sediments. Some soil types took centuries to develop and are not easily replaced or repaired if lost or damaged. Inherent in the clay and sandy nature of soils at RTSWS's is a risk of significant erosion when vegetation is removed or soil structures are disturbed. The nature of these soils make the protection of these soils vital for maintaining many of the functional systems that make up a healthy ecosystem.

9.2.2.1 Soils

The soils of the RTSWS installation are primarily Tollhouse rocky coarse sandy loams, Sheephead rocky fine sandy loams, Mottsville loamy course sands, Ramona gravelly sandy loam, La Posta rocky loamy coarse sand, rough broken land, and others (see **Table 9-1**). Characteristics of these soils are shown in **Figure 9-2**.



Source: i-cubed imagery, Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 9-1: Remote Training Site Warner Springs Topography and Faults

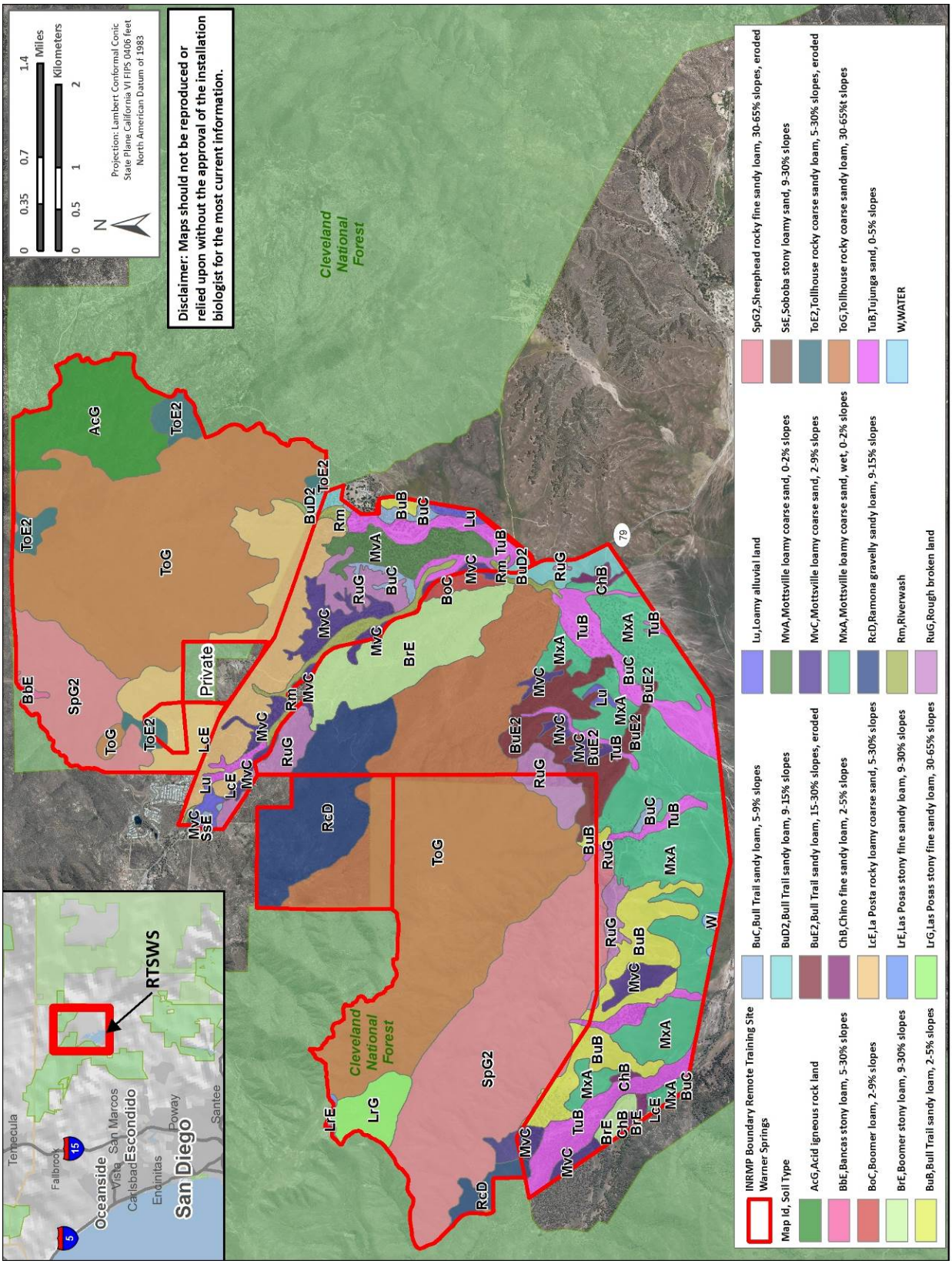


Figure 9-2: Remote Training Site Warner Spring Soils Map

Table 9-1: Soil Series on Remote Training Site Warner Springs

Soil Series	Sloping	Runoff	Erosion Hazard
Acid igneous rock land	Variable	Rapid	N/A
Bancas stony loam	5 to 30 percent slopes	Medium	Moderate
Boomer loam	5 to 9 percent slopes	Medium	Slight to Moderate
Boomer stony loam	9 to 30 percent slopes	Medium to Rapid	Moderate to High
Bull trail sandy loam	2 to 5 percent slopes	Medium	Moderate
Bull trail sandy loam	5 to 9 percent slopes	Slow	Slight
Bull trial sandy loam	9 to 15 percent slopes	Slow to Medium	Slight to Moderate
Bull trail sandy loam	15 to 30 percent slopes	Medium to Rapid	Moderate to High
Chino fine sandy loam	2 to 5 percent slopes	Very Slow	Slight
La Posta stony fine sandy loam	9 to 30 percent slopes	Medium	Moderate
La Posas stony fine sandy loam	9 to 30 percent slopes	Medium to Rapid	Moderate to High
La Posas stony fine sandy loam	30 to 65 percent slopes	Rapid	High
Loamy alluvial land	N/A	N/A	N/A
Mottsville loamy coarse sand	0 to 2 percent slopes	Very Slow	Slight
Mottsville loamy coarse sand	2 to 9 percent slopes	Slow to Medium	Slight to Moderate
Mottsville loamy coarse sand, wet	0 to 2 percent slopes	Very Slow	Slight
Ramona gravelly sandy loam	9 to 15 percent slopes	Medium to Rapid	Moderate to High
Sheephead rocky fine sandy loam	9 to 30 percent slopes, eroded	Medium to Rapid	Moderate to High
Soboba stony loamy sand	9 to 30 percent slopes	Medium to Rapid	Moderate to High
Tollhouse rocky coarse sandy loam	5 to 30 percent slopes, eroded	Medium to Rapid	Moderate to High
Tujunga sand	0 to 5 percent slopes	Slow to Very Slow	Slight

Source: U.S. Navy 2009c

Boomer loam (BL). Boomer soils are found on uplands with slopes of 2 to 75 percent. They formed over weathered metavolcanic (greenstone) bedrock ranging in elevation from 152 to 1,524 meters (500 to 5,000 feet). Boomer soils are well-drained with slow to rapid runoff and have moderately slow permeability.

Bull trail sandy loam (BTSL). Bull series soils consist of deep, well drained soils formed in loess over residuum weather from rhyolite in elevations ranging from 1,829 to 2,133 meters (6,000 to 7,000 feet). They are found in swales on hills and have slopes of 0 to 30 percent. They are well-drained, have medium runoff and moderately low permeability.

Chino fine sandy loam (CFSL). Chino series soils are found in basins and flood plains at elevations of near sea level to 945 meters (3,100 feet). They formed in alluvium derived from granitic rock. Chino soils are poorly to somewhat poorly drained; runoff is slow to very slow and permeability is moderately slow.

Bancas stony loam (BSL). Bancas series soils are on rolling to very steep uplands at elevations from 610 to 1,524 meters (2,000 to 5,000 feet). They formed in residuum weathered from rock, usually metamorphosed but including granite, gneiss, quartz diorite, and quartz mica schist. Bancas soils are well-drained with medium to very rapid runoff and moderate permeability.

La Posta stony fine loam (LPSFL). La Posta series soils are found in hilly mountainous areas at elevations of 610 to 1,372 meters (2,000 to 4,500 feet). They formed in residuum weather from granitic rocks. The La Posta series soils are somewhat excessively drained, have medium or rapid runoff and rapid permeability.

Mottsville loamy coarse sand (MLCS). Mottsville series soils are formed in alluvium derived from granitic rocks and are found on alluvial fans, fan remnants and fan aprons with slopes of 0 to 15 percent in elevations ranging from 1,370 to 1,615 meters (4,500 to 5,300 feet). Mottsville soils are excessively drained, have negligible or very low surface runoff, and high permeability. These soils are susceptible to rare flooding for extremely brief periods throughout the year.

Ramona gravelly sandy loam (RGSL). Ramona series soils are situated on terraces and fans at elevations of 76 to 1,067 meters (250 to 3,500 feet). They formed in alluvium derived mostly from granitic and related rock sources. Ramona soils are well-drained with slow to rapid runoff and moderately slow permeability.

Sheephead rocky fine sandy loam (SRFSL). Sheephead series soils formed in material weathered from mica, schist, gneiss or granite and are found on mountainous uplands with slopes of 0 to 75 percent. They are found in elevations ranging from 610 to 2,286 meters (2,000 to 7,500 feet). Sheephead soils are somewhat excessively drained, have medium to very rapid runoff, and have moderately rapid permeability.

Soboba stony loamy sand (SSLS). Soils in the Soboba series consist of excessively drained, very deep, stony, loamy sands occurring on alluvial fans with slopes ranging from 9 to 30 percent. They are typically found on alluvial fans and are excessively drained with medium to rapid runoff.

Tollhouse stony loamy sand (TSLS). Tollhouse series soils formed in material weathered from granitic rock and closely related coarse crystalline rocks. Rock outcrops are common to many. They are found in areas strongly sloping to very steep in mountainous regions at elevations of 610 to 2,438 meters (2,000 to 8,000 feet). Tollhouse soils are somewhat excessively or excessively drained, have rapid to very rapid runoff and have moderately rapid or rapid permeability.

Tujunga sand (TS). Tujunga series soils are formed in alluvium weathered mostly from granitic sources. They are found on alluvial fans and flood plains in elevations ranging from 2 to 1,310 meters (5 to 4,300 feet). Tujunga soils are somewhat excessively or excessively drained with negligible or very low runoff; permeability is rapid. Flooding is none to frequent.

Specific Concerns

- Fire and
- Development/anthropogenic disturbances.

Current Management

Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1C requires that installation sources of dust, runoff, silt, and erosion debris be controlled to prevent damage to land, water resources,

equipment, and facilities, including adjacent properties. An erosion-and-sediment-control plan should be implemented where appropriate. Maintenance of vegetative cover is consistent with ecosystem management goals expressed earlier. Other materials can be used including bio-engineered bank stabilization techniques, gravel, fabrics, riprap, and recycled concrete and pavement that are environmentally safe and compatible with the site. Where bare ground is necessary, other measures for dust, sedimentation, and erosion control should be implemented (e.g., check dams, wind breaks, diversions). To minimize land maintenance expenditures and help ensure environmental compliance, physically intensive activities should when possible be located on those areas least susceptible to erosion. The erosion potential of a site and adjacent water resources need to be identified and analyzed in preparing development, training, and land use plans.

Management Objective and Strategy

Objective: Protect soils by maintaining soils and reducing runoff, erosion, and gully formation.

Strategies:

1. Monitor and rehabilitate degraded soil resources. Soil resources will be monitored, evaluated, and rehabilitated. Survey results will be analyzed to assist with identification of degraded soil or eroded areas.
2. Develop and include an Erosion Control Plan as a component plan to this Integrated Natural Resources Management Plan (INRMP) when it is completed.
3. Develop and disseminate informational materials and a short seminar on the erosion control BMPs and watershed protection issues.
4. Educate personnel who are likely to impact the watersheds on erosion and sedimentation BMPs and watershed protection issues.
5. Develop and use an erosion and sedimentation questionnaire designed to gauge the effectiveness of the informational materials and short seminar.
6. Periodically review erosion control BMPs to ensure that they are still adequate to control adverse erosion and sedimentation on RTSWS. Conduct surveys to determine whether activities on RTSWS are adversely impacting soil and water resources as a result of erosion and sedimentation.

9.2.2.2 Water and Sediment Quality

The San Luis Rey River is an important natural resource feature of the RTSWS. Portions of the river and adjacent uplands provide suitable habitat for many species of mammals, amphibians, birds, and fish found in the RTSWS. It is a perennial river that runs through the RTSWS as it flows west out of the Cleveland National Forest to the Pacific Ocean. It is unlike most major rivers in southern California in that it has undergone relatively little channelization. However, the cumulative impacts of various land use practices in the basin, including agriculture, mining, recreation, and urbanization appear to be degrading the river's environmental value. Regional impacts of concern, resulting from agricultural and livestock uses, urban runoff, sand mining, and septic systems include surface water quality degradation, habitat loss, invasive species, and channel bed erosion (U.S. Navy 2008i).

Managed by the Vista Irrigation District (VID), the Henshaw Dam and adjoining Henshaw Lake are situated on the border of the Warner Valley HA, below the Palomar Mountains and 96.6 kilometers (60 miles) northeast of San Diego. The dam was built in 1922 and controls 36 percent of the watershed and three small reservoirs (U.S. Navy 2008i). In a normal year, the average rainfall of 66 centimeters

(26 inches) (CDFG 2010c) in this area provides a significant source of water supply for VID (about 40 percent of average demands), and, via contracts, the city of Escondido and the Rincon Band of Mission Indians. However, during extended dry periods when there is little or no run-off and minimal groundwater replenishment, over 80 percent of the total water supplied to customers comes from imported sources (VID 2006).

Several alluvial groundwater aquifers have been identified in the San Luis Rey River watershed and groundwater is used throughout the watershed for agricultural, industrial, and municipal supplies (RWQCB 2008). The principal aquifer in the RTSWS area is the Warner Basin (RWQCB 2008). This basin is bounded on the west by Lake Henshaw and the Elsinore fault and on all other sides by impermeable crystalline rocks of the Peninsular Ranges (CDWR 2003). The principal water-bearing deposits of this aquifer are alluvium reaching thicknesses of at least 274 meters (900 feet) and residuum. California coastal aquifers range in depth from several inches to 305 meters (1,000 feet), so the Warner Basin is deep relative to others in this area of California (U.S. Navy 2010d). The principal compound at the RTSWS is completely dependent upon two wells for its water supply. The compound has no water supply connections with any other water systems. The SERE compound is serviced by a wastewater treatment plant facility and wastewater is pumped into a spray aeration field. In accordance with the current National Pollutant Discharge Elimination System (NPDES) permit for the facility, the sludge is picked up every other month and taken to a wastewater plant in San Diego (U.S. Navy 2008i).

The cumulative impacts of various land use practices in the Warner Valley HA of the San Luis Rey River watershed, including agriculture, mining, recreation, and urbanization, appears to be degrading the river's environmental value. Regional impacts of concern, resulting from agricultural and livestock uses, urban runoff, sand mining, and septic systems include surface water quality degradation, habitat loss, invasive species, and channel bed erosion (U.S. Navy 2009c).

In general, surface water and groundwater exist within different physical and chemical systems. Due to these differences (e.g., evaporation rates, absorption, dispersion, diffusion, attenuation, flow velocities, temperatures, biological activity), the water quality in each system can be quite different. However, in the case of the San Luis Rey River Watershed, surface water and groundwater have become an integrated system. Since groundwater provides base flow to the river for most of the year, groundwater quality will have an effect on surface water quality. In addition, because surface waters recharge the shallow alluvial groundwater basins, surface water quality affects groundwater quality (RWQCB 2008).

Hydrologically, the RTSWS is situated in the Warner Valley subbasin of the San Luis Rey River Watershed. All streams flow westward, but none carry much water and most are ephemeral. The watercourses that flow from the project area represent the headwaters of San Luis Rey River, and the West Fork which drains into Lake Henshaw, providing water to northern San Diego County, including the city of Vista, and portions of San Marcos, Escondido, Oceanside and unincorporated areas of the county.

Specific Concerns

- Erosion and sedimentation and
- Development/anthropogenic disturbances.

Current Management

The Navy currently manages water quality, primarily hazardous materials handling and waste disposal practices, based on requirements in OPNAVINST 5090.1. Those requirements, in turn, are developed primarily to comply with Federal environmental regulations.

***Planning and Monitoring*:** Erosion of soils above NBC facilities and roadways is a factor to consider during construction planning. If natural erosion is occurring on a higher elevation terrace, the inputs of sediment can be drastic and pose a threat to facilities or traffic on roads. If the project is planned for an area below undeveloped land, one simple assessment involves making visual scans of the surrounding habitat.

Stabilization techniques: More often than not on NBC, development yields areas that require long-term soil stabilization because of their characteristics. Cut and fill slopes, dirt roads, and drainages are examples of situations found on NBC that need a permanent erosion control strategy. Occasionally, construction projects are in areas where future erosion is not particularly a factor. Examples of this include island zones planned for landscaping in parking areas or as medians, or, relatively level areas in developed zones that are planned for landscaping only. Often, only temporary soil stabilization is required in these areas. Techniques for permanent soil stabilization in areas of high and low erosion potential and temporary erosion control include installing structures that act as a soil blockage to prevent earth movement and soil degradation (e.g., gabion-type retaining walls, soil-nail walls, crib walls, and gunite facings).

Landscape design: Construction projects will almost always include landscaping in the overall plan. Not only is it an essential part of long-term erosion control, but for aesthetics as well. Decisions about plant types (native vs. non-native) used in revegetation/restoration segments of construction projects can be affected by budget issues. There are major advantages to planting native plants in bare areas resulting from construction projects. Sensitive wildlife species have more habitats available for use, irrigation is not required for ongoing maintenance, and landscaped areas merge with undeveloped adjacent native habitat zones. If native vegetation coverage is successfully established, it can provide the best, most cost-effective, long-term erosion control because the plants have evolved to grow in this particular area of southern California. Revegetation/restoration and landscaping activities follow the Landscaping and Installation Appearance Plan Approved Plant List (see **Appendix H**).

Water control measures: Practically all forms of development require installations that will control the flow of water during storms and work related tasks. There are many different forms of water control installations made up of different materials. Wood, metal, plastic, rock, rubber, concrete, and plant material are all utilized when runoff must be controlled. On NBC, natural drainages/slopes, parking lots, and roads are the primary generators of mass amounts of runoff. In natural resource situations, measures are usually taken to simply slow the rate at which sheetflow is traveling. When construction projects result in cut and fill slopes, water flow will be heavier with lack of vegetation cover, consequently requiring an installation that will direct large amounts of water to adequate drainage systems.

Management Objective and Strategy

Objective: Protect waterways from adverse effects of storm water runoff from development sites to the maximum extent feasible.

Strategies:

1. Conduct surveys of all streams within the installation to identify erosion, sediment accumulations, or other threats to stream stability.
2. Develop actions specific to each unstable stream reach that can be undertaken to assist with stream recovery.
3. As funding allows, undertake natural channel design principles to restore stream reaches with highly unstable conditions.

4. Periodically evaluate streams to ensure that streams are not adversely impacted by installation activities.

9.2.3 Habitat Management

9.2.3.1 Terrestrial Habitats, Vegetation Communities, and Land Cover

RTSWS occurs in a largely undeveloped part of San Diego County that contains expansive wild lands encompassing numerous habitats that are minimally disturbed by humans. Such undisturbed, high-quality wildlands are habitat for numerous species, including a variety of small-to-medium-sized mammals, numerous deer and coyote, and bobcats and mountain lions. In terms of regional patterns of habitat use, this large undeveloped landscape represents what is referred to in conservation terminology as a "core area." Core areas lie within a larger matrix of semi-developed areas that pose barriers to species migration and dispersal. Within the developed matrix, however, zones have been identified that provide a high potential for linking discontinuous core areas together. These linkages enhance the value of core areas as wildlife habitat, especially mammals with large home ranges such as the mountain lion, and those that tend to migrate across large swaths of land, such as mule deer (U.S. Navy 2008i).

A total of 32 plant communities were classified during the mapping process, including 19 distinct alliances and 13 associations (see **Table 9-2** and **Figure 9-3**). Descriptions of each distinct vegetation alliance listed follow (associations are not described separately as they represent combinations of two alliances that are already described). The vegetation communities are based on the 1995 A Manual of California Vegetation which does not meet standards of the National Vegetation Classification System as required by the Federal Geographic Data Committee; therefore, they will not match the NatureServe vegetation types listed on the Navy Conservation Website.

Chaparral Communities

Seven distinct chaparral alliances and four associations were mapped within RTSWS. The most extensive are the chamise and red shank-chamise alliances, which exist in a mosaic. The other alliance and associations are all of limited extent, mostly restricted to north- and east-facing slopes within a surrounding matrix of chamise.

Chamise and Red Shank-Chamise Alliances. Chaparral communities comprise the vast majority of the vegetation on RTSWS, covering approximately 60 percent of the installation. Chamise, an evergreen shrub with needlelike leaves, is the dominant species in the chamise alliance.

Other Chaparral Types. In addition to the dominant chamise and red-shank chamise alliances, there are several other chaparral types present within RTSWS (see **Table 9-2**). Although of limited extent (none cover more than 5 percent of RTSWS), these areas possess a number of distinct species compositions, most notably scrub oak and bigberry manzanita. These two species mix in varying ratios, with or without chamise or red shank to form seven of the eight minor alliances and associations. Bigberry manzanita is also a key component of the sixth alliance, in which birchleaf mountain mahogany and holly-leaf redberry are co-dominant. For the most part, these patches of miscellaneous chaparral are found on north- or east-facing slopes in steep canyons that run up into the Cleveland National Forest lands west of Highway 79.

Table 9-2: Vegetation Series Occurring on Remote Training Site Warner Springs

Vegetation Community	Acres
Chaparral Communities	**8,345.8**
Chamise alliance	1,170.4
Chamise-bigberry manzanita alliance	121.4
(Chamise-bigberry manzanita)-red shank [association]	23.3
Red shank-chamise alliance	3,366.9
Red shank-bigberry manzanita [association]	4.0
Scrub oak-chamise alliance	474.5
Scrub oak alliance	76.3
Scrub oak-(red shank-chamise) [association]	9.5
Scrub oak-(chamise-bigberry manzanita) [association]	72.8
Scrub oak-birchleaf mountain mahogany [association]	23.2
Birchleaf mountain mahogany- bigberry manzanita-holly leaf redberry [association]	3.8
Scrub Communities	**617.9**
Big sagebrush alliance	393.0
Big sagebrush-California buckwheat [association]	26.4
California buckwheat alliance	89.2
Wright's buckwheat alliance	74.6
Pine boldenbush alliance	19.8
Yerba santa alliance	14.9
Woodlands (upland)	**1,371.1**
Coast live oak alliance	998.8
Coast live oak/big sagebrush [association]	253.5
Coast live oak/scrub oak [association]	67.8
Coast live oak-big cone Douglas fir [association]	51.0
Riparian Communities	**479.6**
Scalebroom alliance	172.3
Fremont cottonwood alliance	35.9
Coast live oak-Fremont cottonwood [association]	18.1
Fremont cottonwood-mixed willow [association]	217.9
Fremont cottonwood/hoary leaf coffeeberry [association]	6.0
Fremont cottonwood (sparse)/scalebroom [association]	29.4
Grassland Communities	**1,593.3**
California annual grassland-nodding needlegrass [association]	1,559.2
Creeping ryegrass alliance	29.4
Mexican rush alliance	4.7
Deergrass alliance	N/A
Others	**54.4**
Seep	0.4
Ponds	0.8
Disturbed/ruderal	6.8
Rock	10.8
Paved roads and developed areas	66.9

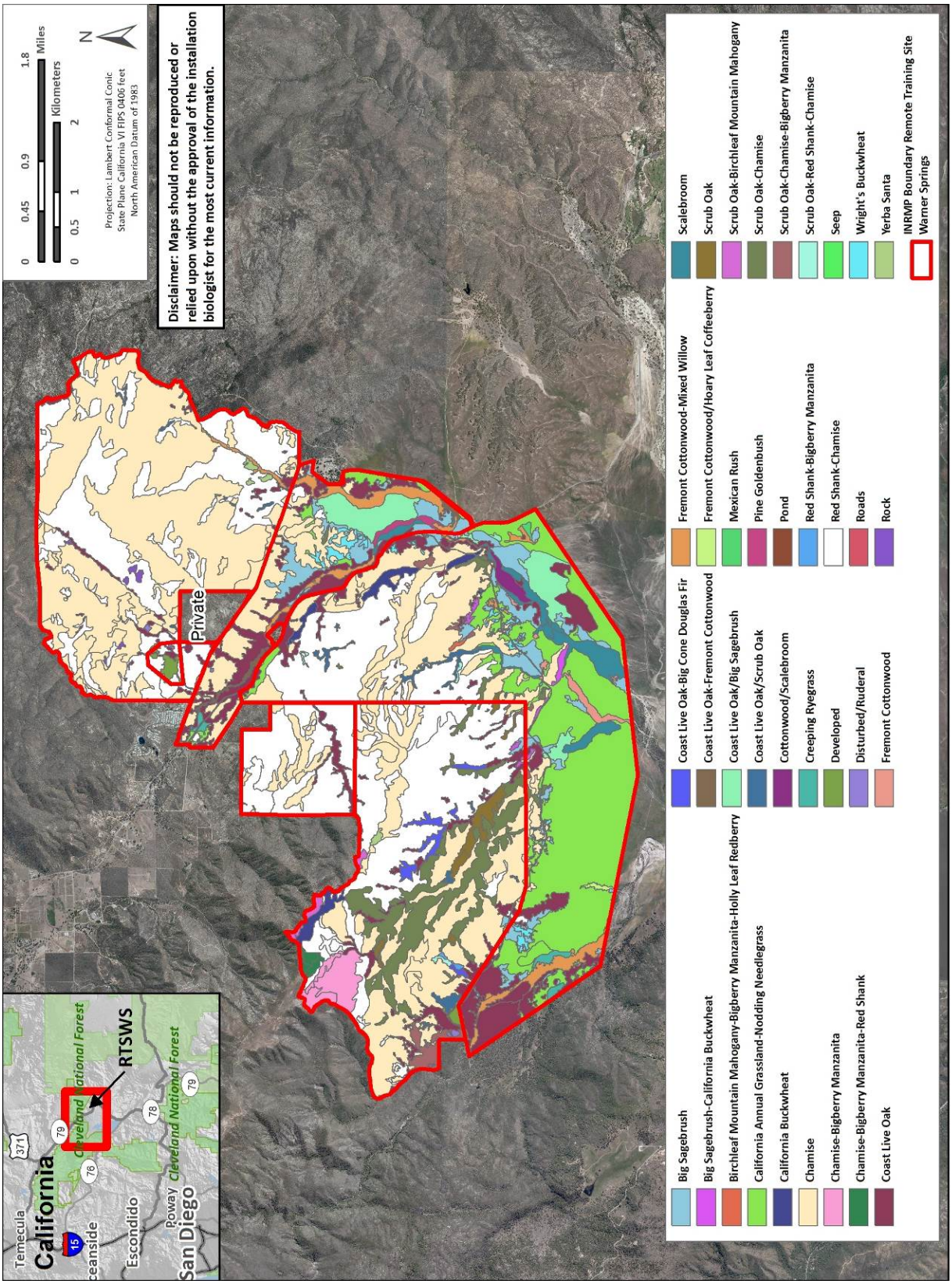


Figure 9-3: Remote Training Site Warner Springs Vegetation Communities

Scrub Communities

Four alliances and one association of scrub have been designated within RTSWS, comprising only a small portion (4.9 percent) of the installation, with big sagebrush accounting for more than half. Within the big sagebrush alliance, big sagebrush is the dominant shrub species in most areas, and is almost exclusively located on VID lands. Usually few other shrub species are present at more than trace levels, and the spaces between Artemisia shrubs are generally filled in with native and non-native forbs and grasses. Prickly pear and cholla are also scattered in amongst the shrubs at low densities. On the firebreaks and on some of the lower hillsides, California buckwheat dominates, with or without big sagebrush as a co-dominant. These areas are more-or-less open with a prominent layer of native and non-native grasses and forbs. Big sagebrush also commonly occurs in association with live oak woodlands, and in one area south of Fink Road, it occurs amidst a stand of widely spaced Fremont's cottonwoods (*Populus fremontii*).

Three other minor scrub communities were also mapped, and although these three communities together comprise less than 1 percent (44.1 hectares [109 acres]) of RTSWS, they are highly distinctive. The Wright's buckwheat (*Eriogonum wrightii*) alliance occurs on several low slopes below the lower fringes of chamise chaparral on both sides of Highway 79 or on low knolls rising from the grasslands along Fink Road.

The pine goldenbush (*Ericameria pinifolia*) alliance is another of the minor scrub communities mapped, and occurs primarily in a single area along the eastern edge of Cañada Aguanga east of Highway 79. A second very small patch occurs nearby.

The third minor scrub community, the yerba santa alliance, is dominated by yerba santa and occurs in two distinct areas, with one patch occurring near the top of Palomar Divide and three small patches on a ridge north of the Conservation Camp.

Woodlands (Uplands)

Coast live oak woodlands comprise nearly 10 percent of RTSWS, primarily along both sides of Highway 79, and at the western end of VID expansion parcel. Pockets of oak woodland are also found in many of the canyons. Throughout much of the coast live oak woodland, few other trees are found, aside from the occasional Engelmann oak (*Q. engelmannii*). Common shrubs include scrub oak, *Ceanothus* spp., *Arctostaphylos* spp., skunkbrush (*Rhus trilobata)*, and big sagebrush, but seldom at very high densities. Herbaceous cover is usually non-native grasses (*Bromus* spp.) and native and non-native forbs. In some areas, big sagebrush occurs in somewhat dense stands, and these areas are mapped as live oak/big sagebrush. Some of the canyons above Fink Road contain a wide variety of tree species, including coast live oak, canyon live oak (*Q. chrysolepis*), Fremont's cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), and big-cone Douglas fir (*Pseudotsuga macrocarpa*). Although some Coulter pines (*Pinus coulteri*) also occur, there are no patches large enough to meet the minimum mapping unit standard.

In some of the canyons of the Cleveland National Forest lands east of Highway 79, the oak woodlands are less dominated by coast live oak and contain a greater mix of other tree species, including canyon live oak, California sycamore, and bigcone Douglas fir. For the most part, these other tree species comprise a minor component; therefore, the community is still classified as coast live oak woodland. In a few places, however, there are sufficient numbers of bigcone Douglas fir, usually in the upper ends of the canyons, to call these areas out separately as coast live oak-bigcone Douglas fir woodlands.

Riparian Communities

Two distinct alliances and three associations of riparian vegetation were mapped on RTSWS, comprising less than 4 percent (194.2 hectares [480 acres]) of the installation. The largest riparian alliance present is classified as scalebroom (*Lepidospartum squamatum*), and although scalebroom is the primary shrub present, it seldom occurs in dense stands. For the most part, these areas are very open, sandy streambeds with sparse vegetation cover. A few scattered cottonwoods and willows might be present and small stands of mulefat occur.

Where cottonwoods and willows become more prominent, the community is defined as either Fremont cottonwood-mixed willow (88.1 hectares [217.9 acres]) or Fremont's cottonwood (14.5 hectares [35.9 acres]). An additional 7.3 hectares (18.1 acres) of riparian vegetation were classified as Coast live oak-Fremont cottonwood, where coast live oak and cottonwood are co-dominant trees. In a small drainage at the southern edge of VID lands west of Highway 79, an unusual stand of either dying or regenerating cottonwoods with an open understory of hoary-leaf coffeeberry (*Rhamnus tomentella*) occurs. The area does not fit well within any known alliance or association. It is currently called out as an association of the two species.

Grassland Communities

Grasslands cover approximately 644.7 hectares (1,593 acres; 12.8 percent) of RTSWS. Most of the grasslands are dominated by cheatgrass and other *Bromus* species, wild oats, and a large mix of native and non-native forbs, particularly filaree, owl's clover, clover (*Trifolium* spp.), lupines (*Lupinus* spp.), goldfields (*Lasthenia californica*) and shortpod mustard (*Hirschfeldia incana*). However, there are some areas where native bunch grass species (i.e., *Nassella* spp. and *Muhlenbergia* spp.) occur at quite high densities and where non-native species are reduced to a secondary role. There is a general trend for native bunchgrass density to increase towards the western end of the installation, and some of the largest and highest density bunchgrass areas are west of the West Fork of the San Luis Rey River. For the most part, the patches of native grass exist in a complex mosaic with areas where non-native species are dominant. Native grasslands are a restoration objective throughout California, so their presence has management implications. Separating the native from non-native grasslands on RTSWS requires considerable effort, and mapping units were not of sufficient size to delineate them separately. Therefore, these areas were classified as an association of California annual grassland and nodding needlegrass grassland. This is not an association that appears in any published listing.

Creeping Ryegrass Alliance. There are three areas that are classified as the creeping ryegrass alliance (see **Figure 9-3**). These are moist areas in which creeping ryegrass (*Leymus triticoides*) is the sole or dominant grass species. Other native forbs and grasses are also prominent, especially at the northernmost occurrence in VID lands, where lizard's tail (*Anemopsis californica*) was nearly co-dominant with the ryegrass.

Mexican Rush Alliance. A single 1.9-hectare (4.7-acre) patch of Mexican rush (*Juncus mexicanus*) occurs in the south-eastern corner of VID lands west of Highway 79. This stand is almost completely covered by Mexican rush with a few other species present at very low densities.

Deergrass Alliance. One additional grassland community, the deergrass (*Muhlenbergia rigens*) Alliance, was mapped within RTSWS, within dense but small patches in many of the narrow, intermittent stream beds throughout the area. None of these patches was large enough to be mapped separately, but it is so distinctive from any of the other grasslands that has been included in the list of Alliances.

Specific Concerns

- Invasive species;
- Altered fire regime;
- Development/anthropogenic influence;
- Erosion and sedimentation and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

Management of native habitats at RTSWS includes their enhancement by the removal of invasive exotic plant species and planting of native species, as well as habitat restoration of sorely disturbed areas. Removing invasive exotic plants, planting native species, and restoring habitat activities are conducted through coordination with the NBC botanist/biologist.

Management Objective and Strategy

Objective: Develop and implement a program for natural land and habitat restoration and rehabilitation.

Strategies:

1. Conduct long-term resource monitoring to detect changes caused by military activities.
2. Continue invasive and noxious weed identification and control as necessary.
3. Complete evaluation and prioritization of active erosion sites.
4. Update vegetation mapping.
5. Ensure that natural resources staff responsible for plant community conservation update training regarding management of these resources on a military installation on an annual basis.
6. Develop specifications and standards for reseeding/revegetation of disturbed sites for use in contracts, maintenance, and other projects.
7. Periodically review management to ensure it still meets ecosystem management goals.

9.2.3.2 Wetlands and Floodplains

Wetlands and Other Waters of the United States

Wetlands, as defined by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE), are "areas that are inundated or saturated by surface or groundwater 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" (USACE 1987). In September 2008 the USACE published the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (*Version 2.0*). The Regional Supplement was part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. The definition of a wetland was not changed (USACE 2008).

A 2006 wetland delineation of the 60-acre existing SERE compound and 90-acre adjacent Cleveland National Forest land originally intended for inclusion in the SERE compound in the Cleveland National Forest documented 1.6 hectares (4.1 acres) of jurisdictional waters and wetlands in the drainages that flow

into the San Luis Rey River (see **Figure 9-4**). Most of the jurisdictional waters are also wetlands. Due to the narrow, linear nature of the waters and many of the wetlands, the acreage of waters and wetlands is believed to be the maximum estimate. Drainages were often less than 0.6 meters (2 feet) across, with a linear wetland community no more than 0.6 meters (2 feet) wide. Occasional benches, seeps and meadows occurred where slope gradient lessened or stream flow was impaired in some way, or bedrock prevented water penetration into the soil.

The most common wetland plant communities within the exclusive use area were:

- Deergrass-alkali sacaton-saltgrass (Muhlenbergia rigens-Sporobolus airoides-Distichlis spicata) seep or meadow;
- Deergrass series with occasional anemopsis *(Anemopsis californica)*, willow-leaf dock *(Rumex salicifolia)*, Mexican rush or annual species and
- Red willow *(Salix laevigata)* series with cottonwood, mixed mulefat, bugle hedgenettle *(Stachys adjugoides)*, spikerush *(Eleocharis* sp.*)*, or tamarisk (U.S. Navy 2007).

Floodplains

Wetland management strategies vary depending primarily on the wetland type, size, location and condition. A wetland's value is decided by the quality of the functions and values it provides, including its biomass production, habitat, erosion control, stormwater storage, water quality protection, aquifer recharge potential, and low flow augmentation. Some of the factors used to measure the quality of these functions are the wetland's size, its location in the watershed, the amount of development in the watershed, vegetative structure and composition, rate of water flow through the wetland, the size of natural buffers, and surrounding land uses. Regardless of the habitat value, wetland areas are almost always poor choices for building sites or for most activities, other than providing non-consumptive enjoyment of the outdoors. Installation natural resources staff will ensure during the program/project review process that program/project managers are aware of the laws and regulations regarding the protection of wetlands. Refer to **Section 2.4.2** for additional information on regulatory compliance related to the CWA.

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species encroaching into wetland habitat;
- Climate change (e.g., changes in temperature or sea level rise);
- Erosion and sedimentation from either anthropogenic or natural causes and
- Pollution.

Current Management

Future delineations will be conducted on a project-by-project basis. A major goal in wetland and floodplain management is to minimize the impact that RTSWS has on wetlands and floodplains. The natural resources staff strives to enhance healthy, functional wetlands. When possible, it is a goal to avoid impacts, direct and indirect, thereby enhancing waters of the U.S. to increase functions and services provided by waters of the United States including wetlands. It is also a goal to maximize floral diversity of wetland communities, which, in turn, maximizes the faunal diversity of the ecosystem. Through achieving these goals, and through mitigating for unavoidable impacts to wetlands, RTSWS can manage for no net loss of wetland and floodplain acreage, functions, and services by achieving these goals and mitigating for unavoidable impacts to wetlands.

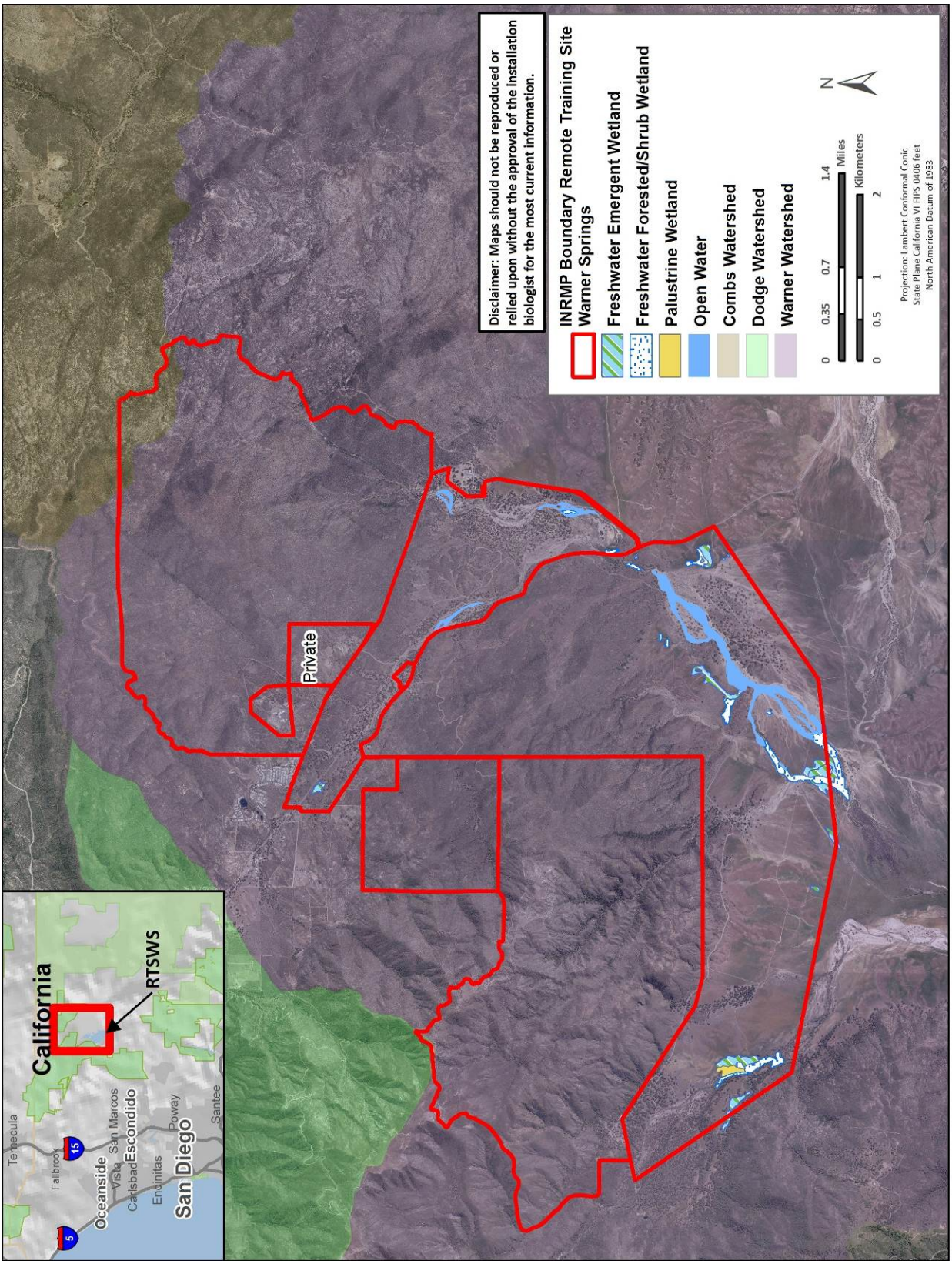


Figure 9-4: Remote Training Site Warner Springs Watersheds and Water Resources

According to OPNAVINST 5090.1C CH-1, the Navy will comply with the national goal of no net loss of wetlands, and will avoid loss of size, function and value of wetlands.

Management Objective and Strategy

Objective: Maintain healthy, functional waters of the United States, including wetlands and non-wetland waters of the United States such as those wetlands on RTSWS, and to the extent practicable prevent indirect or unplanned encroachments.

Strategies:

1. Update the wetland inventory data, including wetland distribution and categories.
2. Conduct Environmental Review for activities that could affect directly and indirectly, waters of the U.S., including wetlands.
3. Plan development and training activities to avoid wetland impacts to the maximum extent possible and mitigate unavoidable impacts on waters of the U.S., including wetlands.
4. Maintain water quality to protect surface waters and wetlands from excessive sediment-laden runoff. Prevent erosion and scour to maintain water quality.
5. Remain in compliance with the Clean Water Act (CWA), Rivers and Harbors Act (RHA), and other applicable regulations and implement procedures to manage for a no net loss of wetland and floodplain acreage, functions, and services.
6. Reduce habitat fragmentation and control the spread of invasive species.
7. Periodically review the natural resources management program to ensure that management actions do not adversely impact directly and indirectly, waters of the United States, including wetlands.
8. Implement erosion control best management practices (BMPs) to ensure adverse environmental impacts to waters of the United States, including wetlands, do not occur.

9.2.3.3 Marine Habitats

Not applicable at RTSWS.

9.2.3.4 Wildland Fire

Federal wildland fire policy requires that all Federal lands with burnable vegetation have a fire plan and resources to safely mitigate losses. This policy was adopted by the DoD Wildland Fire Policy Working Group in 1996. DoD fire policy was developed by DoD Instruction 6055.06, Fire and Emergency Services Program. In addition, a Wildland Fire Management Plan is a requirement of the USFS Special Use Permit Operating Plan.

Specific Concerns

Loss of special status species habitat due to large uncontrolled fire that promote the spread and introduction of invasive species, (species include the Quino checkerspot butterfly, arroyo toad, Southwestern Willow Flycatcher, and Stephens' kangaroo rat).

Current Management

RTSWS has not developed a Wildland Fire Management Plan; however, development of this plan has been initiated. Currently the Navy conducts fuel maintenance around all buildings, and there are procedures in place to minimize fires from training and operating activities. Currently the Navy conducts fuel maintenance around all buildings, and there are procedures in place to minimize fires from training and operating activities. The Navy also maintains a fuel break on the northern boundary of the VID exclusive use area just adjacent to the Stone Ridge mobile home community.

Management Objective and Strategy

Objective: Support a Wildland Fire Management Plan to protect high-value natural resources areas from catastrophic wildfire while conserving resources and military operational flexibility.

Strategies:

1. Conduct an Annual Preparedness Meeting prior to each fire season with the Federal Fire Department, Bureau of Land Management (BLM), Vista Irrigation District (VID) and U.S. Forest Service, and U.S. Navy personnel to discuss the Fire Management Plan and wildland fire management guidelines.
2. Use hand tools to prune, cut, and thin vegetation within 15 meters (50 feet) of buildings. Vegetation management will be conducted outside the breeding season for migratory birds, or the vegetation will be searched in advance for nests.
3. Educate the RTSWS community about wildland fire. This can be accomplished through posting fire prevention signs around RTSWS and developing fire prevention messages and handouts for Navy personnel.
4. Once complete, review the RTSWS Fire Management Plan at least annually and update plan according to DoD Instruction 6055.06.

9.2.4 Fish and Wildlife Management

For the purposes of this INRMP, wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. The primary goal of wildlife management at RTSWS is to maintain wildlife populations at levels compatible with land use objectives while promoting the existence, importance, and benefits of nongame species.

The basis of managing a rich assemblage of nongame wildlife is to provide a mosaic of habitats that are structurally and biologically diverse. In managing for a diversity of habitats and diversity within those habitats, the potential exists for numerous species to be found. RTSWS should employ these basic techniques for managing wildlife.

- ***Monitoring Wildlife.*** Creating, monitoring, and updating GIS data on wildlife species will allow RTSWS to store, retrieve, present, and analyze the data to make informed management decisions.
- ***Managing for Migratory Birds.*** The Migratory Bird Treaty Act (MBTA) provides for a year-round closed season for nongame birds and prohibits the taking of migratory birds, nests, and eggs, except as permitted by the USFWS. Impacts on birds protected under the MBTA will be avoided through surveying for nesting birds in areas proposed for disturbance and, if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS

recommends that conducting activities outside of nesting areas or outside of the general migratory bird-nesting season can help avoid direct impacts.

- ***Protecting Sensitive Areas.*** RTSWS should maintain biological diversity by protecting, to the extent practical, sensitive areas that provide unique habitat niches. Protection measures might include restricting vehicle movement, and protecting habitats of exceptional biological value by establishing protective buffers and maintaining healthy and diverse ecosystems.

9.2.4.1 Invertebrates

For a complete listing of invertebrate species observed on RTSWS, see **Appendix F.**

Terrestrial Invertebrates

The invertebrate surveys carried out at RTSWS, augmented by records from other surveys (especially Quino checkerspot butterfly surveys, which contributed a number of butterfly observations not detected in the collected samples), yielded a total of 681 distinct invertebrate taxa. **Table 9-3** shows the numbers of distinct taxa for six of the larger insect orders. The remaining 104 taxa not represented in **Table 9-3** were distributed among 18 other Orders, covering the full range of arthropod diversity, including mites, spiders (and other arachnids), springtails, bristletails, grasshoppers and crickets, dragon and damselflies, snakeflies and lacewings, and mantids (U.S. Navy 2007). In addition, the SDNHM has collected and preserved over 980,000 invertebrate specimens (SDNHM 2010).

Table 9-3: Number of Taxa and Families Represented by the Six Larger Insect Orders occurring on Remote Training Site Warner Springs

Order	Number of Taxa	Number of Families
Coleoptera (beetles)	116	37
Diptera (flies)	66	39
Hemiptera (true bugs)	96	18
Homoptera (cicadas, aphids, leafhoppers)	100	14
Hymenoptera (bees and wasps)	117	21
Lepidoptera (moths and butterflies)	72	11

Source: U.S. Navy 2007

Specific Concerns

- Pollution and oil spills;
- Improper pesticide use;
- Introduction and spread of invasive species and
- Habitat modification.

Current Management

Opportunities for the management of fish and wildlife species on RTSWS are primarily accomplished by managing habitats. RTSWS natural resources personnel coordinate with the California Department of Fish and Wildlife (CDFW) and USFWS to identify, prioritize, and implement habitat enhancement projects targeted for particular species or groups of species (i.e., migratory birds). Projects to manage

wildlife habitat include invasive plant control, enhancing and protecting wetlands, and conducting surveys (e.g., migratory nesting bird survey).

Habitat loss has a direct correlation to a decline or loss of fish and wildlife populations. Installation INRMPs are meant to be used as tools in operational, training, and construction planning endeavors to minimize or prevent loss of habitat, thus preserving species diversity and populations at respective installations.

Management Objective and Strategy

Objective: Employ a systematic approach to managing wildlife resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting species that are incidentally observed during special status species surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
4. Revegetate areas on base with native species using species on the Naval Facilities Engineering Command Southwest (NAVFAC SW) recommended plant list.
5. Control the spread of invasive species.
6. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

9.2.4.2 Pollinators

A pollinator is an animal or insect that transfers pollen grains from flower to flower (DoD Legacy 2010a). Pollinators are responsible for pollinating 80 percent of the crops we consume, as well as the majority of plants and fruits consumed by wildlife. Examples of pollinators in the San Diego region include bees, butterflies, moths, beetles, flies, and birds. Several potential invertebrate and avian pollinator species occur on RTSWS. Invertebrate species include California sister (*Adelpha bredowii californica*), pacific sara orangetip (*Anthocaris sara sara*), mormon metalmark (*Apodemia mormo*), Behr's metalmark (*Apodemia virgulti*), Lorquin's admiral (*Basilarchia lorquini*), western pigmy-blue (*Brephidium exila*), bramble hairstreak (*Callophrys dumetorum*), spring azure (*Celastrina ladon*), echo blue (*Celastrina ladon echo*), Gabb's checkerspot (*Chlosyne gabbii gabbii*), California ringlet (*Coenonympha californica californica*), orange sulfur (*Colias eurytheme*), Harford's sulfur (*Colias harfordii*), afranius duskywing (*Erynnis afranius*), propertius duskywing (*Erynnis propertius*), mournful duskywing (*Erynnis tristis*), desert pearly marble (*Euchloe hyantis lotta*), Bernardino blue (*Euphilotes bernardino*), Dammer's blue (*Euphilotes enoptes*), southern blue (*Glaucopsyche lygdamus australis*), northern white skipper (*Heliopetes ericetorum*), snowberry clearwing (*Hemaris diffinis*), Edward's blue (*Hemiargus ceraunus gyas*), Reakirt's blue (*Hemiargus isola*), juba skipper (*Hesperia juba*), yellow-faced bee (*Hylaeus* sp.), brown elfin (*Callophrys augustinus*), common buckeye (*Junonia coenia grisea*), marine blue (*Leptotes marina*), dainty sulfur (*Nathalis iole*), mourning cloak (*Nymphalis antiopa*), pale swallowtail (*Papilio eurymedon*), western tiger swallowtail (*Papilio rutulus*), anise swallowtail (*Papilio zelicaon*), common sootywing (*Pholisora catullus*), cabbage white (*Pieris rapae rapae*), acmon blue (*Plebejus acmon*), checkered white (*Pontia protodice*), spring white (*Pontia sisymbrii sisymbrii*), white checkered skipper

(*Pyrgus albescens*), mud cawber (*Scelipheron caementarium*), common gray hairstreak (*Strymon melinus pudica*), red admiral (*Vanessa atalanta rubria*), painted lady (*Vanessa cardui*), American lady (*Vanessa virginiensis*), and plume moth (*Family Pterophoridae*). In addition, three avian species that are known pollinators including Black-chinned Hummingbird (*Archilochus alexandri*), Anna's Hummingbird (*Calypte anna*) and Costa's Hummingbird (*Calypte costae*) occur at RTSWS.

The relationship between the fate of pollinators and the ability of installations to meet readiness and stewardship obligations has been a focus of the DoD Legacy Resources Management Program (DoD Legacy) for the past several years.

Pollinators ensure that native landscapes on installations do not become barren, or overrun with invasive species. The DoD acknowledges that habitat restoration and invasive species removal go hand in hand. Through enhancing and restoring pollinator habitat by restoring native plant communities and removing and controlling invasive species, DoD installations can save money, protect threatened and endangered species, and contribute to biodiversity (DoD Legacy 2010a).

For more information on DoD's work to support pollinators, visit *http://www.DoDpollinators.org*. Another good source for information on enhancing pollinator populations can be found within The Pollinator Partnership™/ NAPPC publication *Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners in the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast* available online at:

http://www.pollinator.org/PDFs/Calif.Coastal.Chaparral.rx2.pdf

Specific Concerns

- Improper use of pesticides;
- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Fire.

Current Management

RTSWS is currently managing for pollinator species through implementation of many programs; such as landscaping, invasive species control, and restoration efforts that indirectly benefit pollinators.

Management Objective and Strategy

Objectives: Maintain and enhance pollinator populations and their habitat when not in conflict with health and safety, or the military mission.

Strategies:

1. Inventory and monitor populations and habitat composition of pollinators.
2. Develop BMPs to ensure that pollinator species are not adversely impacted by RTSWS activities.
3. Identify and develop pollinator friendly landscapes.

4. Develop and distribute outreach and education materials on pollinators to personnel, operators and visitors on RTSWS.
5. Revegetate and restore land with plants that attract pollinators, and include pollinator-friendly plants with native species contained on the NAVFAC SW recommended plant list.
6. Control the spread of invasive species.
7. Review existing literature on pollinators.
8. Work with San Diego County Agricultural Department to explore feasibility of developing and implementing a management program that supports bee relocation as opposed to bee eradication.
9. Provide connectivity between vegetation areas by creating corridors of perennials, shrubs, and trees that provide pollinators shelter and food as they move through the landscape.
10. Provide windbreakers and nesting areas, such as bat boxes or sites without high vegetation, for bee nests.
11. Inventory and become knowledgeable of local pollinators
12. Maintain a minimum of lawn areas that support recreational needs.
13. Restrict the use of pesticides, including herbicides and insecticides when possible.
14. Provide water sources in large open areas.
15. Maintain natural meadows and openings that provide habitats for sun-loving wildflowers and grasses.

9.2.4.3 Fish

There is one main perennial stream located on RTSWS, the West Fork of the San Luis Rey River. The West Fork watershed, composed of the main perennial stream and several ephemeral streams, flows into nearby Lake Henshaw. During surveys conducted in January and May 2006, three species of fish were documented within the West Fork of the San Luis Rey River on RTSWS. These were the arroyo chub, threadfin shad (*Dorosoma petenense*), and common carp (*Cyprinus carpio*). In 2010, three additional non-native fish species were documented within the West Fork of the San Luis Rey River. These include the mosquitofish (*Gambusia affinis*), bullhead catfish (*Ictalurus melas*), and the green sunfish (*Lepomis cyanellus*) (Clark et al. 2011). Of these, only the arroyo chub is native to the area. The arroyo chub is a California species of special concern and U.S. Forest Service sensitive species. Based on the level of expected use by the Navy for training purposes, the overall fish population on RTSWS is not anticipated to be impacted in this area (U.S. Navy 2007).

Specific Concerns

- Overharvesting;
- Pollution from oil spills and other hazardous wastes into the San Diego Bay;
- Improper use of pesticides;
- Habitat loss;
- Invasive species;
- Climate change (e.g., changes in temperature or sea level rise);
- Non-native species including carp, threadfin shad, and bullfrogs;
- Predators and
- Fire.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing wildlife resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting species that are incidentally observed during special status species surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals
4. Revegetate areas on base with native species using species on the recommended plant list.
5. Control the spread of invasive species.
6. Ensure compliance with NBC instructions for fishing and NEPA.
7. Evaluate predator control and develop strategies to control invasive predators (e.g., bullfrogs).
8. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management

9.2.4.4 Reptiles and Amphibians

Reptiles and amphibians are anticipated to be reasonably widespread throughout the training area and populations of individual species would be expected to absorb incidental losses associated with low intensity habitat impacts, take in accordance with the CDFW permit regulations, and inadvertent trampling without significant ecological consequence. Twenty-five species of reptiles and amphibians were recorded within RTSWS during the 2006 biological resources surveys. The most common native amphibian species encountered were western toads (*Bufo boreas*), pacific treefrogs, and California Treefrogs along the stream beds of the West Fork and mainstream of the San Luis Rey River. The non-native bullfrog (*Rana catesbeiana*) was also detected through vocalizations along the San Luis Rey River, and bullfrog tadpoles were found in the West Fork of the San Luis Rey River. The western spadefoot toad, a California species of special concern, was encountered in cow ponds in VID lands (see **Section 9.2.5.2** for more information on the western spadefoot) (U.S. Navy 2007).

Common reptile species within RTSWS include side-blotch lizards, western fence lizards, and San Diego horned lizards. Other lizards seen included granite spiny lizards, alligator lizards, coastal whiptails (*Aspidoscelis tigris stejnegeri*), and long-nosed leopard lizards (*Gambelia wislizenii*). Western (or Coronado Island) skinks were found along the West Fork of the San Luis Rey River. Snake species seen included red racers (*Masticophis flagellum* ssp. *piceus*), California striped racers (*Masticophis lateralis* ssp. *lateralis*), southwestern speckled rattlesnakes (*Crotalus mitchelli* ssp. *stephensi*), southern pacific

rattlesnakes (*Crotalus oreganus* ssp. *helleri*), and gopher snakes. The western patch-nosed snake, a California State Species of Special Concern, was also documented on RTSWS (U.S. Navy 2007).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Fire.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. The NBC INRMP addresses terrestrial resources, plans are developed collaboratively with the Cleveland National Forest, USFWS and CDFW, and are the primary vehicle by which natural resource projects are planned and funded." CDFWA broad range of goals, objectives, strategies and projects are identified and prioritized based on the need for regulatory compliance or stewardship. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing wildlife resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.

Strategies:

1. Ensure that the natural resources staff members responsible for wildlife management and conservation obtain focused training regarding management of these resources as related to conservation on a military installation on an annual basis.
2. Continue documenting species that are incidentally observed during special status species surveys.
3. Periodically review the monitoring program to ensure it still meets ecosystem management goals
4. Survey for and monitor herpetofauna populations using guidelines recommended by PARC.
5. Once finalized, implement DoD PARC Strategic Plan.
6. Revegetate areas on base with native species using species on the recommended plant list.
7. Control the spread of invasive species.
8. Evaluate predator control and develop strategies to control invasive predators (e.g., bullfrogs).
9. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

9.2.4.5 Birds and Migratory Bird Management

For a complete listing of avian species observed on RTSWS, see **Appendix F**. Several special status bird species are known to occur on RTSWS and are discussed in **Section 9.2.5**.

The diversity of bird species in San Diego County is a result of varied topography, climate, soils, and the county's location along the Pacific Flyway, a major north-south bird migration route. RTSWS lies within the Peninsular Range, which is capable of supporting more than 400 bird species, including warblers, ducks, sandpipers, phalaropes, gulls, terns, sparrows, towhees, and flycatchers. Most of these species are migrants or winter residents. Based on the level of expected use by the Navy for training purposes overall bird populations on RTSWS are not anticipated to be impacted in this area (U.S. Navy 2007). A total of 153 birds species were observed within RTSWS during the 2005 and 2006 surveys. The most significant finds were that of the Tricolored Blackbird (*Agelaius tricolor*) and the Gray Vireo (*Vireo vicinior*), both California species of special concern and USFWS Birds of Conservation Concern (see **Section 9.2.5.2**) (U.S. Navy 2007).

Common year-round residents on RTSWS include: Mourning Dove (*Zenaida macroura*), California Quail, Wild Turkey (*Meleagris gallopavo*), Bushtit, Western Scrub Jay, American Crow, Lark, Dark-eyed Junco (*Junco hyemalis*), Song Sparrow, California Towhee, Spotted Towhee, Lawrence's Goldfinch (*Spinus lawrencei*), Lesser Goldfinch, House Finch, Tricolored Blackbird, Western Meadowlark, Oak Titmouse, White-breasted Nuthatch, European Starling, Wrentit, Bewick's Wren, House Wren, Western Bluebird, Northern Flicker, Acorn Woodpecker, and Nuttall's Woodpecker (U.S. Navy 2007).

Common winter residents observed on RTSWS include: Green-winged Teal, Savannah Sparrow, Fox Sparrow (*Passerina amoena*), White-crowned Sparrow, Brewer's Blackbird (*Euphagus cyanocephalus*), American Pipit, Yellow-rumped Warbler, and Ruby-crowned Kinglet (*Regulus calendula*) (U.S. Navy 2007).

Common breeding residents that occur on RTSWS during the summer only include: Black-headed Grosbeak, Black-chinned Sparrow, Cliff Swallow, Western Kingbird, and Ash-throated Flycatcher (U.S. Navy 2007).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise);
- Fire and
- Predation.

Current Management

The MBTA (16 U.S.C. 703-712) protects all migratory birds and prohibits the taking of migratory birds, their young, nests, and eggs, except as permitted by the USFWS. The USFWS recommends that RTSWS avoid impacting birds protected under the MBTA by surveying for nesting birds in areas proposed for disturbance and if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends conducting activities outside of nesting areas or outside of the general migratory

bird-nesting season that extends from mid-February through the end of August, to help avoid direct impacts.

Prohibited Acts: Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not.

On March 15, 2005, the USFWS published in the Federal Register (FR 70(49):12710-12716) a final list of the bird species to which the MBTA does not apply. The list is required by the Migratory Bird Treaty Reform Act of 2004. The actual list of migratory birds protected by the MBTA is published in the CFR (Title 50, Part 10.13). When it became law in 2004, the Reform Act excluded any species not specifically included on the Title 50, Part 10 list from protection.

The 2003 National Defense Authorization 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.
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 February 28, 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.

In addition, DoD and the USFWS entered into a Memorandum of Understanding (MOU) in July 2006, to Promote the Conservation of Migratory Birds, in accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (DoD 2007). This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations other than military readiness activities are consistent with the MBTA. The MOU also describes how the USFWS and DoD will work together cooperatively to achieve these ends. The MOU does not authorize the take of migratory birds; the USFWS, however, may develop incidental take authorization for Federal agencies that complete an Executive Order MOU.

Current management of migratory birds also includes habitat restoration, implementation of the DoD CBM, and general bird surveys approximately every 5 years (during natural resource inventory surveys).

Management Objective and Strategy

Objective: Maintain and enhance populations, and nesting and foraging habitats of migratory birds on RTSWS.

Strategies:

1. Assess the effects of all projects on migratory birds during NEPA process. Ensure compliance with the MOU between the USFWS and DoD on the Conservation of Migratory Birds and the "Migratory Bird Rule".
2. Identify any actions that require an MBTA permit and, if necessary, obtain appropriate permit for intentional take of migratory birds.
3. Develop effective management for minimizing the unintentional take of migratory birds.
4. Conduct regular surveys to determine what species of migratory birds may have potential to be on NBC.
5. Once finalized, implement monitoring protocols contained within the DoD Coordinated Bird Monitoring Plan. Contribute data to the Coordinated Bird Monitoring Database.
6. Continue monitoring listed species as described in this INRMP and adapt monitoring and management actions as needed.
7. Develop migratory bird specific BMPs and ensure these BMPs are included in project plans (e.g., plan all tree trimming during the non-nesting season).
8. Develop and enhance partnerships with agencies and groups involved (e.g., USFWS and CDFW) in migratory bird management.
9. Develop and distribute outreach and education materials on migratory birds.
10. Revegetate with native species contained on the NBC recommended plant list.
11. Control the spread of invasive species.
12. Participate in DoD Partners in Flight initiative.
13. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).

9.2.4.6 Bird/Wildlife Aircraft Strike Hazard

A full BASH program is not in place at RTSWS due to the limited air operations but may be considered if air operations increase in the future.

Natural resource managers are responsible for ensuring BASH programs are addressed in this INRMP and is compliant with all applicable state and Federal natural resource laws and regulations as well as all applicable DoD, DoN, and U.S. Navy environmental policies, directives, and instructions.

9.2.4.7 Mammals

For a complete listing of mammal species observed on RTSWS, see **Appendix F**.

A total of 37 mammal species were observed within RTSWS. Of the larger mammals, mule deer (*Odocoileus hemionus*) were by far the most commonly encountered, especially in the grasslands near the

edges of the oak woodlands and under the eaves of the woodlands themselves. Coyotes and bobcats were seen on many occasions in many areas, including in the grasslands south of Fink Road and along roads such as the Palomar Divide on the ridgeline north of Fink Road. Mountain lions are also known to be present, although no direct sightings were made during the course of the biological resources surveys. Mountain lion footprints were commonly seen in the sandy streambeds, and on one occasion, a severed deer leg was found that appeared to have been gnawed off by a large predator (U.S. Navy 2007).

Numerous American badger (*Taxidea taxus*) dens were also found in VID lands west of the highway and numerous small rodents were found within RTSWS. The southern mule deer observed are part of the San Diego deer herd, one of three herds of southern mule deer recognized in southern California (the others are the San Jacinto and Santa Ana herds). The San Diego deer herd ranges for a small distance into Riverside County, Orange County, and Baja California, Mexico. This study documented a significant presence of large mammals that require contiguous, sizable tracts of land, such as the American Badger, Southern Mule Deer, and Mountain Lion. This area of San Diego County has become increasingly significant for large mammals because of its size and geographic position (U.S. Navy 2007).

A total of 11 bat species were recorded as a result of the 2005 to 2006 biological resources surveys, including 4 species that are California species of special concern (see **Table 9-5**) (U.S. Navy 2007).

Specific Concerns

- Development/anthropogenic disturbances;
- Invasive species (flora and fauna);
- Habitat loss and/or changes;
- Erosion and sedimentation;
- Climate change (e.g., changes in temperature or sea level rise) and
- Fire.

Current Management

All species groups are managed through INRMPs, including, at a minimum, baseline inventory and regular monitoring. All natural resources are also managed through the project site approval process, through which avoidance and minimization measures are considered during project development and implementation, and site-specific surveys are initiated as necessary.

Management Objective and Strategy

Objective: Employ a systematic approach to managing terrestrial mammals, using a process that includes inventorying, monitoring, modeling, management, assessment, and evaluation, as needed.

Strategies:

1. Continue documenting mammal species during Natural Resources inventory efforts and those that are incidentally observed during special status species surveys.
2. Periodically review the monitoring program to ensure it still meets ecosystem management goals.
3. Install bat boxes where appropriate.
4. Maintain and promote partnerships with agencies and groups (e.g., USFWS and CDFW) involved in wildlife management.

5. At RTSWS, coordinate with local and regional efforts on the management of sensitive mammals such as the mountain lion and American badger.
6. At RTSWS, populations of invasive feral pigs have begun to spread onto the property. Navy NR staff should work in coordination with the landowners to support the control and removal efforts that are currently underway in San Diego County.

9.2.4.8 Marine Mammals

Not applicable at RTSWS.

9.2.5 Special Status Species (Federally Listed and Other Special Status Species)

Special status species include those species that are federally or state listed endangered, threatened, candidate, or California species of special concern (SOC) and California fully protected species (CFP); birds on the Federal Birds of Conservation Concern (BCC) list; and plants identified by the California Native Plant Society (CNPS) as belonging to the Rare Plant Rank list of 1B (see **Figure 9-5**). In addition, those migratory bird species that have been determined to be of the highest "concern" to the DoD and that have been identified on the DoD Partners in Flight (PIF) Priority Species list have been included. **Table 9-4** includes species either observed on RTSWS during natural resources survey, or species with the potential to occur on each installation.

The following sections include brief descriptions of those species actively managed by natural resources personnel at RTSWS.

An installation's overall ecosystem management strategy must provide for protection and recovery of federally listed species. Under the ESA, an "endangered species" is defined as any species that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The USFWS has also presented an updated list of species that are regarded as candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and could warrant protection under the ESA. General management actions for listed species include the following:

- Preparation and implementation of specific management actions for listed species that include protocols for monitoring surveys and for site marking of sensitive areas;
- Maintaining GIS data on the distribution and habitat availability for listed species and sharing this information with the CNDDB and Cleveland National Forrest;
- Implement Environmental Review requirements in accordance with OPNAVINST 5090.1C CH-1;
- Conduct Environmental Awareness briefings (e.g., natural resource training) as necessary;
- Minimization and conservation measures aimed at reducing the potential for accidental take;
- Investigating and implementing research projects to better understand ecological requirements of listed species and
- Investigation and implementation of habitat improvement and non-native species control to conserve listed species.

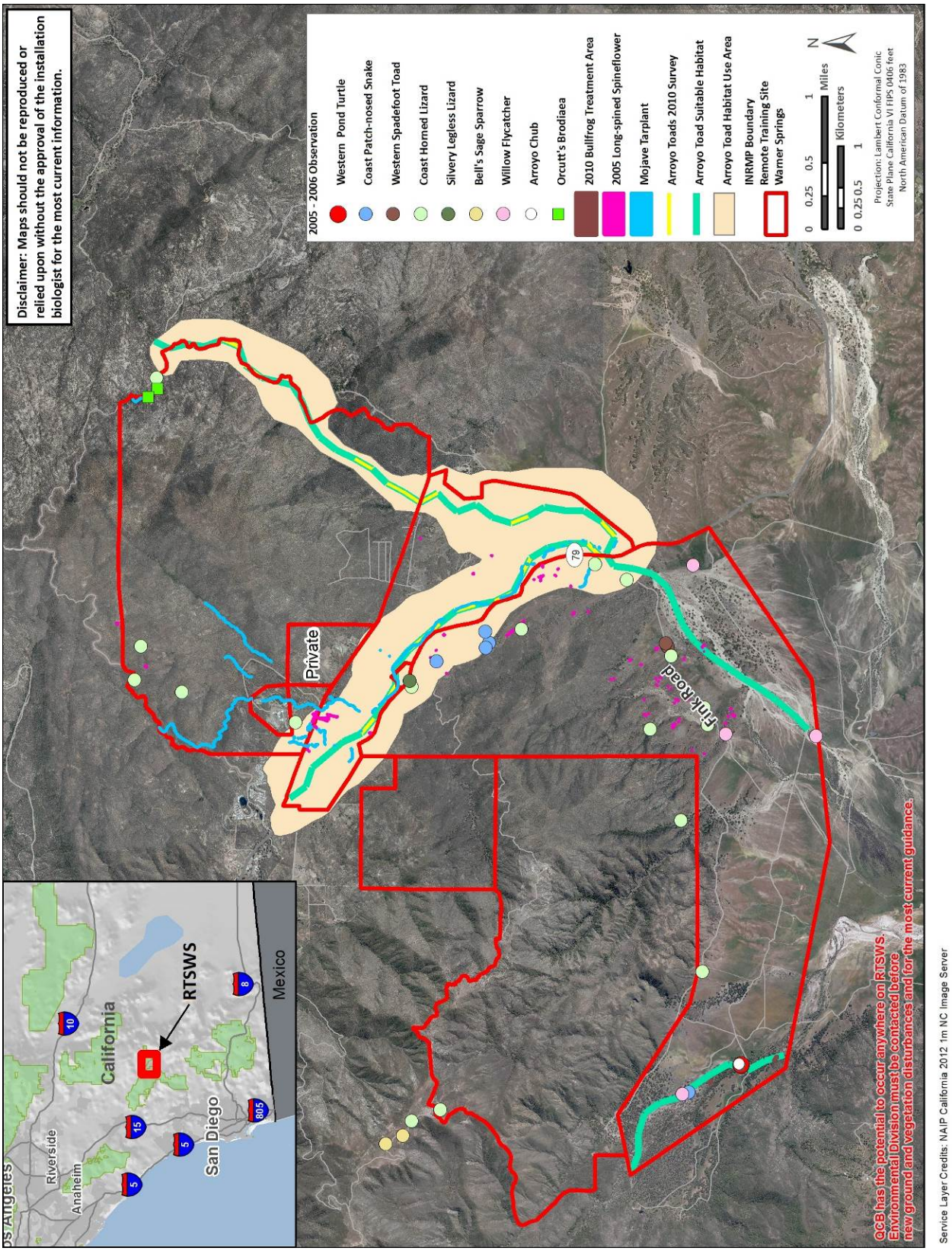


Figure 9-5: Remote Training Site Warner Springs Other Special Status Species

Table 9-4: Special Status Species Observed and Listed Species with Potential to Occur on Remote Training Site Warner Springs

Common Name	Scientific Name	Federal Status	State Status	Other Status
Plants				
Nevin's barberry[1&2]	*Berberis nevinii*	FE	SE	CNPS 1B.1
Orcutt's brodiaea	*Brodiaea orcuttii*	–	–	CNPS 1B.1
Vail Lake ceanothus[1&2]	*Ceanothus ophiochilus*	FT	SE	CNPS 1B.1
Long-spined spineflower	*Chorizanthe polygonoides* var. *longsipina*	–	–	CNPS 1B.2
Mojave tarplant	*Deinandra mohavensis*	–	SE	CNPS 1B.3
Slender-horned spineflower[1&2]	*Dodecahema leptoceras*	FE	SE	CNPS 1B.1
Invertebrates				
Quino checkerspot butterfly[1]	*Euphydryas editha quino*	FE	–	–
Fish				
Arroyo chub	*Gila orcutti*	–	SSC	–
Amphibians and Reptiles				
Arroyo toad[1]	*Anaxyrus californicus*	FE	SSC	–
Silvery legless lizard	*Anniella pulchura pulchura*	–	SSC	–
Western pond turtle	*Emys marmorata*	–	SSC	–
Coast horned lizard	*Phrynosoma blainvillii*	–	SSC	–
Coronado Island skink	*Plestiodon skiltonianus interparietalis*	–	SSC	–
Coast patch-nosed snake	*Salvadora hexalepis virgultea*	–	SSC	–
Western spadefoot toad	*Spea hammondii*	–	SSC	–
Birds[3]				
Tricolored Blackbird[1]	*Agelaius tricolor*	BCC	SSC	DoD PIF
Grasshopper Sparrow	*Ammodramus savannarum*	–	SSC	DoD PIF
Sage Sparrow	*Artemisiospiza bellii*	–	–	DoD PIF
Golden Eagle	*Aquila chrysaetos*	BGEPA, BCC	CFP	DoD PIF
Long-eared Owl	*Asio otus*	–	SSC	–
Oak Titmouse	*Baeolophus inornatus*	BCC	–	–
Ferruginous Hawk	*Buteo regalis*	BCC	–	–
Swainson's Hawk	*Buteo swainsoni*	BCC	–	–
Lawrence's Goldfinch	*Spinus lawrencei*	BCC	–	–

Common Name	Scientific Name	Federal Status	State Status	Other Status
Birds[3] (continued)				
Vaux's Swift	*Chaetura vauxi*		SSC	–
Northern Harrier	*Circus cyaneus*	–	SSC	–
Olive-sided Flycatcher	*Contopus cooperi*		SSC	DoD PIF
Yellow Warbler	*Setophaga petechia brewsteri*	BCC	SSC	–
White-tailed Kite	*Elanus leucurus*	–	CFP	–
Willow Flycatcher[1]	*Empidonax traillii brewsteri*	BCC	SE	–
Southwestern Willow Flycatcher[1&2]	*Empidonax traillii extimus*	FE	SE	–
Loggerhead Shrike	*Lanius ludovicianus*	BCC	SSC	DoD PIF
Sage Thrasher	*Oreoscoptes montanus*	–	–	DoD PIF
Nuttall's Woodpecker	*Picoides nuttallii*	BCC	–	–
Oregon Vesper Sparrow	*Pooecetes gramineus affinis*	–	SSC	–
Rufous Hummingbird	*Selasphorus rufus*	BCC	–	–
Black-chinned Sparrow	*Spizella atrogularis*	BCC		DoD PIF
Gray Vireo	*Vireo vicinior*	BCC	SSC	DoD PIF
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	–	SSC	–
Mammals				
Pallid bat	*Antrozoous palidus*	–	SSC	–
Townsend's big-eared bat	*Corynorhynus townsendii*	–	SSC	–
Stephens' kangaroo rat[1]	*Dipodomys stephensi*	FE	ST	–
Western mastiff bat	*Eumops perotis*	–	SSC	–
Western red bat	*Lasiurus blossevillii*	–	SSC	–
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	–	SSC	–
American badger	*Taxidea taxus*	–	SSC	–

Source: U.S. Navy 2007, U.S. Navy 2009c, USFWS 2010a, CDFG 2010b

Notes: [1] Special Status Species with focused management. [2] Federally listed species with the potential to occur.
[3] Birds are named using the American Ornithologists' Union nomenclature.

Key:

BCC = Bird of Conservation Concern
SSC = California Species of Special Concern
FP = California Fully Protected Species
BGEPA = Bald and Golden Eagle Protection Act
DoD PIF = DoD Partners in Flight Priority Species
FT = Federally Threatened
FE = Federally Endangered
ST = State Threatened
SE = State Endangered

If threatened, endangered, or candidate species are discovered on the installation during a biotic inventory, species information and management actions should be incorporated into the INRMP.

Several rare plants, as listed by the CNPS, were documented on RTSWS during the 2004-2005 natural resources surveys (see **Figure 9-5**). These species are listed on the CNPS Lists 1B. List 1B includes plants that are rare, threatened, or endangered in California and elsewhere. The plants of List 1B are rare throughout their range with the majority of them endemic to California. Most of the plants of List 1B have declined significantly over the last century. List 1B plants constitute the majority of the plants in CNPS' Inventory with more than 1,000 plants assigned to this category of rarity. All of the plants constituting List 1B meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Wildlife Code, and are eligible for state listing (CNPS 2010).

The intent of this section is to identify objectives and strategies to manage RTSWS using a regional ecosystem-based approach that manages special status species while protecting the operational functionality of the mission. While single-species management is not promoted as a general philosophical management approach on the installation, specific controls are used to protect special status species beyond management of the ecosystem. Other procedures in place for management of special status species are modifying the ecosystem and human interactions within this environment. The following sections include brief descriptions of those species actively managed by natural resources personnel at RTSWS.

For a complete description, background and species account including distribution, range, habitat and biology, of the Special Status Species described below, see **Appendix F**.

9.2.5.1 Federally Listed Species

Three federally listed species, the endangered Quino checkerspot butterfly (*Euphydryas editha quino*), endangered arroyo toad (*Anaxyrus californicus*), and endangered Stephens' kangaroo rat (*Dipodomys stephensi*) (see **Figure 9-6**) are known to occur on RTSWS. Additionally, four federally listed species, endangered Nevin's barberry (*Berberis nevinii*), threatened Vail Lake ceanothus (*Ceanothus ophiochilus*), endangered slender-horned spineflower (*Dodecahema leptoceras*), and the endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*), have the potential to occur on RTSWS.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Fire;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

Management needs of threatened, endangered, and candidate species and their habitats are based on results contained within surveys performed for RTSWS. Known listed species that occur on RTSWS include the arroyo toad, Stephens' kangaroo rat, and Quino checkerspot butterfly. There is suitable habitat for the Southwestern Willow Flycatcher, but this species has not been documented on RTSWS.

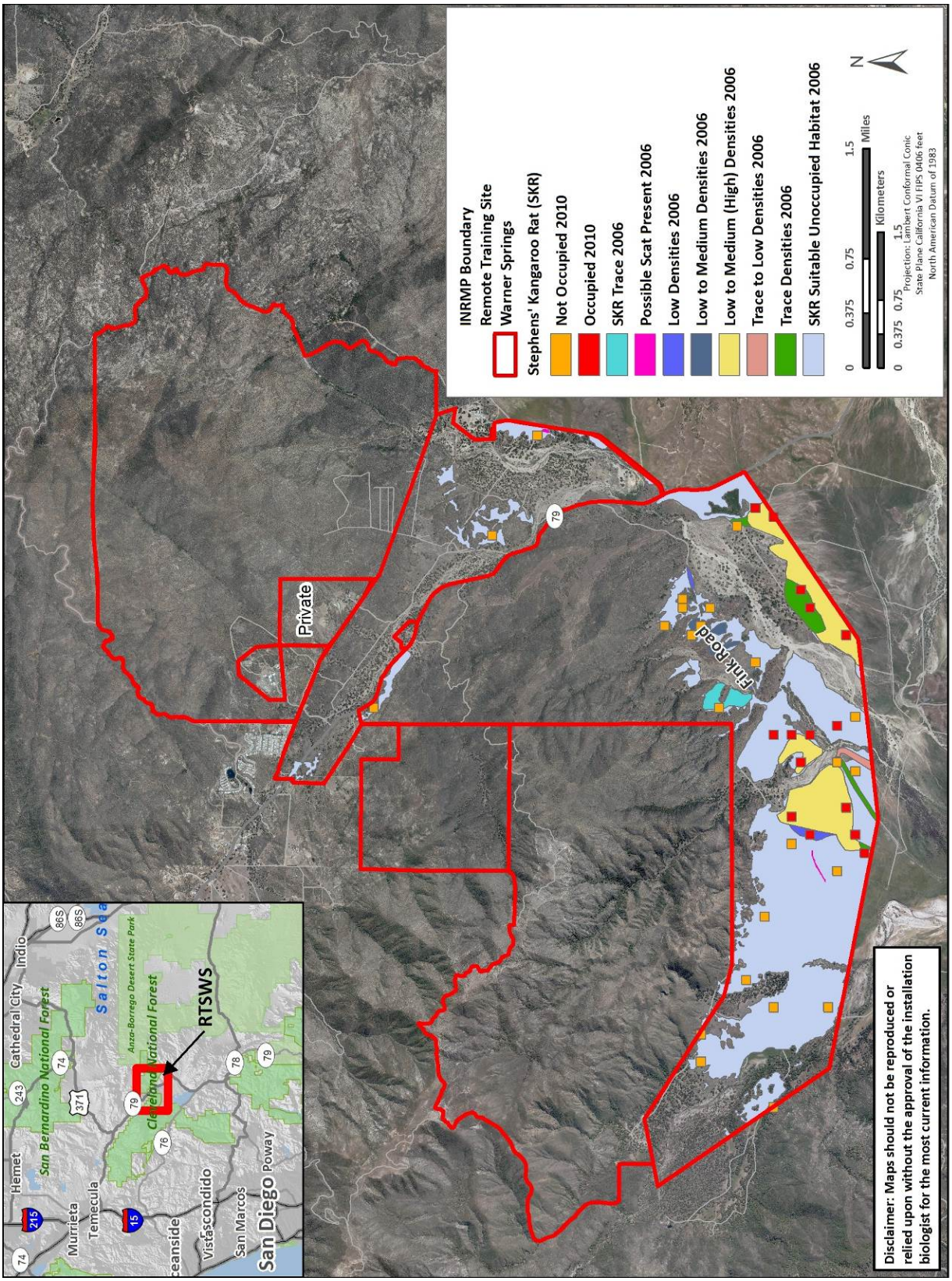


Figure 9-6: Remote Training Site Warner Springs Locations of Stephens' Kangaroo Rat

RTSWS will continue to conduct species surveys as deemed necessary and subject to available funding. Management strategies will be developed or revised based on the recommendations of those surveys. Other procedures in place for management of threatened, endangered, and candidate species are modifying the ecosystem and human interactions within this environment.

The Navy currently conducts management of listed species at RTSWS in accordance with applicable Biological Opinions that are discussed in detail in the below appropriate sections. Examples of management strategies include annual surveys and assessment of species status on the installation, minimization of disturbances, and site preparation where necessary.

There is no critical habitat for any of the listed species in NBC. This is, in part, due to U.S. Navy environmental planning through INRMPs. ***Appendix D*** *identifies within the INRMP all management and conservation efforts for a federally listed species that the USFWS and NMFS would use to consider when making a determination not to designate critical habitat on an installation.*

On February 9, 2011 the USFWS concluded that the benefits of excluding lands owned by RTSWS and Camp Morena from designation as critical habitat outweighed the benefits of inclusion and exclusion would not result in extinction of the species. Therefore, the Secretary exercised his discretion and excluded 1,878 hectares (4,640 acres) of BLM and U.S. Forest Service lands leased to the DoD in Unit 15 (Upper San Luis Rey River Basin) and Unit 19 (Cottonwood Creek) for reasons of national security (FR Doc No: 2011-1703).

Management Objective and Strategy

Objective: Maximize effectiveness and efficiency of the NBC Endangered Species Program to achieve the best conservation possible while maintaining and improving training activities at the desired level.

Strategies:

1. Prioritize management issues within and between species, and within the overall natural resources program to guide management actions and funding expenditures.
2. Coordinate with the USFWS to identify actions that adversely impact training capabilities, and identify activities that could adversely affect listed species. Adapt measures as warranted and consult with the USFWS to receive incidental take coverage where appropriate.
3. Ensure that NBC remains in compliance with the ESA.
4. Periodically review the natural resources management program to ensure that management actions do not adversely impact threatened and endangered species.
5. Promote species recovery and ensure essential habitat is conserved by providing proper funding, providing a benefit to the species, and ensuring effectiveness of management strategies employed.

Nevin's Barberry

This federally listed endangered species was documented to occur in the general region of RTSWS and as having a reasonable potential to occur within the boundaries of RTSWS (U.S. Navy 2007). Surveys were conducted for Nevin's barberry in 2005 at RTSWS, during its typical blooming period (April), and no occurrences of the species were observed. Suitable habitat for this species includes the margins of dry washes with sandy and gravelly substrates and alluvial shrub communities and steep, generally north-facing slopes and coarse soils with the following plant communities: alluvial scrub, chamise chaparral, coastal sage scrub, oak woodland, and/or riparian scrub or woodland (USFWS 2009b). The

nearest documented population of this species was noted to be between 16 and 97 kilometers (10 and 60 miles) from RTSWS (U.S. Navy 2007).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise);
- Invasive species control;
- Fire management (both positive and negative);
- Fire regime and
- Presence of the species.

Current Management

Because no Nevin's barberry were detected within the RTSWS, no special management measures are proposed. Adherence to general management measures will avoid or minimize any adverse impacts to suitable Nevin's barberry habitat. Remapping the distributions of special status plants (those on the CNPS, BLM, and USFWS special status species lists) will be included as a management recommendation in the NBC INRMP. These surveys will include the Nevin's barberry and will focus on areas with higher levels of training activity.

Management Objective and Strategy

Objective: No management of Nevin's barberry is required since this species is not found on the RTSWS, but efforts to survey for this species will continue.

Strategies:

1. Include Nevin's barberry as a target species in future surveys.

Vail Lake Ceanothus

This federally listed threatened plant was documented to occur in the general region of RTSWS and as having a reasonable potential to occur within the boundaries of RTSWS (U.S. Navy 2007). Only three populations of this species have ever been documented (USFWS 2008). This narrow endemic plant is restricted to three known occurrences in chamise-chaparral habitat on ridgetops and north- to northeast-facing slopes at elevations of 579 to 1,067 meters (1,900 to 3,500 feet) in southwestern Riverside County, California (USFWS 2008). It is associated with harsh, phosphorus-deficient soils derived from metavolcanic and ultra-basic parent materials, deeply weathered gabbro, and pyroxeniterich outcrops (USFWS 2008). The nearest documented population of this species is over 10 miles away from RTSWS (U.S. Navy 2007). Surveys were conducted for Vail Lake ceanothus in 2005 at RTSWS and occurrences of the species were not observed (U.S. Navy 2007).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise);
- Invasive species control;
- Fire management (both positive and negative) and
- Fire regime.

Current Management

Because no Vail Lake ceanothus' were detected within the RTSWS, no special management measures are proposed. Adherence to general management measures will avoid or minimize any adverse impacts to suitable Vail Lake ceanothus habitat. Remapping the distributions of special status plants (those on the California Native Plant Society [CNPS], BLM, and USFS special status species lists) will be included as a management recommendation in the NBC INRMP. These surveys will include the Vail Lake ceanothus and will focus on areas with higher levels of training activity.

Management Objective and Strategy

Objective: No management of Vail Lake ceanothus is required since this species is not found on the RTSWS, but efforts to survey for this species will continue.

Strategies:

1. Include Vail Lake ceanothus as a target species in future surveys.

Slender-horned Spineflower

Slender-horned Spineflower (*Dodecahema leptoceras)* was included in the list of species that had been documented to occur in the general region of RTSWS and as having a reasonable potential to occur within the boundaries of RTSWS (U.S. Navy 2007). Slender-horned spineflower is a small annual plant in the buckwheat family that typically occurs in drought prone alluvial benches subject to only rare flood events (USFWS 2010c). Surveys were conducted for slender-horned spineflower in 2005 at RTSWS, during its typical blooming period, and no occurrences of this species were observed (U.S. Navy 2007).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise);
- Invasive species control;
- Fire management (both positive and negative) and
- Fire regime.

Current Management

Because no slender-horned spineflowers were detected within the RTSWS, no special management measures are proposed. Adherence to general management measures will avoid or minimize any adverse impacts to suitable slender-horned spineflower habitat. Remapping the distributions of special status plants (those on the CNPS, BLM, and USFS special status species lists) will be included as a management recommendation in the NBC INRMP. These surveys will include slender-horned spineflower and will focus on areas with higher levels of training activity.

Management Objective and Strategy

Objective: No management of slender-horned spineflower is required since this species is not found on the RTSWS, but efforts to survey for this species will continue.

Strategies:

1. Include slender-horned spineflower as a target species in future surveys.

Quino Checkerspot Butterfly

In spring 2011 surveys were conducted for Quino checkerspot butterfly on 174 hectares (432 acres) of suitable habitat on RTSWS. Suitable habitat consisted of mostly undeveloped land dominated by sage scrub, open mixed and chamise chaparral, coast live oak woodland, grasslands and grazed pasture lands, oak woodlands, and fuel breaks. Four Quino checkerspot butterflies were observed on RTSWS during the 2011 surveys. Potential host plant species documented included Chinese houses (*Collinsia concolor*), Coulter's snapdragon (*Antirrhinum coulterianum*), dot-seed plantain (*Plantago erecta*), wooly plaintain (*Plantago patagonica*), owl's clover (*Castileja exserta*), and rigid bird's-beak (*Cordylanthus rigidus*). Several potential nectar sources were documented, these include but are not limited to, California goldfields (*Lasthenia californica*), California buckwheat (*Erigonum fassiculatum*), and chia (*Salvia columbariae*) (U.S. Navy 2012h). Surveys were only conducted on a small portion of RTSWS with the highest concentration of host and nectar plants to maximize likelihood of finding this species.

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise);
- Invasive species;
- Habitat degradation through training;
- Facilities projects (e.g., construction and maintenance, including roads);
- Other natural resources management (e.g., erosion control and invasive species control);
- Fire management (both positive and negative) and
- Fire regime.

Current Management

The Quino checkerspot butterfly was first detected on RTSWS in 2011. The Navy has submitted an RTSWS Biological Assessment in response to this finding and is awaiting issuance of a BO from the USFWS. Currently the Navy does not conduct invasive species control or revegetation efforts to support Quino checkerspot butterfly. The Navy has, however, avoided impacts in Quino checkerspot butterfly habitat. Impacts from training are minimal and the Navy does not anticipate any major impacts on Quino checkerspot butterfly.

Management Objective and Strategy

Objective: Promote recovery and maintain populations of the Quino checkerspot butterfly on RTSWS.

Strategies:

1. Invasive species control.
2. Periodic monitoring (recommend at least every 3 years).
3. Vulnerability assessment.
4. NEPA/SAR process to avoid/minimize adverse impacts (e.g., threats).
5. Coordination with other elements of the natural resources program.
6. Develop comprehensive road maintenance plan.
7. Perform outreach and education to installation workforce, military members, and improve understanding of natural resources including sensitive and listed species.

8. Minimize adverse fire management impacts.
9. Implement fire management strategies that benefit Quino checkerspot butterfly.
10. Improve understanding of population dynamics of Quino checkerspot butterfly.

Arroyo Toad

Nine arroyo toads were documented during the 2006 surveys, mostly along a 14-kilometer (8.7-mile) stretch of the San Luis Rey River. Within RTSWS, populations of the arroyo toad are restricted to areas of low-gradient sandy drainage, with seasonally low-energy braided channels for breeding, and adjacent uplands, with sandy or friable soils for foraging and burrowing. Arroyo toad tadpoles were observed in quiet pools and foraging adults were observed along damp sandbars at night. Quiet pools and damp sandbars are present along the riparian corridor and adjacent uplands of the Upper San Luis Rey River. Arroyo toads were observed along most of the onsite reaches of the River east of Highway 79, but not in narrow stream corridors, those with cobbly substrates, or those densely vegetated (U.S. Navy 2007).

In addition, on May 3, 2010, an arroyo toad was heard calling from the Indian Flats campground near the upper portion of the San Luis Rey River and one egg string was documented in the lower portion of the San Luis Rey River. Throughout the breeding season, 56 percent of potential toad breeding habitat contained water. Approximately 4.0 and 4.5 kilometers (2.4 and 2.8 miles) of Cañada Aguanga and the San Luis Rey River respectively remained dry. In Cañada Aguanga, there was no evidence of breeding; however, occupancy along the 5.5 km reach was estimated to be 36 percent (se= 23%). In the San Luis Rey, breeding was documented by detection of tadpoles in only the upper reaches with overall occupancy estimated at 29 percent (se= 12%). In these areas, the numbers of tadpoles detected within a reach was low, ranging from one to two. No arroyo toads were recorded in the portion of San Luis Rey River west of Highway 79. Both the Cañada Aguanga and the San Luis Rey River had adult arroyo toads. No arroyo toads were found in the West Fork San Luis Rey River. The location of Arroyo Toads found are similar to data collected by NBC in 2006 (U.S. Navy 2007). The weather for the 2010 season was cool in the evenings followed by warm days. Several western toad tadpoles were seen throughout many of the sites (Clark et al. 2011).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise);
- Predation by non-native bullfrogs;
- Impacts due to SERE training;
- Roadkills;
- Stream alterations;
- Off-road driving;
- Other elements from natural resources program (e.g., revegetation and invasive plant control);
- Chytrid fungus;
- Fire Management activities and
- Wildland fire.

Current Management

The 2009 Biological Opinion (BO) on the U.S. Navy's proposed expansion and realignment of the RTSWS (FWS-SDG-09B0277-09F0806) discusses multiple conservation measures for minimizing the effects of the action on the arroyo toad. Among the requirements listed in this BO are: (1) a review of the status of the arroyo toad; (2) road kill surveys during the most active time of the year for the arroyo toad

and immediately following training activities.; (3) training of SERE instructors to be knowledgeable about the fauna of the action area and to be able to identify the arroyo toad; (4) development of educational material with information on identifying the arroyo toad, how to differentiate between similar non-listed species and a synopsis of the training area rules and restrictions to avoid and minimize adverse impacts; and (5) daily removal of all trash that may attract predators. For a complete list of Terms and Conditions and Conservation measures, see **Appendix I.**

In addition, the Navy complies with USFS and BLM agreements.

Management Objective and Strategy

Objective:

1. Maintain current populations and distribution of arroyo toads on RTSWS;
2. Promote the recovery of the species and
3. Maintain habitat quality.

Strategies:

1. Continue bullfrog removal and control program.
2. Educate military operators to ensure minimization and avoidance measures are followed.
3. Conduct arroyo toad surveys at least every 3 years. If toads are discovered in areas outside of current arroyo toad Management Area, these locations will be added to the ATMA and managed accordingly.
4. Establish nighttime speed limit of 24 kilometers per hour (15 miles per hour) in ATMA and install signs informing drivers.
5. Implement site approval process and NEPA to avoid and minimize impacts to riparian habitat.
6. Digging, disking, grading, mechanical fill, or deposition of fill must avoid ATMA. (Except when approved by the service for revegetation).
7. Driving shall only be permitted on existing dirt and paved roads.
8. Coordination with other elements of the natural resources program.
9. Minimize adverse fire management impacts.

Southwestern Willow Flycatcher

Focused surveys for the Southwestern willow flycatcher were conducted in 2006 on RTSWS. Suitable nesting habitat was documented on RTSWS and common tree and shrub species included willows (*Salix* spp.), seep willow (*Baccharis* spp.), cottonwood (*Populous* spp.) and tamarisk (*Tamarix ramosisisma*). The drainages surveyed consisted of southern willow scrub, southern coast live oak riparian forest, and southern cottonwood-willow riparian forest, and was determined to be marginal habitat for this species. No Southwestern Willow Flycatchers were documented during these surveys. Four Willow Flycatchers belonging to another subspecies (probably *E.t.brewsteri*) were detected during the three sets of Southwestern Willow Flycatcher surveys conducted in 2006. Further investigation into the presence/absence of the Southwestern Willow Flycatcher at RTSWS is needed (U.S. Navy 2007).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Potential nest parasitism;
- Habitat modification due to facilities maintenance (e.g., landscape modifications, invasive species, and noise);
- Impacts from other uses including recreation and hunting;
- Other elements from NR program (e.g., revegetation and invasive plant control);
- Predation;
- Invasive species within riparian habitat;
- Potential threats to birds on wintering grounds and
- Wildland fires.

Current Management

No specific management measures are currently take place. Adherence to existing general management measures and management measures identified for the state endangered Willow Flycatcher, including management measures designed to protect wetlands and control invasive plants/weeds, will minimize any adverse impacts to the Southwestern Willow Flycatcher and their habitat within the RTSWS.

Management Objective and Strategy

Objective: Maintain suitable habitat for Southwestern Willow Flycatcher.

Strategies:

1. Implement site approval process and NEPA to avoid and minimize impacts to riparian habitat.
2. Control invasive species.
3. Enhance habitat through revegetation projects.
4. Investigate and consider control of Brown-headed Cowbirds to decrease nest parasitism.
5. Survey population at least every 3 years using USFWS protocol. If nesting confirmed, include nest and territory monitoring, if feasible.
6. Coordinate trails and hunting management through Vista Irrigation District and US Forest Service.
7. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
8. Work with regional recovery groups to address threats on wintering grounds.
9. Determine presence/absence within suitable habitat.
10. Coordinate with other elements of the natural resources program.
11. Rank habitat having a high value at risk under the fire management plan.

Stephens' Kangaroo Rat

Out of a total of 978 trap nights at 21 locations, 25 Stephens' kangaroo rats were captured at 11 locations. Stephens' kangaroo rats were captured along Fink Road and in the expansive sparse grasslands southward of Fink Road toward the southern boundary of RTSWS. The distribution of Stephens' kangaroo rat is complex in habitats near Fink Road, due to the mixture of open grasslands, sparse to dense stands of shrubs, and scattered patches of riparian and oak woodland. Farther south, expansive sparsely-vegetated grasslands in level or gently sloping terrain harbor healthy populations of Stephens' kangaroo rat, with densities ranging mostly from low (i.e., 2 to 10 individuals per hectare) to medium (i.e., 11 to 30 individuals per hectare); and in some areas occurring in high densities (i.e., greater than 30 individuals per hectare) (U.S. Navy 2007).

The dense grassland habitats west of Highway 79 are presently largely unoccupied by the Stephens' kangaroo rat, although the species may occur at very low densities along some dirt roads or in other clearings in these grasslands. Such dense unoccupied grasslands were mapped as potential habitat for Stephens' kangaroo rat and would likely be broadly occupied by this species following the reduction of herb density and corresponding increase of bare ground by such forces as grazing (cattle or sheep), fire or long-term drought (U.S. Navy 2007).

In 2010 and 2011, the USGS designed and carried out a multi-tiered, habitat-based, adaptive monitoring program designed to track yearly trends in the total area occupied by Stephens' kangaroo rat on RTSWS. The monitoring areas were divided into two sampling strata based on historic occupancy: Strata A, 249 hectares (615 acres) of historically occupied, and Strata B, 678 hectare (1675 acres) of suitable but historically unoccupied habitat. Surveys included a combination of searching for kangaroo rat sign and live-trapping (Brehme et al. 2011). USGS surveyed 40 plots in both stratums A and B. Of these, 30–33 (2010, 2011) plots contained potential Kangaroo Rat sign (potential burrows, tracks, and/or scat) on the initial survey. In the fall of 2010, biologists were only able to live-trap 13 of these plots due to rain, low temperatures, and access restrictions for the hunting season. In August of 2011, biologists continued the monitoring by live-trapping 31 plots with potential or positive kangaroo rat sign for 2 to 4 nights (four to eight trap check events). A total of 16 individuals were trapped in 2010 and 54 individuals were trapped in 2011 (Brehme et al. 2011).

Specific Concerns

- Lack of disturbance and consequent plant community succession;
- Impacts due to training;
- Off-road driving;
- Roadkills;
- Climate change (e.g., changes in temperature or sea level rise);
- Other elements from the natural resources program (e.g., revegetation and invasive plant control) and
- Fire management.

Current Management

Current management of Stephens' kangaroo rat includes compliance with USFS and BLM agreements, as well as the 2009 BO on the U.S. Navy's proposed expansion and realignment of the RTSWS (FWS-SDG-09B0277-09F0806) which discusses multiple conservation measures for minimizing the effects of the

action on the Stephens' kangaroo rat. Among the requirements listed in this BO are: (1) a review of the status of the Stephens' kangaroo rat; (2) road kill surveys during the most active time of the year for the Stephens' kangaroo rat and immediately following training activities.; (3) training of SERE instructors to be knowledgeable about the fauna of the action area and to be able to identify the Stephen's Kangaroo Rat; (4) development of educational material with information on identifying the Stephens' kangaroo rat, how to differentiate between similar non-listed species and a synopsis of the training area rules and restrictions to avoid and minimize adverse impacts; and (5) daily removal of all trash that may attract predators. For a complete list of Terms and Conditions and Conservation measures, see **Appendix I.**

Management Objective and Strategy

Objectives:

1. Maintain current populations and distribution of Stephens' kangaroo rat on RTSWS.
2. Promote the recovery of the species.
3. Maintain habitat quality.

Strategies:

1. Digging, disking, grading, mechanical fill, or deposition of fill must avoid Stephens' kangaroo rat habitat. (Except when approved by the USFWS for revegetation).
2. Enhance the feasibility to expand/improve the habitat of Stephens' kangaroo rat.
3. Educate military operators to ensure minimization and avoidance measures are followed.
4. Outreach and education to local landowners.
5. Conduct Stephens' kangaroo rat surveys at least every 3 years, update distribution maps as necessary, and post in appropriate areas at RTSWS.
6. Establish nighttime speed limit of 15 miles per hour in Stephens' kangaroo rat-occupied areas and install signs informing drivers.
7. Implement site approval process and NEPA to avoid and minimize impacts to Stephens' kangaroo rat -occupied habitat.
8. Allow vehicle traffic only on dirt and paved roads.
9. Coordination with other elements of the natural resources program.

9.2.5.2 Other Special Status Species

In addition to federally listed threatened and endangered species, RTSWS recognizes species that occur at a level of rarity that currently does not warrant federal listing. **Table 9-4** lists other special status species and their corresponding CDFW or other federal status. No focused management or surveys currently take place on RTSWS for most of the other special status species.

Other Special Status Species with Focused Management

Tricolored Blackbird

The San Diego County population is currently estimated to be more than 100,000 individuals; the same number of birds could be seen in a single day 40 years ago. The population of Tricolored Blackbirds on

RTSWS is estimated to be approximately 400 birds, or less than 1 percent of the population of San Diego County. The species is recognized as being in precipitous decline, especially in southern California, making conservation of colony sites and associated foraging habitat a management issue (U.S. Navy 2007).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Habitat loss and fragmentation;
- Facilities maintenance;
- Predation;
- Invasive species within marshes;
- Loss of foraging habitat and
- Stormwater management.

Current Management

Adherence to the existing general management and conservation measures and the additional specific measures specified in this section will minimize adverse impacts to the populations of special status species and their habitat within the RTSWS.

Management Objective and Strategy

Objective: Maintain suitable marsh habitat on RTSWS to support the Tricolored Blackbird.

Strategies:

1. Implement site approval process and NEPA to avoid and minimize impacts to marsh habitat (e.g., direct development away, direct lighting away, and minimize predator perches).
2. As necessary control and remove invasive species in Tricolored Blackbird habitat.
3. Determine presence/absence within suitable habitat.
4. Contribute to regional vulnerability assessments.
5. Coordinate with regional efforts (e.g., Partners in Flight) and working groups to determine appropriate management responses to climate change.
6. Coordinate with other elements of the natural resources program.
7. Ensure fire management activities are conducted outside of the avian breeding season.
8. Ensure feral cats and cat colonies are eliminated from NBC installations (CNO Policy Letter dated January 10, 2002).
9. Coordinate trails and hunting management through landowners (VID, U.S. Forest Service, and BLM).

Willow Flycatcher

The Willow Flycatcher is a rare migrant or summer visitor to RTSWS. The only sightings of this species in RTSWS during the December 2005 to September 2006 surveys occurred in June and September, 2006. In June, one individual was observed along the west fork of San Luis Rey River just above the gauging station; and another was observed along the west fork of the San Luis Rey River, just south of the road ford. The site of a Willow Flycatcher's main colony along the San Luis Rey River, just downstream of Lake Henshaw, is only 5–6 kilometers (3–4 miles) south of the site of these observations. In September, a juvenile was observed along the east fork of the San Luis Rey River, just upstream of Highway 79, and another juvenile was at the pond near the southeast corner of RTSWS. The date is typical for fall migrants of *E. t. brewsteri* (U.S. Navy 2007).

Specific Concerns

- Climate change (e.g., changes in temperature or sea level rise) and associated impacts (e.g., changes in food resources);
- Nest parasitism;
- Habitat modification due to facilities maintenance (e.g., landscape modifications, invasive species, and noise);
- Impacts from other uses including recreation and hunting;
- Other elements from natural resources program (e.g., revegetation and invasive plant control);
- Predation. Assumed threat but needs to be investigated further;
- Invasive species within riparian habitat;
- Threats to birds on wintering grounds and
- Wildland fires.

Current Management

No specific management measures have been written for this species. Adherence to existing general management measures, including management measures designed to protect wetlands and control invasive plants/weeds, will minimize any adverse impacts to the state endangered Willow Flycatcher and their habitat within the RTSWS.

Management Objective and Strategy

Objective: Maintain suitable habitat for the Willow Flycatcher on RTSWS.

Strategies:

1. Implement site approval process and NEPA to avoid and minimize impacts to riparian habitat.
2. Control invasive species.
3. Enhance habitat through revegetation projects.
4. Investigate and consider control of Brown-headed Cowbirds to decrease nest parasitism.
5. Survey for species at least every 3 years using USFWS protocol. If nesting confirmed, include nest and territory monitoring, if feasible.

6. Coordinate trails and hunting management through VID and US Forest Service.
7. Coordinate with regional recovery efforts and working groups to determine appropriate management responses to climate change.
8. Work with regional recovery groups to address threats on wintering grounds.
9. Determine presence/absence within suitable habitat.
10. Coordinate with other elements of the natural resources program.
11. Rank habitat as having a high value at risk under the fire management plan.

Other Special Status Species with General Management

In addition to special status species detected during the periodic natural resources surveys, several other special status species have been observed and are known to occur on RTSWS (see **Table 9-5** for a complete list). No focused management or surveys currently take place on RTSWS for these other special status bird species.

Specific Concerns

- Habitat loss resulting from urban development and habitat fragmentation;
- Invasive species encroaching on native species habitats and federally protected species;
- Habitat loss due to either anthropogenic or natural causes;
- Erosion and sedimentation from either anthropogenic or natural causes;
- Fire;
- Climate change (e.g., changes in temperature or sea level rise) and
- Predation.

Current Management

General mitigation measures have been designed to maintain the integrity of the natural landscape and vegetation within the area of the RTSWS and to avoid, minimize or reduce any impacts that might occur to biological resources on RTSWS. These management and conservation measures were designed to avoid or reduce the chance of such negative impacts occurring to the point where the likelihood of such impacts would be discountable, or to reduce any potential impacts to the point where they would be less than significant to the resource, or individual species or their habitats. A complete list of general mitigation measures can be found in the *Remote Training Site Warner Springs, Environmental Assessment, Final May 2010.*

Management Objective and Strategy

Objective: Minimize the potential for adverse effects on special status species and their associated ecosystems while protecting the operational functionality of the installation mission by using an ecosystem-based management approach.

Strategies:

1. Investigate the need for implementing research projects to understand ecological requirements of special status species.
2. Continue use of the established NBC Environmental Review process to identify actions that result in adverse effects on special status species or their habitats.

3. Coordinate with the proponent to ensure NEPA and other regulatory requirements are met to reduce adverse effects.
4. Review and update species lists and constraints maps to reflect presence of threatened, endangered, and other special status species.
5. Conduct regular surveys for threatened, endangered, and candidate species that may be present on RTSWS.
6. Continue monitoring special status species as described in this INRMP and adapt monitoring and management actions as needed. Use monitoring information and other information to guide adaptive management.
7. Work with stakeholders to develop appropriate habitat goals and management actions to achieve those goals and establish success criteria and reporting requirements.
8. Augment education program currently conducted at RTSWS for military personnel who might have contact with sensitive species or their habitats.
9. Initiate habitat improvement projects to conserve biodiversity and protect plant and animal habitats.
10. Implement erosion control BMPs to ensure adverse environmental impacts to sensitive habitat do not occur.
11. Revegetate with native species included on the NBC recommended plant list. Include sensitive plant species in the NBC recommended plant list.
12. Periodically review the natural resources management program to ensure that management actions do not adversely impact special status species habitat.
13. Maintain accurate, usable, and informative GIS data for ease in management planning and documentation.
14. Continue to protect existing native plant communities whenever possible.

9.2.6 Invasive Species Management

Invasive species management is a large part of pest management activities. The Federal Noxious Weed Act and EO 13112 require Federal agencies to control noxious and invasive species on Federal lands. The Federal Noxious Weed Act, enacted January 3, 1975, established a Federal program to control the introduction and spread of foreign noxious weeds into the United States. Amendments in 1990 established management programs for undesirable plants (including noxious weeds) on Federal lands. There are several plant species that are considered noxious and control is mandatory for those found on the Federal list. EO 13112 requires that Federal agencies prevent the introduction of invasive species, detect and control populations of invasive species, and restore native species and habitat conditions in ecosystems that have been invaded. Invasive species are alien species (not native to the ecosystem) whose introduction does, or is likely to, cause economic or environmental harm, or harm to human health. All of the invasive weeds listed on the Federal list are not necessarily found at RTSWS.

The California Wildlife Action Plan has identified the growth and spread of floral and faunal invasive species in the state as a major concern to maintaining biodiversity in the state (CDFG 2007). As a result, natural resources personnel on RTSWS ensure that invasive species are not introduced on the installation, and have developed a program to control the spread of and the eradication of existing infestations of invasive species.

Problems associated with invasive non-native plants and animals are currently being addressed at many different levels in California, within the constraints of budgets and staffing resources. Examples include the California Invasive Plant Council (Cal-IPC) which coordinates activities addressing noxious weeds within the state. The NRCS also has a role in coordinating an aggressive state/Federal/private effort to eradicate, or at least stop, the spread of invasive species.

Both tamarisk, also known as salt cedar, and pampas grass (*Cortaderia jubata*) are invasive plant species that occur in riparian or wet areas within RTSWS. Tamarisk spreads downstream and can alter hydrological regimes that federally listed species depend upon. For the arroyo toad, tamarisk can densify riparian vegetation, making it difficult for the toads to move around and reducing the amount of open surface water for breeding and younger life stages. For species that prefer willows such as the Least Bell's Vireo, tamarisk can replace willow stands and thus degrade habitat values. The current level of tamarisk and pampas grass in RTSWS is low, and at their current level would be expected to require less than 5 days of effort by an eradication team to remove (U.S. Navy 2007). It is recommended that a removal effort be contracted for as soon as possible. Methods for controlling tamarisk should be modeled after the successes already achieved in southern California. The San Luis Rey Weed Management Area is a primary source of information, as well as University of California Cooperative Extension (U.S. Navy 2007).

Biological surveys conducted in 2006 at RTSWS documented the presence of non-native bullfrog adults and tadpoles (*Rana catesbeiana*) along the West Fork of the San Luis Rey River. Bullfrogs are common on RTSWS around open water and these species are a highly undesirable predator of many native reptiles and amphibians among other species. The reduction and control of bullfrogs through take pursuant to the CDFW permit is considered to be desirable (U.S. Navy 2007). Bullfrog control was initiated in 2009 and is discussed further below.

All installation pest management activity is coordinated by the installation Integrated Pest Management (IPM) Coordinator. Pesticides to be applied on the installation must be approved by the regional pest management consultant and included in the installation pesticide/herbicides authorized use list. All pesticides/herbicides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager. Neither herbicide nor pesticide application is permitted on Cleveland National Forest lands. Chemical and manual exotic and invasive species treatments are required to be entered in the NAVFAC Online Pesticide Reporting System.

Specific Concerns

- Anthropogenic disturbances (e.g., foot traffic) can be a potential source of invasive species;
- Landscaping on and off the installation;
- Rapid spread of invasive non-native plants that displace native species and degrade habitat for native floral and faunal species and
- Climate change (e.g., changes in temperature or sea level rise).

Current Management

RTSWS has developed a program to monitor and control the spread of existing infestations of invasive species, and to determine if new species populations have become established that complies with USFS and BLM agreements. Assessments of invasive species populations are conducted annually during the rainy season to determine extent of invasive species populations on RTSWS. Once assessed, species are prioritized for treatment based on the extent of the infestation, and where the populations are located

(e.g., next to listed species habitat). RTSWS is actively monitoring for and controlling invasive species; however, there is no formal plan in place to ensure that control activities employed by RTSWS are consistent and effective. In 2009 the Navy began a bullfrog monitoring and removal program at the West Fork of the San Luis Rey River. In 2010 eradication of bullfrogs, metamorphs, and large tadpoles was conducted using high velocity pellet guns, netting, and trapping. In total 38 adults, 84 metamorphs and 185 tadpoles were removed during the 2010 removal treatments.

Adherence to existing general management and conservation measures and the conservation measures and terms and conditions outlined in the BO issued by USFWS on October 30, 2009 will minimize adverse impacts on habitat within RTSWS. The following conservation measures and terms and conditions to minimize the impact of incidental take anticipated by Navy activities were recommended by the USFWS:

1. Methods for controlling tamarisk (*Tamarix ramosissima*) and pampas grass (*Cortaderia jubata*) will be modeled after the currently successful methods in southern California. The proposed treatment method(s) will be approved by the landowner prior to implementation. The Navy will also consult with the Service if the work may affect federally listed species.
2. Control and removal of non-native bullfrogs (*Rana catesbeiana*) from riparian and wetland areas will be requested for funding.

Management Objective and Strategy

Introduction and Spread of Invasive Species

Objective: Minimize non-native species encroachment in areas where severe to moderate encroachment occurs, and in new areas of encroachment where infestation might be spreading but is not yet severe.

Strategies:

1. Annually review and update NBC recommended plant list.
2. Develop and implement an Invasive Species Management Plan to control the spread of invasive species on RTSWS. The plan should include specific prescriptions to evaluate individual invasive species, to identify targeted species, to control further spread of targeted species, and to develop and implement a program to monitor species abundance.
3. Conduct annual surveys to determine whether controls on existing infestations of species have been effective, and whether new populations have become established.
4. Develop and implement a review process for all projects that include a landscaping component to ensure non-native species are not introduced.
5. Coordinate with the Natural History Museum to identify unknown species that may be invasive.
6. Develop outreach and education materials for distribution within the RTSWS community.

Early Detection and Rapid Response

Objective: Enhance current early detection and rapid response management capabilities.

Strategies:

1. Ensure the bio-security plan establishes early detection protocol and rapid response options, to include the following:

   a. Establish adequate monitoring locations to detect invasive species introduction and spread.
   b. Develop a communication network as a rapid response tool to quarantine specific invaders and identify the pathway.
   c. Support rapid response by determining funding sources, contract vehicles, and cooperative mechanisms that can be accessed quickly.
   d. Prepare Instructions that include measures to prevent the introduction of invasive non-native species, detect early and respond rapidly to new introductions, and control and monitor established populations.
2. Prepare educational materials for RTSWS military and civilian employees, contractors, and other visitors as a tool in early detection of non-native terrestrial species.

Project Planning

Objective: Ensure control and management of invasive species is included in project planning and maintenance projects.

Strategies:

1. Address non-native species in NEPA and other ground disturbing project plans.
   a. Ensure funding is secured for non-native removal during all phases (including post-project), if applicable.
   b. Monitor projects to ensure personnel are following BMPs, conservation measures, and other guidelines and requirements.
2. Manage roads, access routes, and new construction sites to minimize the spread of invasive non-native species and ensure that road or access routes are not created without authorization and project review approval.
   a. Require that maintenance or repair of existing roads stay within established footprints.
   b. Clean roadside mowing equipment of adhering dirt and vegetation between mowing cycles.
   c. Schedule roadside mowing to minimize weedy species seed distribution.
3. If applicable, project proponent must include invasive species treatments and revegetation of temporarily disturbed areas in project description.
4. Wash vehicles and personnel boots, bags, and clothes before coming on site; before moving to a different site on bases, as applicable; and before leaving base, as applicable. Implement standard operating procedures to ensure personnel are following guidelines.

Coordination with Regional Agencies

Objective: Promote cooperative interagency efforts to collect and analyze comprehensive monitoring data, including shared funding and staffing.

Strategies:

1. Coordinate with regional and local agencies on efforts undertaken by RTSWS to control the spread of invasive and exotic species.

9.2.7 Grounds and Landscape Maintenance

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat. Planting windbreaks around buildings and parking areas, establishing wildflower areas, and reducing mowing are all ways to spend dollars more wisely, educate the public about the benefits of reduced maintenance, and become better stewards of the environment. In managing natural resources in the cantonment area, RTSWS acknowledges its responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (1994). The memorandum's requirements include the following:

- Using regionally native plants for landscaping;
- Using construction practices that minimize adverse effects on the natural habitat;
- Reducing pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- Implementing water-efficient practices and
- Creating demonstrations of these practices to promote their use elsewhere.

Landscaping opportunities exist throughout NBC in association with administration buildings, training facilities, recreational areas, and housing. Normal grounds maintenance operations focus on lawn care, drainage ditch maintenance, road maintenance, landscaping maintenance, and pest management.

Specific Concerns

- Water use conservation requirements

Current Management

The installation's representative biologist and NAVFAC SW landscape architect monitor landscaping and grounds projects to ensure that all projects follow the guidance contained in the NBC recommended plant list (see **Appendix H**). This guidance includes:

1. Landscape designs and plant lists shall be reviewed and approved by the Installation Botanist, Installation Wildlife Biologist, and NAVFAC Landscape Architect in the planning stages of project design.
2. Ensuring that projects comply with the most recent version of the landscaping plant list.
3. It is vital that coordination with the Navy points of contact listed above occur early in the planning process to determine site-specific needs and constraints. Please note that not all species on this list are appropriate for all settings. For example, in some areas trees may not be approved due to the presence of federally listed species.
4. Additional species may be included in the landscape design contingent upon the approval of the Navy points of contact listed above. All plants shall be verified for availability in size and quantities needed for each project prior to specifying on plans or scopes of work.

5. The list is updated periodically. Prior to initiating a project, please obtain the most recent list from either of the Navy points of contact listed above.

In addition, landscaping guidelines were developed for RTSWS in January 2011. Specific guidelines for landscape management at RTSWS include the following (U.S. Navy 2011i):

1. Landscaping will not interfere in military activities and will be designed to prevent blocking the "line of site" around the perimeters of the facility.
2. Utilizing indigenous species that are appropriate for the site being landscaped.
3. Do not use non-native invasive species.
4. Utilize drought tolerant native species.
5. Utilize species that will provide soil stabilization, particularly on slopes.
6. Incorporate appropriate management strategies to allow for reduced water, pesticide and herbicide use.
7. Utilize evergreen species to provide year round structure and annual and perennial subshrubs and shrubs to provide color.
8. Maintenance needs of individual species should be taken into account when designing a landscape to ensure plants grouped together have similar maintenance needs.

Management Objective and Strategy

Objectives: Maintain an aesthetically pleasing landscape on RTSWS that preserves natural ecosystem functions, conserves water in landscaped areas, and promotes pollinator species.

Strategies:

1. Provide professional advice to assist the grounds landscaping and maintenance program in the use of native species as identified in the NBC recommended plant list.
2. Maintain and annually update the list of recommended plants that can be used in landscaping.
3. Develop and implement BMPs for grounds maintenance at RTSWS (e.g., water conservation). Periodically review the Landscape Management Plan to ensure plan BMPs still meet installation needs.
4. Restore native plant communities and collect seeds of native species for submittal to Natural History Museum.
5. Develop monitoring metrics, and set targets to ensure management strategies are meeting goals and objectives.

9.2.8 Pest Management

Authority for pest management activities on RTSWS is directed under the Federal Insecticide, Fungicide and Rodenticide Act as amended (7 U.S.C. 136r-1), DoD Instruction 4150.07, SDMAI IPMP, December 2009, and OPNAVINST 6250.4C, Pest Management Programs, OPNAVINST 5090.1C CH-1, Chapter 17. IPM is a sustainable approach that incorporates the use of multiple techniques to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control might be an option used in conjunction with other methods. IPM strategies depend on surveillance to

establish the need for control and to monitor the effectiveness of management efforts. DoD Instruction 4150.07 establishes annual goals, or measures of merit, for IPM that include the following:

- All DoD installations will have current pest management plans;
- Maintain the 55 percent pesticide use reduction achieved from 1993-2003 (in pounds of active ingredient) and
- All installation DoD and contract pesticide applicators will be appropriately certified or licensed.

In addition, OPNAVINST 6250.4C directs the Navy and Marine Corps to (DoN 2012):

a. Prevent pests from adversely affecting military operations and missions.
b. Safeguard human health and morale by controlling pests that transmit diseases, annoy personnel, or represent a hazard to public health or safety.
c. Maintain and extend the service life of facilities, structures, and materiel by preventing economic pest damage.
d. Enhance the natural environment through the careful protection and management of ecosystems, endangered and threatened species, wildlife, watersheds and water quality in order to maintain optimal biodiversity.
e. Ensure pesticide use is safe and consistent with label directions.
f. Use the principles of IPM to avoid and minimize the use of pesticides when nonchemical alternatives are available and cost effective.
g. Comply with quarantine laws and regulations as related to protecting plants, animals and human health.
h. Comply with laws and regulations concerning pesticide storage, application, disposal of hazardous wastes, and transport of hazardous materials and substances.
i. Damage to riparian areas and the habitats of rare and endangered species [including arroyo toad (*Anaxyrus californicus*) and Stephens' kangaroo rat (*Dipidomys stephensi*)] by the foraging habits of newly introduced feral pig (*Sus scrofa*) (Pers. Comm. D.A. Smith 2013).

Specific Concerns

- Water use conservation requirements and
- Overuse of fertilizers.

Current Management

The 2009 IPMP for SDMAI, which includes RTSWS, describes pest management requirements, identifies pests for SDMAI, outlines roles and responsibility for IPM at each SDMAI, outlines procedures for pest control at each facility, and describes the administrative, safety, and environmental requirements of the program. Specific aspects of the program include pest identification, pesticide management (includes storage, transportation, and use and disposal), environmental health and safety, emergency pest management, and available program resources (U.S. Navy 2009a). All installation pest management activity is coordinated by the installation IPM Coordinator. Pesticides to be applied on the installation must be approved by the regional NAVFAC pest management consultant and included in the installation pesticide authorized use list. All pesticides that are to be applied to natural areas should also be reviewed and approved by the natural resources manager.

Threatened, endangered, or candidate species can be directly or indirectly affected by pest control activities. The following pest management operations require natural resource manager review:

- Weed and outdoor pest control in endangered/threatened species habitats and natural areas;
- Outdoor large area insecticide fogging;
- Pesticide applications to, over or adjacent to water bodies, waterways, or wetlands;
- Installation of bird barriers, exclusion devices, or repelling devices;
- Wildlife and feral animal control;
- Invasive species control and
- Pesticide and herbicide application on Cleveland National Forest lands.

Natural resources managers will obtain any necessary approvals, consultations, or permits. No pest management activities will violate the practices described for threatened, endangered, or candidate species by the California Department of Pesticide Regulation. RTSWS will use the California Department of Pesticide Regulation Endangered Species Project website (*http://www.cdpr.ca.gov/docs/es/index.htm*) to determine the best chemicals to control pest species and their use limitation.

In addition, management of feral animals is a component of pest management at RTSWS. Feral animals, especially feral cats and dogs, pose a potential threat to public health and safety. They also pose a threat to wildlife, including federally listed species and migratory birds. Existing Navy policy included in SECNAVINST 6401.1A of 16 August 1994 regarding veterinary health services prohibits dogs, cats, and other privately owned or stray animals from running free on military installations. The CNO issued a policy letter on 10 January 2002 that clarifies the application of SECNAVINST 6401-1A. An objective of the existing policy is to control feral animals in a humane manner to prevent injury or disease to Navy personnel and eliminate adverse impacts on native wildlife. The instruction requires Navy commands to institute proactive pet management procedures in order to prevent establishment of free-roaming cat and dog populations.

The 2009 SDMAI IPMP identifies a number of strategies to conduct pest management at Navy installations in the San Diego Metro area.

Management Objective and Strategy

Implementation of the Pest Management Plan

Objective: Ensure compliance with environmental legislation, regulations, and guidelines.

Strategies:

1. Update the SDMAI as necessary to ensure that the plan reflects changes in pest populations and current management issues. Incremental updates to the plan will be conducted annually.
2. Implement pest management controls from the SDMAI and other pest-related guidance and plans.
3. Conduct surveys of pests that pose a potential health risk to humans or natural resources.
4. Implement the control of wildlife and the effective elimination of concentrated and diseased populations.
5. Monitor pest and invasive species populations. Track usage of pesticide active ingredients and man-hours spent controlling pest and invasive species during implementation to ensure that the management strategies are sufficient.

6. At RTSWS, populations of invasive feral pigs have begun to spread onto the property. Navy natural resources staff should work in coordination with the landowners to support the control and removal efforts that are currently underway in San Diego County.

Management of Feral Animals

Objective:

Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to preclude establishment of feral cat and dog populations. The Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW P11101.43E) outlines the following measures for each installation:

Strategies:

1. Develop and implement a program to control feral animals on RTSWS. Control populations of feral animals on RTSWS.
2. Conduct surveys when appropriate to determine impact of feral animals on native species on RTSWS.
3. Installation residents should keep and feed pet animals indoors and under close supervision.
4. Support programs to neuter or spay animals before they reach reproductive age.
5. Require routine vaccinations for rabies and other diseases.
6. Require microchipping registration of all pets brought onto installations.
7. Prohibit the feeding of feral animals on the installation.
8. Provide educational materials to pet owners regarding installation regulations and general pet management.
9. Comply with all humane and animal control regulations at the Federal, state, and local level.

9.2.9 Outdoor Recreation and Public Access

RTSWS provides some outdoor recreation opportunities for military personnel and their families, and DoD civilian employees. Recreational use of natural resources is an integral part of ecosystem management. The outdoor recreation program is based on providing quality experiences while sustaining ecosystem integrity. Among the outdoor recreation activities available are hunting and hiking, which are offered to the public by VID, USFS, and BLM in specific locations on RTSWS.

Specific Concerns

- Overuse of recreational areas on RTSWS.

Current Management

The outdoor recreation activities available to the public at RTSWS include a hunting and hiking. In addition, recreational access should be compliant with the requirements associated with the provisions of the American with Disabilities Act of 1990 as amended and the Disabled Sportsman Access Act as amended.

Management Objective and Strategy

Objective: Provide quality outdoor recreation experiences while sustaining ecosystem integrity, and not conflicting with mission priorities.

Strategies:

1. Continue to limit public access and outdoor recreation for reasons that include general security and liability issues, the presence of federally endangered and threatened species, and fire safety.
2. Develop an outdoor recreation plan for RTSWS. Identify and evaluate suitable outdoor recreation opportunities for installation personnel in undeveloped areas that do not contain or have the potential to impact sensitive species.
3. Develop and distribute outreach and education materials for recreational users of RTSWS.

9.2.10 Law Enforcement of Natural Resources Laws and Regulations

The Navy has an interagency cooperation between the San Diego County Sherriff Department, California Highway Patrol, U.S. Border Patrol and USFWS law enforcement to enforce natural resource laws. There are no Navy security personnel stationed at RTSWS.

Specific Concerns

- Unauthorized access or activities in natural areas, or areas used by nesting birds or marine mammals, may disrupt and limit the viability of native populations or habitats.
- Gaps in communication between NBC Environmental Division and NBC RTSWS Force related to enforcement of closure areas or other areas requiring special protection could result in mismanagement of natural resources, or non-compliance with Federal environmental regulations.

Current Management

Law enforcement is provided by the San Diego Sheriff's Department. If there is a problem, the installation will contact the local sheriff's office or dial 9-1-1. Their local office is located in Shelter Valley about 30 minutes away from RTSWS, and they have three officers that work out of that office. The RTSWS Quarterdeck watch makes one round of the SERE course a day during non-class days. California Department of Fish and Wildlife Law Enforcement can also respond if needed, however, it could take several hours for them to respond. RTSWS has established the following objectives for enforcement: (1) Enforce laws and regulations pertaining to the implementation of the natural resources program; (2) Integrate natural resources enforcement into the overall natural resources program; and (3) Use enforcement personnel to enhance the natural resources program at RTSWS.

There are no game wardens stationed at RTSWS. The DoD police have the authority of the Commander (exclusive jurisdiction) and of the Sikes Act to enforce all Federal laws relating to the management of natural resources at RTSWS, including the ESA, CWA, and MBTA.

Management Objective and Strategy

Objective: Ensure compliance with state and Federal natural resources laws and regulations.

Strategies:

1. Provide training to personnel responsible for enforcement of applicable laws and regulations.
2. Continue to protect special status species and their natural communities.
3. Cooperate with other agencies, particularly the USFWS and CDFW, to ensure that natural resources laws are adequately enforced.
4. Periodically review Federal and state laws and regulations to ensure natural resources laws and regulations are adequately enforced.

9.2.11 Environmental Awareness and Outreach

Conservation Awareness

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The NBC approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about the unique and valuable natural resources on the installation, the more responsibly they act toward using them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Activities such as fish stocking, land rehabilitation, and wildfire suppression can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public support these easily understood efforts. However, such issues as protection of sensitive areas for little known plant and wildlife species, prescribed burning, and permit fees and their uses require effective conservation communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

Specific Concerns

- Communication about the natural resources of NBC, environmental regulations, and protocols for situations where wildlife is trapped or injured, or birds are nesting or roosting in unwanted areas, may not be effectively conveyed due to staff turnover.

Current Management

The Sikes Act requires each military service to support environmental education for personnel and for the public where and when it is compatible with military safety and security needs. Natural resources personnel work with volunteers, whenever feasible, to use their skills and build their interest in the installation natural resources program. The conservation effort on site will continue to expand as this INRMP and subsequent natural resource management programs are undertaken to ensure efficient and thorough management of the natural resources on base.

Management Objective and Strategy

9.2.11.1 Education

Objective: Provide people on the installation and in the surrounding community with an understanding of the RTSWS natural resources program. Promote environmental stewardship through training and awareness.

Strategies:

1. Provide decision makers with the information they need to make educated decisions about installation natural resources.
2. Provide general conservation education to the RTSWS community, including the means to attend training.
3. Periodically review outreach and education materials to ensure that each is still current and meeting the goals of the outreach and education program.
4. Reach out to local community groups for volunteers.
5. Establish a watchable wildlife program.
6. Educate the local community, as well as installation personnel and tenants, about the installation natural resources program. Develop and distribute educational materials about the RTSWS natural resources program to stakeholders near RTSWS (e.g., BLM, VID, and the U.S. Forest Service).

9.2.12 Geographic Information Systems (GIS) Management, Data Integration, Access and Reporting

GIS is a computer system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface. GIS is used to create information layers used to develop and manipulate maps. GIS data are represented as different layers each containing data on a particular kind of feature (e.g., soils, wetlands, roads) from surveys, inventories, and other projects with spatial information. Each feature is linked to a position on the graphical image of a map. The data layers are organized to create maps and to perform statistical analysis.

GIS will also provide support for the entire environmental program and the training community. NBC will use GIS for complex analyses such as project siting, data interpolations, and risk assessments.

GIS software enables installation staff to capture, store, update, manipulate, analyze, and display all forms of geographically referenced data and tabular information about NBC. The management of reports in one central database enables users to quickly respond to data calls and identify gaps in natural resources management. The training of the NBC Environmental, Facilities Management, and Training staff and the allocation of their time to data entry, mapmaking, analysis of data, and interpretation of the results will determine the success of the installation GIS.

Once fully developed, the installation central databases can be used for the following:

- Providing maps;
- Selecting suitable areas for construction activities;
- Planning land rehabilitation projects;
- Providing special maps for Environmental Awareness materials;
- Ensuring avoidance of cultural resources during ground-disturbing projects;
- Ensuring avoidance of rare species habitats and other areas of special concern during construction projects;
- Identifying site options for use during NEPA evaluation of alternative sites;

- Calculating drainages and water flows;
- Determining Neotropical bird habitat preferences and
- Reviewing natural resources contractor deliverables.

Specific Concerns

- GIS maps and shapefiles may not have appropriate metadata that identifies who, when, and for what purposes the data were collected and
- Natural resource management decisions could be misguided if there are information gaps in the natural resources database, or if the database is not kept current.

Current Management

Currently, there is no central repository for GIS data and reports, research, and other documentation. GIS data is submitted to Navy Assessment Management or the GIS IDIQ contractor. CNIC and NAVFAC guidance on metadata is being developed, but has not yet been finalized.

Management Objective and Strategy

Objective: Collect, store, develop, and maintain data about historical conditions, trends, and current status for critical indicators of ecological integrity and sustainability.

Strategies:

1. Use GIS and other natural resources data as benchmarks for developing future natural resources management goals and objectives.
2. Ensure that central database information is available to biologists, planners, contractors, and others in a quick and timely manner.
3. Annually review GIS data to advise resource managers of needs to update data sets during budget planning and programming.
4. Develop specific language that will be included in all contracts to ensure all spatial data produced are fully compatible with the installation GIS database.
5. Develop a standardized system for recording and mapping significant resource observations (e.g., plants, wildlife, erosion, damage) when incidentally encountered.
6. Provide annual funding for one person to be responsible for updating and maintaining the GIS database. This should include the necessary hardware, software, and training for the use of GIS.
7. Deliver all reports and other GIS data and incorporate it into the Navy GIS database. GIS will be delivered to land owners as appropriate.

10. Naval Base Coronado Off Base Housing Areas

10.1 Current Condition of Natural Resources

Due to the lack of a variety of natural resources on the Holly Square and Lofgren housing areas the following natural resource management areas are not covered in this section; habitat management, wetlands and floodplains management, wildland fires management, general fish and wildlife management, special status species management, outdoor recreation and public access management, and GIS and data management. Natural resources management at NBC strives to integrate biodiversity conservation and an ecosystem-based approach into an adaptive management framework compatible with the military mission. As a result, the natural resources program consists of multiple resource disciplines that are frequently interconnected and share similar objectives. Management projects and plans often consist of multiple program elements with several different resource experts collaborating together.

The following sections describe the current conditions of resources at each of the two housing areas managed by Naval Base Coronado (NBC), which include the housing areas at Holly Square located north of Naval Outlying Landing Field Imperial Beach (NOLF IB), and Lofgren Terrace located east of I-805 (see **Figure 10-1**).

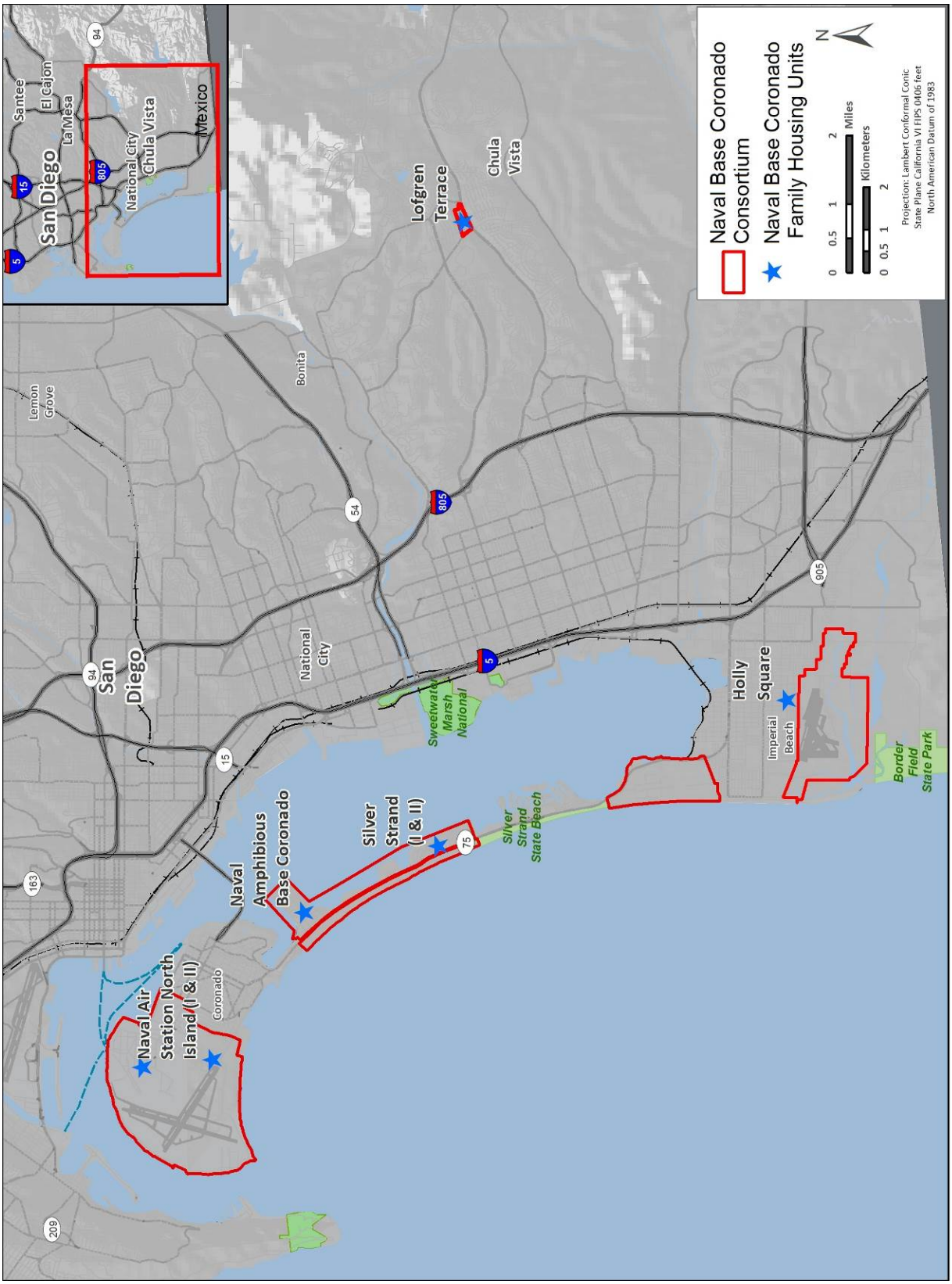
10.1.1 Holly Square Housing Area

Topography, Geology and Seismicity

San Diego County lies almost entirely within the Peninsular Ranges geomorphic province (Burns 1997) and rides atop the Pacific Plate, following a northwesterly path while grinding against the North American Plate. As a result of grinding, earthquakes and past volcanic activity, in combination with weathering processes, have largely shaped San Diego County into a geologically diverse area (U.S. Navy 2006b). Seismic structures running close by include the Rose Canyon Fault Branch, which runs north to south along the eastern side of the Silver Strand (U.S. Navy 2010c). The Rose Canyon Fault is considered the potentially most damaging fault in the area (U.S. Navy 2006b) and is believed to be capable of producing a 7.5 magnitude quake. Another major fault in the county, the Elsinore Fault, runs diagonally from the northwest to southeast across the county through Lake Henshaw. The San Jacinto Fault, further to the east and more or less paralleling the Elsinore Fault, has been the most active of San Diego County's fault zones in recent times (U.S. Navy 2010c).

The closest geologic fault to the Holly Square Housing is the Newport-Inglewood-Rose Canyon fault zone, Silver Strand section. This fault occurs over 500 meters (1,640 feet) offshore, and over 3,000 meters (9,842 feet) from the housing location (see **Figure 10-2**). The Newport-Inglewood-Rose Canyon fault zone and Silver Strand fault zone run north to south offshore. The Newport-Inglewood fault zone occurs mostly in Los Angeles and Orange Counties; it has displayed continuing activity, including a 6.3 magnitude earthquake in Long Beach in 1933. The Newport-Inglewood fault zone eventually merges with the Rose Canyon fault zone, about 64 kilometers (40 miles) northwest of the city of Oceanside (EDAW, Inc. 2002).

Holly Square is immediately north of NOLF IB, and is situated within the coastal plain of the Pacific Ocean. The installation is very flat with very little change in elevation. Lofgren Terrace sits along the northern side of Telegraph Canyon with moderate, south facing slopes with an average elevation of about 150 meters (500 feet) AMSL and fewer than 50 feet in elevation change.



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 10-1: Location of Naval Base Coronado Family Housing Units

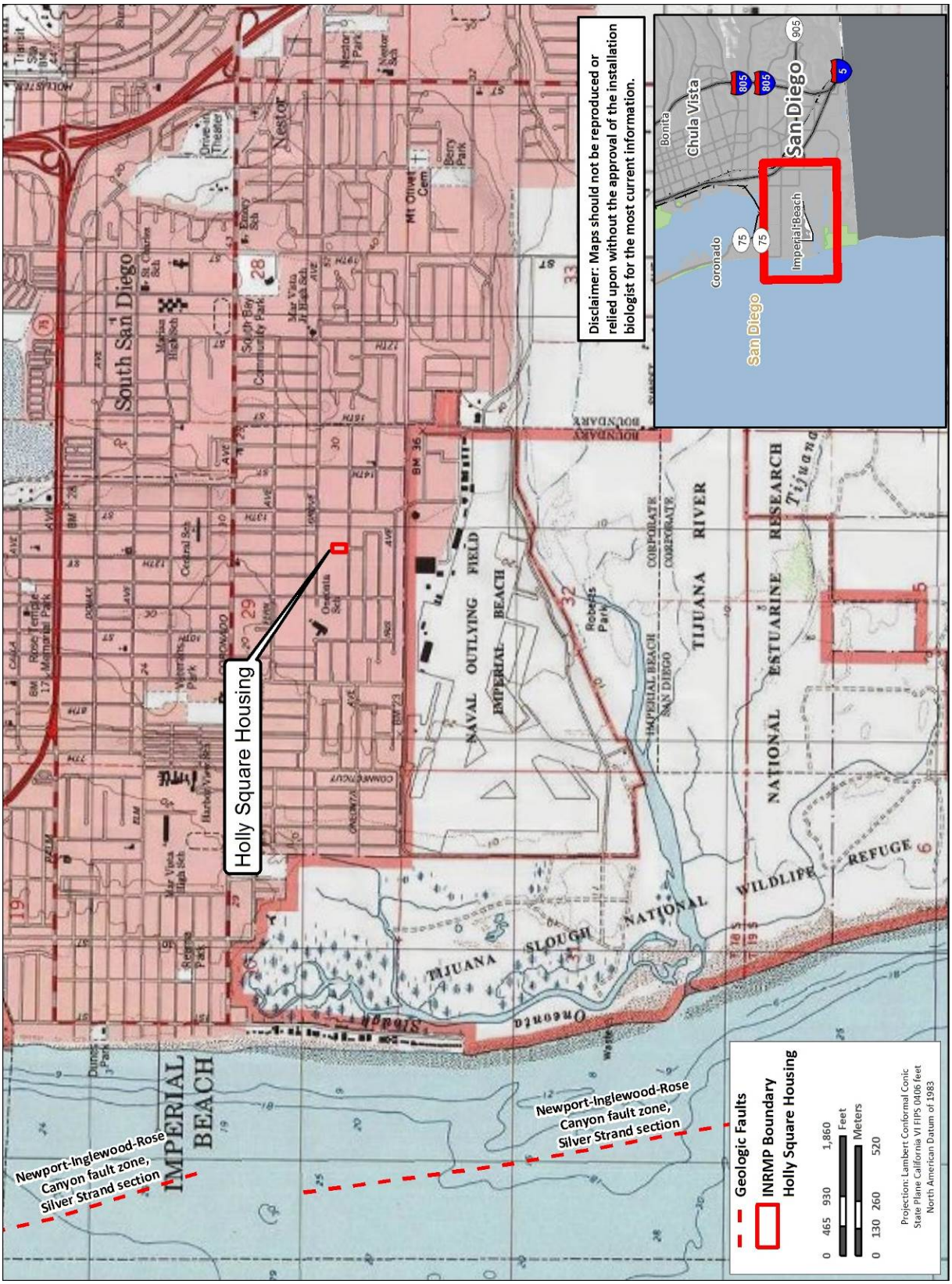


Figure 10-2: Holly Square Housing Topography and Faults

Water Resources

No surface water resources occur within the Holly Square housing area. No wetlands or other waters of the United States occur within the Holly Square housing area (U.S. Navy 2009f).

Soils

The soil type at the Holly Square housing area is Huerhuero-Urban Land Complex (HUC), which occurs on marine terraces has slopes of 2 to 9 percent (see **Figure 10-3**).

Water and Sediment Quality

All U.S. Navy facilities are subject to the statewide General Industrial Stormwater Permit. The U.S. Navy's General State Water Quality Certification was approved on November 2, 1998 (98C-127), and it is by way of compliance with such permits that water quality is managed by the U.S. Navy. Portions of San Diego Bay are on the CWA 303(d) list for impaired water bodies. In accordance with CWA Section 303, TMDLs will be established for water bodies that are listed as impaired. These are the maximum levels of pollutants that a water body can receive while continuing to maintain specific water quality criteria targets.

Terrestrial Habitat

The Holly Square housing area supports ornamental vegetation typical of residential landscaping (U.S. Navy 2009f).

Marine Habitat

The Holly Square housing area contains only upland habitat and is completely landlocked; therefore, no marine habitats occur within the housing area.

Regulatory or Habitat Planning Designation

There are no other regulatory or habitat planning designations within the Holly Square housing area.

Vegetation

The Holly Square housing area supports ornamental vegetation typical of residential landscaping and is mapped as "Developed/Ornamental" (U.S. Navy 2009f). The vegetation communities are based on the 1995 A Manual of California Vegetation which does not meet standards of the National Vegetation Classification System as required by the Federal Geographic Data Committee; therefore, they will not match the NatureServe vegetation types listed on the Navy Conservation Website.

Aquatic Vegetation

There is no aquatic flora at the Holly Square housing area.

Wildlife

The House finch was the only bird species observed within the Holly Square housing area during the 2009 natural resources inventory (U.S. Navy 2009f). No invertebrates, mammals, reptiles, or amphibians were observed within the housing area during the 2009 survey (U.S. Navy 2009f).

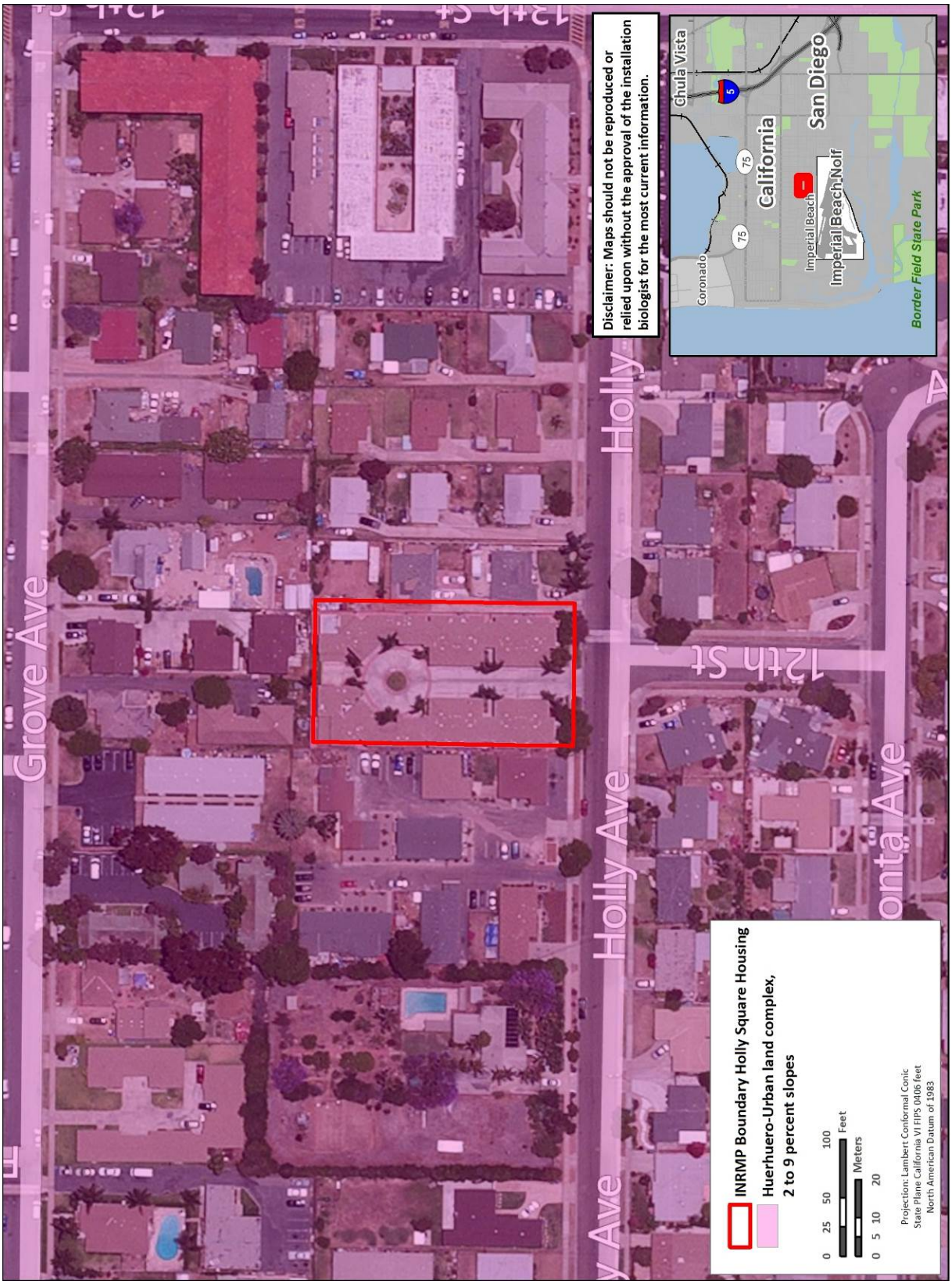


Figure 10-3: Holly Square Housing Area Soils

Special Status Species

No special status species were observed at the Holly Square housing area during the 2009 natural resources inventory (U.S. Navy 2009f).

Invasive and Exotic Species

No invasive species were identified at the Holly Square housing area during the 2009 natural resources inventory (U.S. Navy 2009f).

10.1.2 Lofgren Terrace Housing Area

Topography, Geology and Seismicity

San Diego County lies almost entirely within the Peninsular Ranges geomorphic province (Burns 1997) and rides atop the Pacific Plate, following a northwesterly path while grinding against the North American Plate. As a result of grinding, earthquakes and past volcanic activity, in combination with weathering processes, have largely shaped San Diego County into a geologically diverse area (U.S. Navy 2006b). Seismic structures running close by include the Rose Canyon Fault Branch, which runs north to south along the eastern side of the Silver Strand (U.S. Navy 2010c). The Rose Canyon Fault is considered the most potentially damaging fault in the area (U.S. Navy 2006b) and is believed to have the potential to produce a 7.5 magnitude quake. Another major fault in the county, the Elsinore Fault, runs diagonally from the northwest to southeast across the county through Lake Henshaw. The San Jacinto Fault, further to the east and more or less paralleling the Elsinore Fault, has been the most active of San Diego County's fault zones in recent times (U.S. Navy 2010c).

There is one fault zone, which branches into 3 different sections near the Lofgren Terrace. The three sections of the La Nacion fault zone occur to the west of Lofgren Terrace in over 1000 meters to the west of Discovery Park and Independent Park (see **Figure 10-4**). La Nacion fault is currently not zoned as active under the provisions of the Alquist-Priolo Earthquake Zoning Act; however, there is evidence of activity in late Pilocene time and throughout the Pleistocene epoch. A minimum age of faulting is estimated to be 13,375 years (EDAW, Inc. 2002).

Water Resources

No surface water resources occur within the Lofgren Terrace housing area. No wetlands or other waters of the United States occur within the Lofgren Terrace housing area (U.S. Navy 2009f).

Soils

Mapped soil types for Lofgren Terrace include the following (see **Figure 10-5**) (NRCS 2011):

1. ***Diablo clay (DaD).*** Approximately 80 percent of Lofgren Terrace. This soil has slopes from nine to 15 percent.
2. ***Diablo clay (DaE).*** Approximately one percent of Lofgren Terrace. This soil has slopes from 15 to 30 percent.
3. ***Diablo-urban land complex (DcD).*** Approximately four percent of Lofgren Terrace. This soil has slopes from 5 to 15 percent.
4. ***Salinas clay loam (SbC).*** Approximately 16 percent of Lofgren Terrace. This soil has slopes from tw2o to 9 percent.

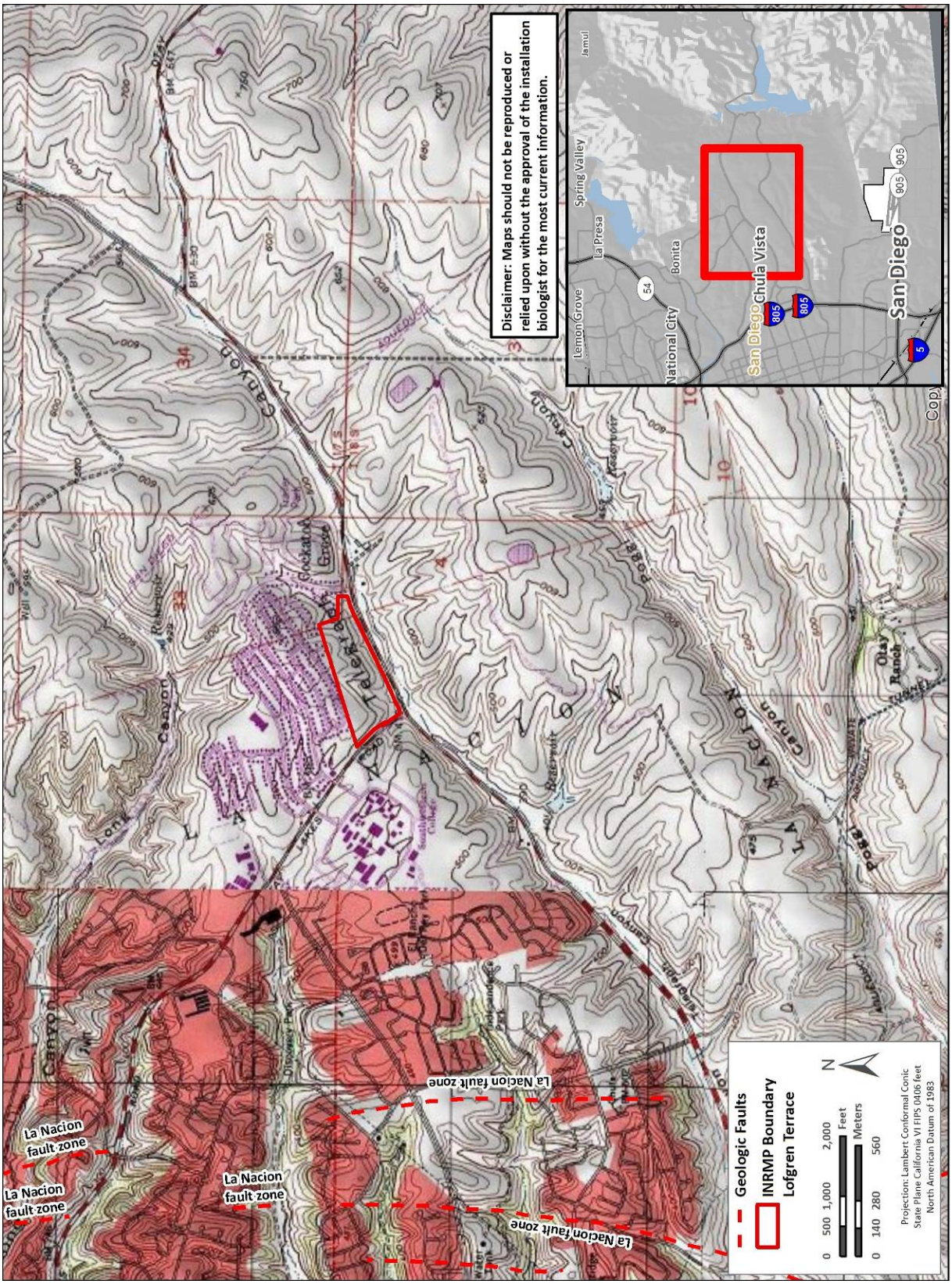


Figure 10-4: Lofgren Terrace Housing Topography and Faults

Figure 10-5: Lofgren Terrace Housing Area Soils Map

Water and Sediment Quality

All U.S. Navy facilities are subject to the statewide General Industrial Stormwater Permit. The U.S. Navy's General State Water Quality Certification was approved on November 2, 1998 (98C-127), and it is by way of compliance with such permits that water quality is managed by the U.S. Navy. Portions of San Diego Bay are on the CWA 303(d) list for impaired water bodies. In accordance with CWA Section 303, TMDLs will be established for water bodies that are listed as impaired. These are the maximum levels of pollutants that a water body can receive while continuing to maintain specific water quality criteria targets. There are five sites around San Diego Bay that are considered by the Regional Water Quality Control Board (RWQCB) to be "toxic hot spots," none of which are associated with NBC (RWQCB 2010).

Terrestrial Habitat

Lofgren Terrace supports ornamental vegetation typical of residential landscaping and is mapped as Developed/Ornamental. In addition to the ornamental landscaping, the southeastern section of Lofgren Terrace comprises mostly invasive, disturbance-related species, such as bromes, eucalyptus trees, fountain grass (*Pennisetum setaceum*), sweetclover (*Melilotus* sp.), and short pod mustard (*Hirschfeldia incana*) (U.S. Navy 2009f).

Marine Habitat

The Lofgren Terrace housing area contains only upland habitat and is completely landlocked; therefore, no marine habitats occur within the housing area.

Regulatory or Habitat Planning Designation

There are no other regulatory or habitat planning designations within the Lofgren Terrace housing area.

Vegetation

Lofgren Terrace supports ornamental vegetation typical of residential landscaping. In addition to the ornamental landscaping, the southeastern section of Lofgren Terrace between Miracosta Circle and Otay Lakes Road comprises mostly invasive, disturbance-related species, such as bromes, eucalyptus trees, fountain grass, sweetclover, and short pod mustard (U.S. Navy 2009f). The vegetation communities are based on the 1995 A Manual of California Vegetation which does not meet standards of the National Vegetation Classification System as required by the Federal Geographic Data Committee; therefore, they will not match the NatureServe vegetation types listed on the Navy Conservation Website.

Aquatic Vegetation

There is no aquatic flora at the Lofgren Terrace housing area.

Wildlife

The American Goldfinch (*Spinus tristis salicamans*) was the only bird species observed within the Lofgren Terrace housing area during the 2009 natural resources inventory (U.S. Navy 2009f). No invertebrates, mammals or amphibians were documented within the housing area. The western fence lizard was the only reptilian species observed within the Lofgren Terrace housing area during the 2009 survey (U.S. Navy 2009f).

Special Status Species

No special status species were observed at the Lofgren Terrace housing area during the 2009 natural resources inventory (U.S. Navy 2009f).

Invasive and Exotic Species

The southeastern section of Lofgren Terrace comprises mostly invasive, disturbance-related species, such as bromes, eucalyptus trees, fountain grass, sweetclover, and short pod mustard (see **Figure 10-6**) (U.S. Navy 2009f).

10.2 Natural Resources Management Strategy

10.2.1 Natural Resources Management Goals and Objectives

The Department of the Navy (Navy) has entered into certain ground leases on Government-owned land, pursuant to the Military Housing Privatization Initiative (MHPI). The United States Congress enacted the MHPI authorities on February 10, 1996, as part of the National Defense Authorization Act for fiscal year 1996. MHPI is codified at Title 10 United States Code, Sections 2837 and 2871 *et seq*. Congress made the MHPI authorities permanent in 2004. Under the MHPI authorities, the Department of Defense can partner with the private sector to revitalize military family housing, including by conveyance or leasing of property or facilities. The Navy refers to projects undertaken under the MHPI authorities as Public/Private Venture (PPV) projects.

Pursuant to the MHPI authorities, the Navy has entered into a certain ground lease with respect to Naval Base Coronado, whereby Government-owned land is leased out to a Limited Liability Company (Lessee) for military family housing purposes. The Lessee for all Naval Base Coronado PPV projects is San Diego Family Housing, LLC (SDFH). The current, relevant ground lease for all Naval Base Coronado PPV neighborhoods is the Second Amended and Restated Real Estate Ground Lease, dated October 1, 2007, by and between the United States of America, acting through the Department of the Navy, as Lessor, and San Diego Family Housing, LLC, as Lessee. This ground lease has an end date of July 31, 2051. This ground lease covers the Coronado PPV neighborhoods addressed in this INRMP, as well as numerous other leased PPV neighborhoods throughout California and Nevada. Certain provisions of the subject ground lease are relevant to this INRMP, as they either directly or indirectly address the issue of natural resources.

Based on key provisions in the ground lease, the Lessee has several important responsibilities with regard to the leased land, pertaining to natural resources. First, it is important to note that per Lease Section 1.1, the Lessee has "exclusive use and possession" of the leased land, which includes the Coronado PPV neighborhoods. The Lessee's key responsibilities with regard to this leased land include the following: Lessee shall comply with all applicable Environmental Laws (Lease Section 11.1); Lessee is to use all reasonable means available to protect the environment and natural resources in accordance with applicable Environmental Laws (Lease Section 11.18); Lessee shall be liable for a violation of applicable Environmental Laws, for damage caused by Lessee and arising from Lessee's activities (in accordance with the Lease terms) (Lease Section 11.18); with regard to natural resource protection, Lessee shall adhere to all applicable Federal and State Laws (including, but not limited to, the Endangered Species Act and the Migratory Bird Treaty Act) (Lease Section 11.31); Lessee is subject to certain specific restrictions with regard to ground disturbing activities at specified PPV neighborhoods, including Rendova Court at NAB Coronado (Lease Section 11.31(a)); Lessee shall, at all times during the lease term and at no expense to the Government, protect, preserve, maintain and repair the premises, and keep them in good order and condition (reasonable wear and tear and damage by casualty excepted) (Lease Section 12.1); and on or before expiration of the lease term, Lessee shall surrender possession of the premises to the Government in good, clean order and repair (ordinary wear and tear excepted) (Lease Section 10.2).

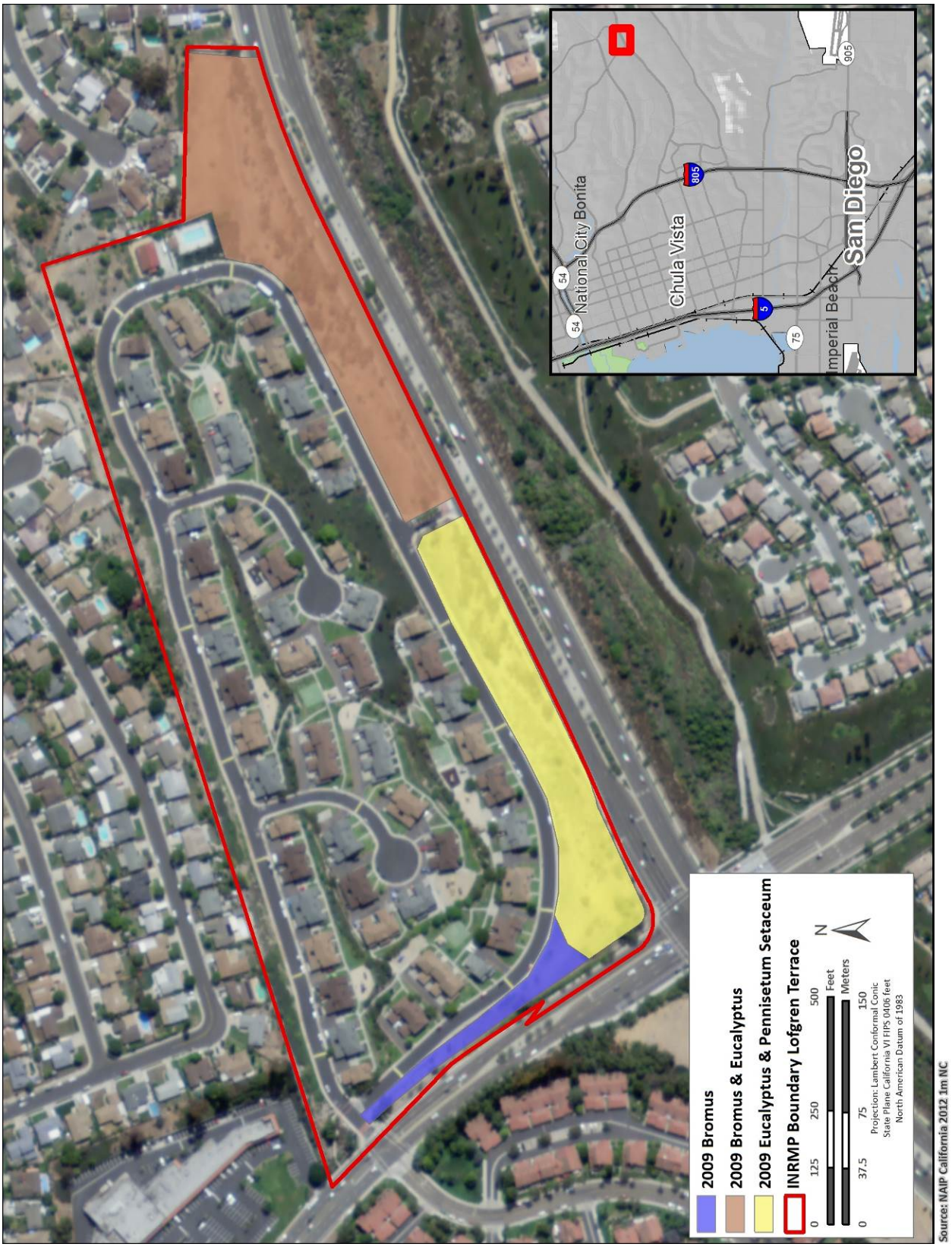


Figure 10-6: Lofgren Terrace Housing Invasive Species Locations

Accordingly, for the Coronado PPV neighborhoods, the Navy notes that the Lessee has exclusive use and possession of the leased land, and has these important responsibilities with regard to natural resources management issues. Lessee will retain these responsibilities until termination of the ground lease (lease termination date is July 31, 2051), at which time the Lessee is to surrender the leased premises to the Government (Navy) in good, clean order and repair. Thus, for natural resources issues that may arise for the Coronado PPV neighborhoods, questions should be directed to the Lessee, SDFH, in accord with the Lessee's exclusive use and possession of the leased land, and per the Lessee's responsibilities as set forth above. If appropriate, the Government will work with the Lessee, and any regulatory agency, for natural resources issues that may arise with respect to the leased land.

Overall, this INRMP provides the most current, best available maps and information regarding the PPV lease boundaries for the Coronado PPV neighborhoods. These boundaries are not completely exact, but do constitute the best, currently available information digitized from Navy Real Estate Summary Maps and SDFH (Lessee) survey drawings. The Navy Real Estate Summary Maps will be updated with official Navy-endorsed shapefiles when such shapefiles become available. In certain cases, there are discrepancies in the lines of the non-leased Navy land boundaries and the PPV lease boundaries, and those discrepancies appear to be due to land survey/GIS translation challenges. Any such discrepancies are noted where observed.

Management Objective and Strategy

Objective: Maintain coordination with the PPV Lessee to avoid and minimize impacts to sensitive natural resources.

Strategies:

1. Continue to work with the Lessee to ensure compliance with all applicable Federal and State laws.
2. Responsible pet ownership is the key to eliminating feral animal populations. Installations shall implement appropriate pet management measures to prevent establishment of feral cat and dog populations. The Handbook for Residents of Navy Region Southwest Military Family Housing (CNRSW 3 P11101.43E) outlines the following measures for each installation:
    a. Installation residents should keep and feed pet animals indoors and under close supervision.
    b. Support programs to neuter or spay animals before they reach reproductive age.
    c. Require routine vaccinations for rabies and other diseases.
    d. Require microchipping registration of all pets brought onto installations.
    e. Prohibit the feeding of feral animals on the installation.
    f. Provide educational materials to pet owners regarding installation regulations and general pet management.
    g. Never abandon animals.
    h. Comply with all humane and animal control regulations at the Federal, state, and local level.
3. Develop and distribute outreach and educational materials on migratory birds to housing residents and PPV staff.

11. Sustainability and Compatible Use

This section summarizes management strategies for the sustained use of natural resources. Landscape-level views of compatibility and sustainability are covered, to establish a tangible link between managing the natural environment and sustaining the military mission.

11.1 Sustainability of the Military Mission in the Natural Environment

Broadly speaking, sustainability takes a long-term view of natural resources stewardship, Navy mission accomplishment, social responsibility, and economic prosperity into the future. For this Integrated Natural Resources Management Plan (INRMP), the topic of sustainability encompasses:

- Achieve no net loss of the capability of the installations to support the military mission by aligning current and future land and water use (location, extent, timing, and intensity) with environmental value protection into the future, while minimizing the cost of environmental conflict resolution and mitigation;
- Resource-specific best practices, consistent with the Naval Base Coronado (NBC) plans;
- Preparations for climate change and regional growth;
- Resource use in the built environment and
- Indicators that help monitor progress toward sustainability objectives.

Specific objectives and strategies were developed to meet the goal of ensuring NBC sustains the mission while protecting natural resources at NBC. In addition, a series of strategies for implementation are presented following the objective for each item. A summary of the management strategies as well as the estimated time frame for completion is presented in **Appendix C, Tables C-1** through **C-8.**

Some of the actions described in this section will be accomplished through interactive partnerships with other Federal, state, and local organizations. Natural resources staff at NBC will initiate partnerships based on the benefits to the regional ecosystem and the local environment.

11.1.1 Integrating Military Mission and Sustainable Land Use Decisions

The mission of NBC is to provide direct day-to-day operation of installation support functions and to ensure that the installation serves the fleet and tenant commands by providing the highest level of operating support and quality of life services for all operating forces and shore activities on NBC.

NBC is well positioned to implement and demonstrate environmentally sound land use planning and development through its land planning and NEPA processes, inter-departmental coordination, adherence to U.S. Navy (Navy) guidance and regulations, and timely review and revision of base site development plans. In addition, Navy policy requires that all military construction projects meet a silver rating under the U.S. Green Building Council LEED 2.0 (Leadership in Energy and Environmental Design) Green Building Rating System (U.S. Navy 2006a).

Management Objective and Strategy

Objective: Sustain natural resources and the Navy institutional mission by enabling innovation in planning, design, project management, and implementation for development projects affecting the built environment.

Strategies:

1. Ensure Navy leadership has visibility with respect to the total cost of mission sustainment, day-to-day operations, infrastructure and building development, and redevelopment. This should incorporate climate change scenarios and the projected value of the loss of habitat associated with the decision for No Action. Natural resources asset valuation is needed to properly implement business decisions that affect resource capability (e.g., value of permitted air emissions, water quality permits, water resources availability). This is completed by identifying those natural resources assets which sustain the mission, and assessing their condition, quality, capacity, and value.
2. Continue to use a NEPA and site approval processes early in the project planning phase that includes water, air quality, engineering, and natural resources professionals.
    a. Continue the integration of Navy natural resources professionals into the sustainability planning through NEPA and site approval processes. Facilitate early, advance project review for stormwater management, landscaping, shoreline and in-water structures.
    b. Continue the integration of Navy natural resources professionals into sustainability planning.
3. Apply sustainability principles to the management of habitats, species, and ecological functions on NBC by identifying resource-specific best practices similar to what has been done for energy and water in the built environment using LEED and Low Impact Development (LID) approaches.
    a. Continue to comply with Executive Order (EO) 13123 which tasks Federal agencies with defining principles for implementing sustainable development in construction. Promote sustainable land use through avoiding the use of undeveloped land, open space, water and soil conservation areas, existing natural ecosystems, endangered species habitats, and floodplains (NAVFACINST 11010.45).
    b. Implement LID practices for protecting water quality.
    c. Use construction siting, materials, and methods that promote biotic communities to the fullest extent possible.
4. Develop sustainability indicators and best management practices (BMPs), to be incorporated into NBC planning process. Monitor effectiveness of BMPs and revise as necessary.
5. Conduct training in sustainable design criteria in the Navy for engineers, construction and design specialists, water quality specialists, and biologists. This could be web-based training.
6. Foster socially and environmentally responsible behavior through communication. Establish and promote submission for exiting sustainability leadership awards for excellence in environmental, transportation, and energy management.

11.1.2 Natural Resources Constraints and Opportunities

Proper management of natural resources on NBC, including maintaining or improving ecological conditions and capability of natural landscapes has numerous effects, including: an increased ability to support military training and readiness; an improvement in the quality of life of military personnel and their families; a streamlining of the compliance process and a reduction in conflicts; and a reduction in littering, pollution, and poaching of wildlife and vegetation by limiting access (Keystone Center 1996).

Maintaining compliance with the numerous laws, policies, and regulations that provide protection of environmental elements and guidance for management of natural and cultural resources may create

constraints to accomplishing the military mission. Some of these laws include the ESA, CWA, Rivers and Harbors Act, Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Coastal Zone Management Act (CZMA), and the National Historic Preservation Act (NHPA). Constraints may include limiting certain activities or prohibiting access to restricted areas in order to preclude damage to important cultural and natural resources.

Similarly, opportunities are areas on an installation where there is little to no restriction on training. Opportunities may include potential buffer areas and corridors, and encroachment partnering areas (U.S. Navy 2006a).

Constraints -- include known locations of federally listed and other special status species, areas preferentially managed for special status species, and areas with a regulatory driver (e.g., jurisdictional waters or migratory bird nest sites).

Opportunities -- include situations related to natural resources in which the Navy might be able to increase efficiency, reduce costs, increase the quality of projects, or otherwise enhance military mission sustainability through coordination with outside entities, internal coordination among departments on specific projects, or achieve the solution to multiple challenges through one unified approach. Constraints do not always totally prevent activities. They can often be worked around. Some constraints may be temporal, others may only constrain certain activities (e.g., digging).

Constraints and opportunities on NBC facilities are illustrated in **Figures 11-1** through **11-7**. Constraints and opportunities figures were not created for those areas lacking natural resources or natural resource constraints.

An Encroachment Action Plan (EAP) was developed for NBC in September 2010 consistent with OPNAVINST 11010.40 (*Encroachment Management Program*), and Commander, Naval Installation Command (CNIC) Instruction 11010.1 (*Encroachment Management Program*) guidance. OPNAVINST 11010.40 defines encroachment as "any non-Navy action planned or executed which inhibits, curtails or possesses the potential to impede the performance of Navy activities" (DoN 2007). The NBC EAP identifies and prioritizes specific encroachment threats and recommends strategies and actions that can be applied at the installation level to prevent or mitigate potential mission impacts (U.S. Navy 2010a).

The EAP was developed by an EAP Working Group, which included command authorities and subject matter experts, who were charged with identifying, quantifying, and recommending specific management strategies and actions to either prevent or mitigate potential impacts of encroachment on the mission capability of NBC (U.S. Navy 2010a). The resulting EAP includes a description of encroachment challenges and associated impacts for NBC facilities, including Naval Air Station North Island (NASNI), Naval Amphibious Base Coronado, Naval Outlying Landing Field Imperial Beach (NOLF IB), Silver Strand Training Complex North (SSTC-N) and Silver Strand Training Complex South (SSTC-S), San Clemente Island, Remote Training Site Warner Springs (RTSWS), Camp Michael Monsoor (CMM), and Camp Morena (CM). The NBC housing areas will be addressed in the next revision to the EAP. To address the challenges and associated impacts identified within the EAP, the plan describes the underlying issues for each challenge, analyzes the impact and severity of the issue, lists any existing mitigation, and recommends strategies and action items for minimizing or eliminating the encroachment challenge.

The EAP identified encroachment challenges and associated impacts for each of the facilities listed above. Encroachment challenges and associated issues identified for each facility, excluding San Clemente Island and the housing areas, within the EAP are included in **Table 11-1** (all encroachment challenges use nomenclature from OPNAVINST 11010.40) (U.S. Navy 2010a).

Management Objective and Strategy

Objective: Achieve no net loss of military value (i.e., achieve military mission) by aligning current and future land and water use (location, extent, timing, and intensity) with environmental value protection into the future, while minimizing the cost of environmental conflict resolution and mitigation.

Strategies:

1. Maintain and enhance existing land uses to support the mission through coordination with all NBC Navy stakeholders.
2. Locate new facilities within existing facility footprints or other previously disturbed areas to the extent practicable.
3. Review proposed new uses or alterations to existing buildings or structures, in consultation with a Navy Historian, to determine the eligibility of affected structures for the National Register of Historic Places (NRHP) contributing elements. As needed, analyze for potential impacts in accordance with guidelines established for NRHP-eligible buildings.
4. Conduct appropriate environmental surveys on any proposed new land use within an undeveloped area to identify sensitive natural and cultural resources, environmental resources, and ERP (hazardous waste cleanups).
5. Ensure compliance with statutes and regulations to protect sensitive natural and cultural resources, to maintain environmental quality and to exercise responsible stewardship of public lands.
6. Ensure the public health and safety of NBC personnel and authorized visitors by maintaining a secure military operating environment on NBC administered lands.
7. Maintain and enhance coordination and cooperation with neighboring communities, agencies, and organizations to ensure compatibility of natural resource uses with the Navy's mission.
8. Provide reasonable accommodation of compatible nonmilitary land use to the extent practicable.
9. Maintain healthy and intact habitats that self-recover from disturbance, using principles of ecosystem management and sustainability to balance short-term projects with long-term goals.
10. Address long-term threats to the stability of the natural environment including but not limited to soil erosion, invasive exotic species, climate change, sea level rise, and habitat fragmentation.
    a. Use ecosite planning (based on soils and vegetation classified by USDA Natural Resources Conservation Service [NRCS] for soil surveys), where available, to assess the condition of habitats.
    b. Avoid the proliferation of roads.
    c. Avoid and minimize road or traffic characteristics that promote plant invasions, or result in significant habitat fragmentation for animals.
11. Continue to use NEPA documentation, including cumulative effects analysis, to guide specific projects and document choices.
12. Ensure the Commanding Officer's (CO's) preparedness to answer as part of the INRMP metrics review the following questions:
    a. Does the natural resources team consult with operators when making changes to the INRMP in order to keep it current? Coordination examples include: maps, signage, pamphlets, other communications, orientations, meetings, training, etc.

Figure 11-1: Naval Air Station North Island Natural Resources Constraints

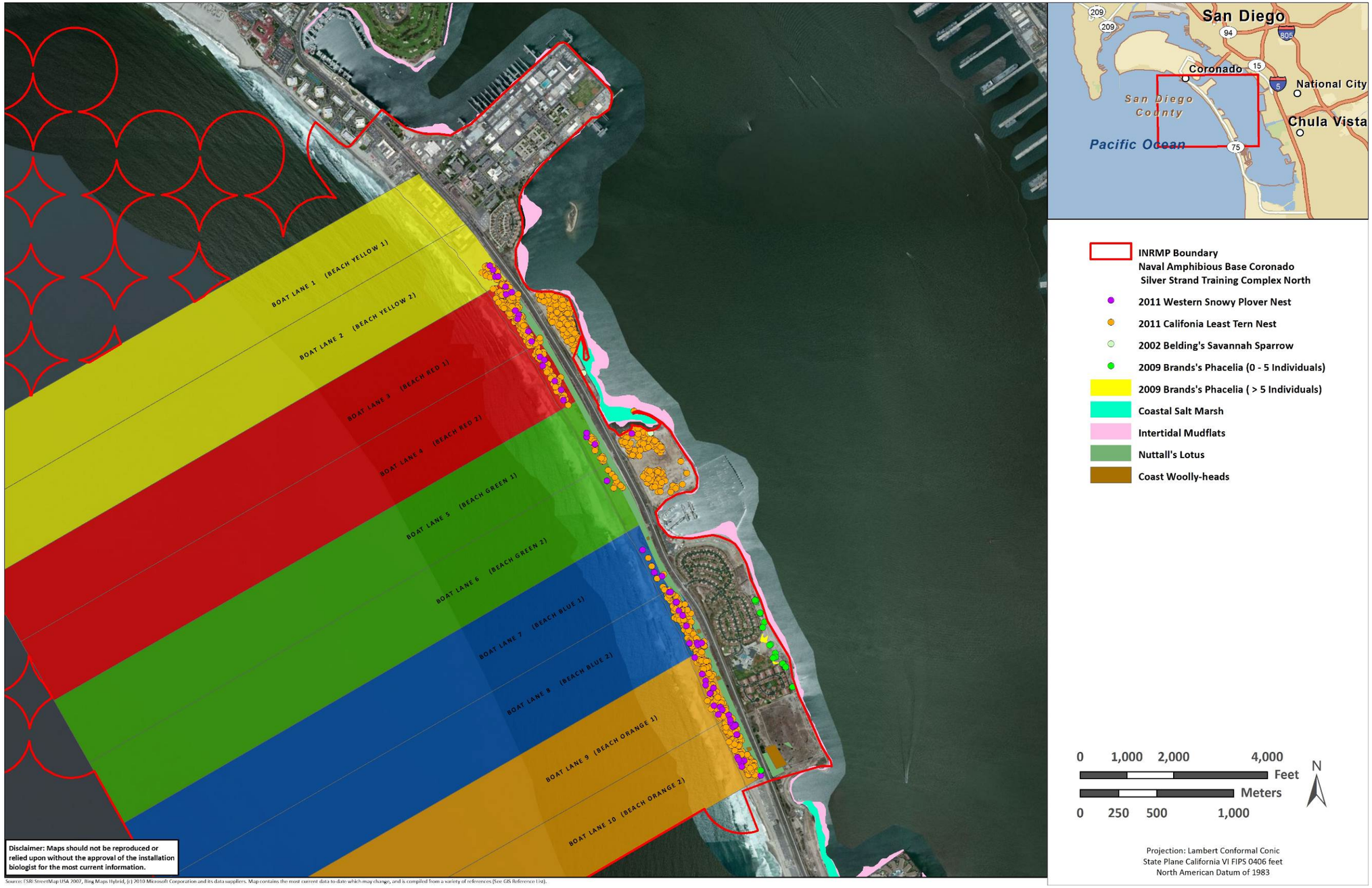


Figure 11-2: Naval Amphibious Base Coronado and Silver Strand Training Complex North Natural Resources Constraints

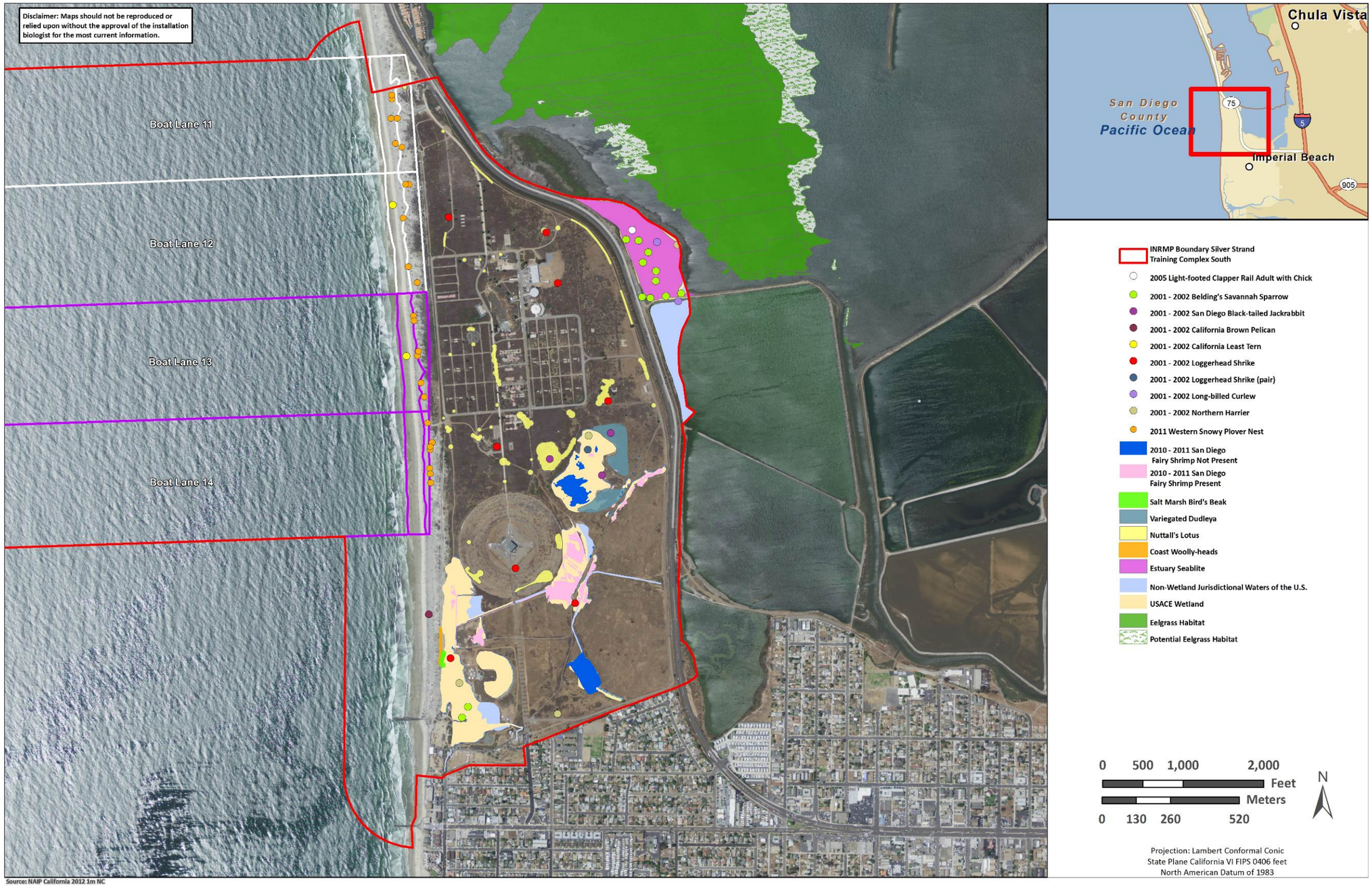


Figure 11-3: Silver Strand Training Complex South Natural Resources Constraints

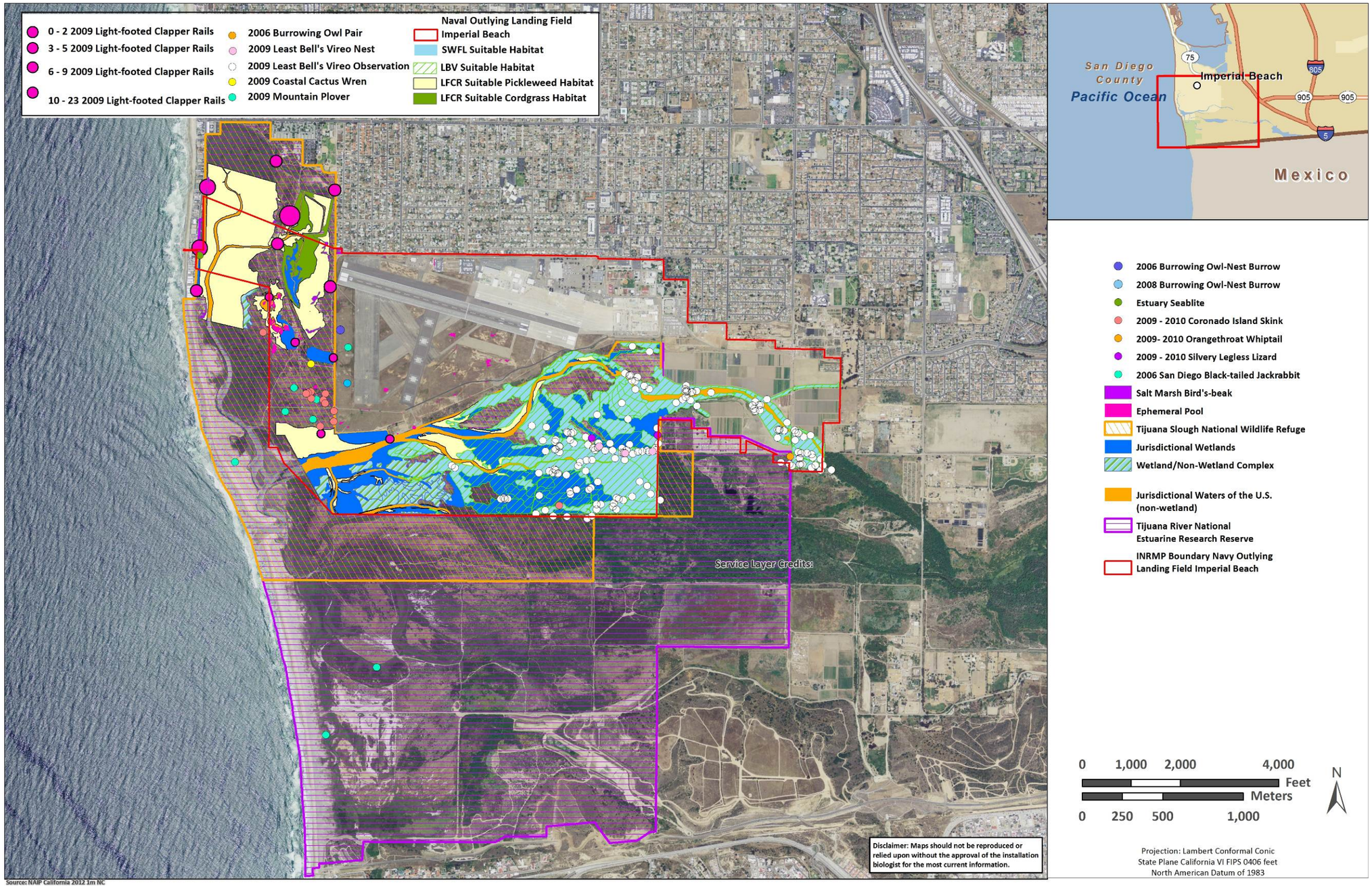
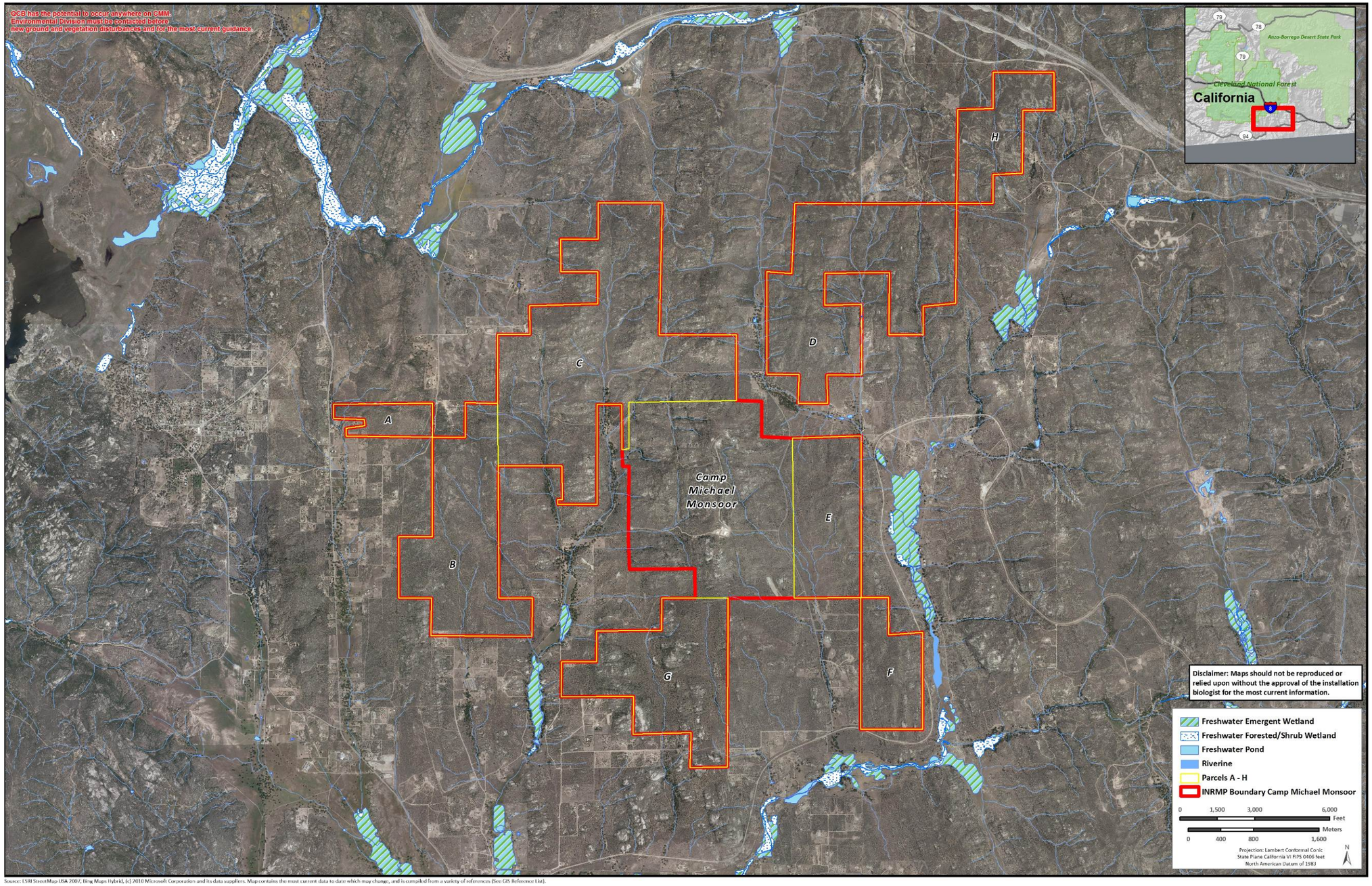
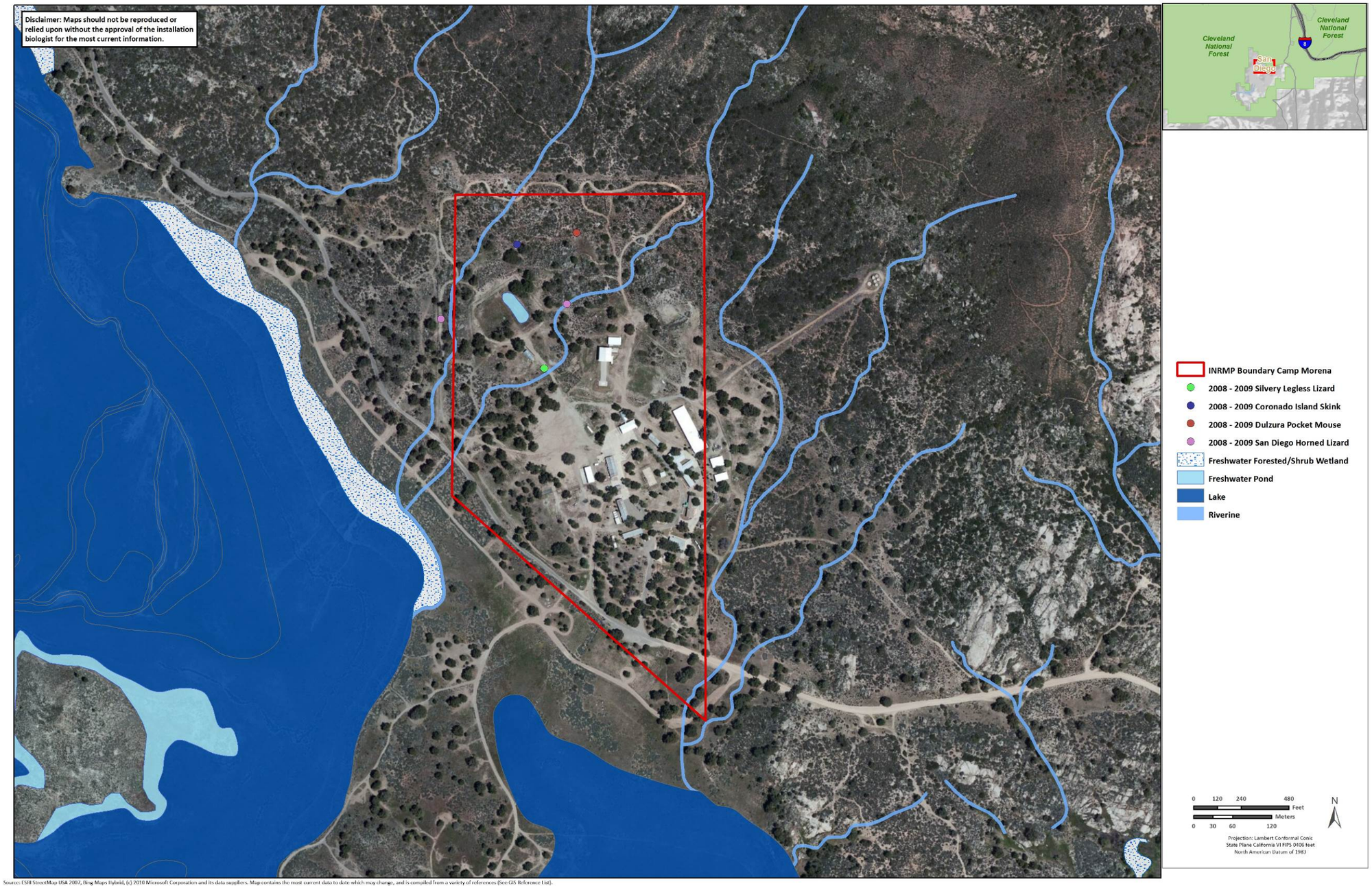


Figure 11-4: Naval Outlying Landing Field Imperial Beach Natural Resources Constraints



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 11-5: Camp Michael Monsoor Natural Resources Constraints



Source: ESRI StreetMap USA 2007, Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers. Map contains the most current data to date which may change, and is compiled from a variety of references (See GIS Reference List).

Figure 11-6: Camp Morena Natural Resources Constraints

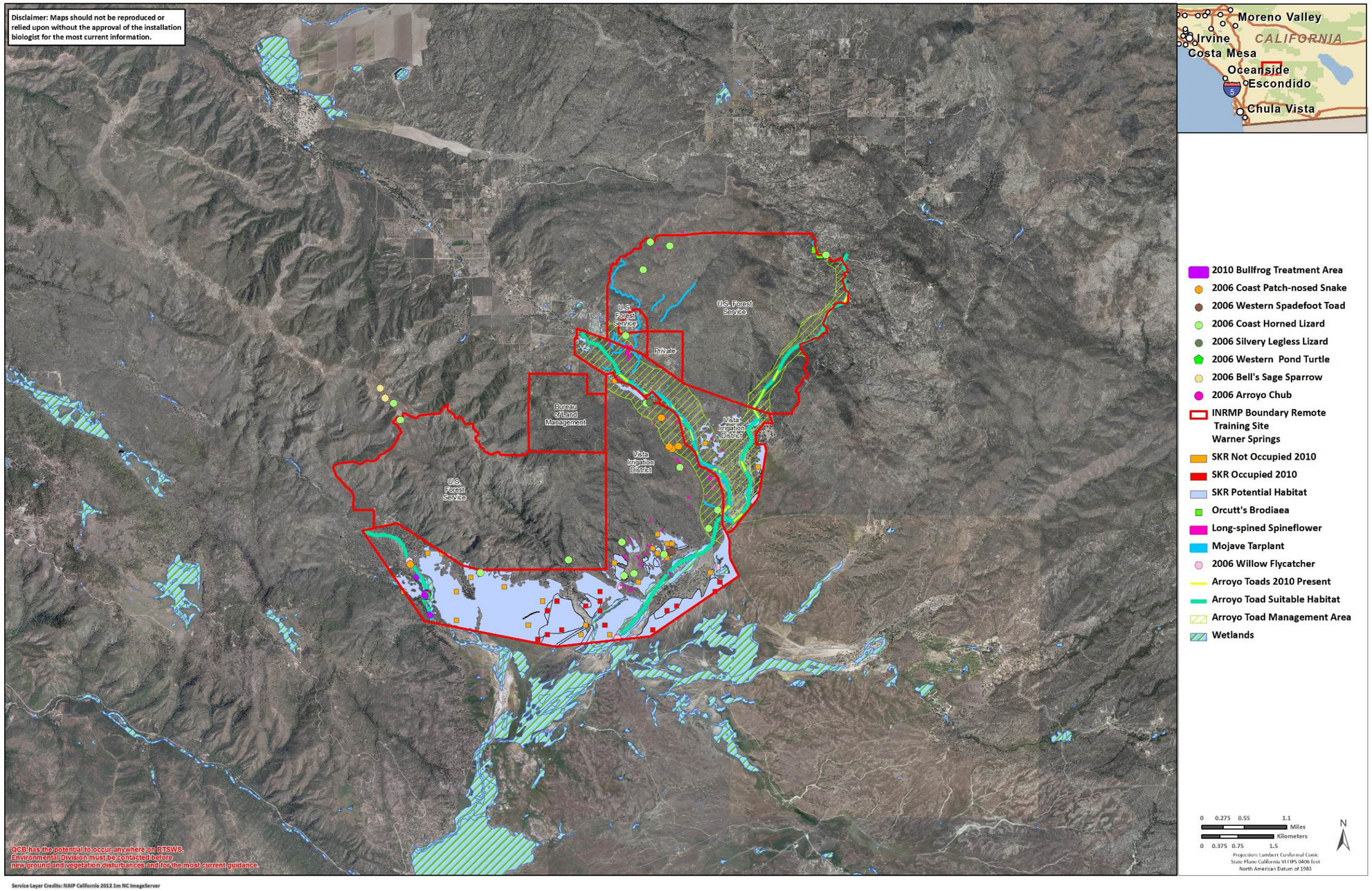


Figure 11-7: Remote Training Site Warner Springs Natural Resources Constraints

THIS PAGE INTENTIONALLY LEFT BLANK

Table 11-1: Encroachment Challenges and Impacts Identified within the Encroachment Action Plan for Naval Base Coronado Facilities (excluding San Clemente Island, and the NBC Housing Areas)

NBC Facility	Encroachment Challenge	Encroachment Impact
Naval Air Station North Island	Airborne Noise	• Avoidance area created • Prohibition of certain operations • Restricted flight altitudes, airspeeds, and/or flight patterns • Restricted night operations • Increased costs or risks
	Urban Development	• Avoidance area created • Reduced access to operating areas • Increased costs or risks
	Competition for Airspace, Land, or Sea Space	• Avoidance area created • Prohibition of certain operations • Increased costs or risks
	Threatened and Endangered Species	• Avoidance area created • Reduced access to operating areas • Prohibition of certain operations • Increased costs or risks
	Maritime Issues	• Increased costs or risks
	Water Quality	• Prohibition of certain operations • Increased costs or risks
	Interagency Coordination	• Avoidance area created
	Legislative Initiatives	• Avoidance area created • Prohibition of certain operations
Naval Amphibious Base Coronado	Urban Development	• Avoidance area created • Reduced access to operating areas • Prohibition of certain operations • Restricted flight altitudes, airspeeds, and/or flight patterns • Restricted night operations • Increased costs or risks
	Competition for Airspace, Land, or Sea Space	• Avoidance area created • Reduced access to operating areas
	Threatened and Endangered Species	• Avoidance area created • Reduced access to operating areas • Prohibition of certain operations • Restricted night operations

NBC Facility	Encroachment Challenge	Encroachment Impact
	Water Quality	• Prohibition of certain operations • Increased costs or risks
Naval Outlying Landing Field Imperial Beach	Urban Development	• Avoidance area created • Prohibition of certain operations • Restricted flight altitudes, airspeeds, and/or flight patterns • Restricted night operations
	Threatened and Endangered Species	• Avoidance area created • Reduced access to operating areas • Prohibition of certain operations • Restricted night operations
	Competition for Airspace, Land, or Sea Space	• Avoidance area created • Prohibition of certain operations • Restricted flight altitudes, airspeeds, and/or flight patterns • Increased costs or risks
	Interagency Coordination	• Increased costs or risks
Silver Strand Training Complex North and South	Competition for Airspace, Land, or Sea Space	• Avoidance area created • Prohibition of certain operations • Restricted flight altitudes, airspeeds, and/or flight patterns • Limitation on use of new technologies • Increased costs or risks
	Threatened and Endangered Species	• Avoidance area created • Reduced access to operating areas • Prohibition of certain operations • Restricted night operations
	Urban Development	• Avoidance area created • Prohibition of certain operations • Reduced access to operating areas • Restricted flight altitudes, airspeeds, and/or flight patterns • Restricted night operations
	Water Quality	• Avoidance area created • Reduced usage days • Prohibition of certain operations • Increased costs or risks

NBC Facility	Encroachment Challenge	Encroachment Impact
Remote Training Site Warner Springs	Interagency Coordination	• Avoidance area created • Reduced realism • Reduced usage days • Reduced access to operating areas • Prohibition of certain operations • Restricted flight altitudes, airspeeds, and/or flight patterns • Increased costs or risks
	Competition for Airspace, Land, or Sea Space	• Avoidance area created • Reduced realism • Reduced access to operating areas • Restricted flight altitudes, airspeeds, and/or flight patterns • Increased costs or risks
Camp Michael Monsoor	Urban Development	• Avoidance area created • Reduced realism • Reduced access to operating areas • Prohibition of certain operations • Restricted flight altitudes and/or airspeeds • Restricted night operations • Increased costs or risks
	Threatened and Endangered Species	• Avoidance area created • Reduced access to operating areas
	Safety Arcs and Footprints	• Increased costs or risks
Camp Morena	Interagency Coordination	• Reduced usage days • Prohibition of certain operations • Increased costs or risks
	Competition for Scarce Resources	• Increased costs or risks

a. To what level do natural resources compliance requirements support the installation's ability to sustain the operational mission?

b. Has there been a net loss of training lands?

2. Review the NBC INRMP annually and update or revise as needed.

11.1.3 Adapting to Effects of Climate Change

The 1994 DoD policy memorandum *Implementation of Ecosystem Management in the DoD* was developed to ensure that resources on DoD installation were managed in a manner to conserve and protect

biological diversity through adopting an ecosystem management approach to natural resources management (Benton et al. 2008). The policy states that "military installations will use ecosystem management to: (1) restore and maintain ecological associations that are of local and regional importance and compatible with existing geophysical components (e.g., soil, water); (2) restore and maintain biological diversity; (3) restore and maintain ecological processes, structures, and functions; (4) adapt to changing conditions, including changes resulting from a changing climate; (5) manage for viable populations, and (6) maintain ecologically appropriate perspectives of time and space" (Benton et al. 2008).

The DoD leadership further strengthened the need to manage resources using an ecosystem management approach in DoD Instruction 4715.03 (DoD 2011), that stressed the importance of recognizing the relationship between ecosystem management and biodiversity conservation. The 2011 DoD Instruction outlined five goals for installations to preserve and enhance biodiversity including: "(1) maintain or restore remaining native ecosystem types across their natural range of variation; (2) maintain or reestablish viable populations of all native species in an installation's areas of natural habitat, when practical; (3) maintain evolutionary and ecological processes, such as disturbance regimes, hydrological processes, and nutrient cycles; (4) manage over sufficiently long time periods for changing system dynamics, including climate change; and (5) accommodate human use in those guidelines.

With the passage of the Sikes Act in 1960 and as amended through 2004, DoD ensured that all INRMPs were developed with an ecosystem management approach to overall natural resources management. One of the primary facets of ecosystem management is to maintain the ecological integrity of the area managed. Ecological integrity is defined as "the ability to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region" (Benton et al. 2008). The INRMP is developed to conserve and protect ecological integrity by promoting a proactive, as opposed to a reactive, strategy for managing resources. The Sikes Act also stipulates that INRMPs are reviewed annually and if necessary, updated every five years to ensure that these documents remain as living documents that can be revised based on changes to current conditions (including changes as a result of climate). The goals and objectives developed for this INRMP were developed using an ecosystem management approach that is flexible and takes into account ecosystem changes resulting from various factors including climate change.

The Navy has also developed *Cooperative Strategy for 21st Century Sea Power* that addresses a need for adaptive management in the face of a changing climate (U.S. Navy, U.S. Marine Corps and U.S. Coast Guard 2007). In addition, the 2008 Navy Environmental Strategy, *Sustaining our Environment, Protecting our Freedom* states the importance of all Naval bases to evaluate activities and ensure that best management practices have been put into place to reduce the overall environmental footprint of the Navy and enhance sustainability (U.S. Navy 2008c). In May 2009, the Navy created a task force to explore and develop policies, and strategies that address climate change. The Task Force Climate Change is made up of senior Navy staff and other stakeholders and findings will be based on many factors, including the most current scientific research.

The updated guidance for Navy INRMPs (OPNAVINST 5090.1C CH-1) added a requirement to address climate change in INRMPs (DoN 2007a). It states that "the evidence for climate change is extensive and has generated consensus in the scientific community. Addressing climate change poses a new challenge for natural resources managers who will need to understand changes in ecosystem structure and function anticipated from climate change, in addition to understanding ecosystems as they function now and as they have in the past." The guidance continues with a framework for addressing climate change issues.

Specific Concerns

- Scientific research indicates that global warming will have long-term, irreversible, adverse consequences on natural resources, including terrestrial and aquatic habitats.
- The California Wildlife Action Plan identifies climate change as one of four primary stressors affecting wildlife, along with growth and development, water management conflicts, and invasive species, and makes recommendations to include climate change science in restoration work.
- Models are the only way to project future changes for NBC and the surrounding region, and to evaluate needed research, data collection, and potential management strategies. However the use of models to explore the potential implications of climate change has risks due to uncertainty. A range of scenarios is possible using accepted models, and local data sets need to be developed and integrated through collaboration and consensus.
- The dynamic nature of information about climate change has risks due to uncertainty for managers on when and how best to invest resources.
- Key questions for NEPA analysis include whether the proposed action is expected to cause climate change effects, whether the proposed action combined with other past, present and reasonably foreseeable actions would cause such effects, and whether sufficient information is available to describe the nature and extent of the proposed action's effect. Developing mitigation for climate change is an emerging issue for NEPA analysis.

Doing nothing may result in a decline to natural resources and increasing threat to infrastructure from multiple sources, and an increase the long term costs of addressing the problem.

Current Management

NAVFAC SW and NBC are investigating collaborations with local universities, agencies, and non-profits and the regional Landscape Conservation Cooperative on vulnerability assessments and landscape-level conservation efforts. Counsel provides guidance and language for addressing climate change in NEPA documents. Currently the Navy is conducting sea level rise studies for parts of NBC.

Management Objective and Strategy

Objective: Adapt to the adverse impacts of climate change through annual goal setting based on science-based scenarios, targets, collaborative planning, and adaptive management.

Strategies:

1. Address the anticipated shifts in species ranges and population abundances through environmental monitoring.
    a. Ensure plant community composition and productivity are within the normal range expected for plant communities/ecological sites.
    b. Ensure sufficient soil health to prevent accelerated erosion.
    c. Ensure the health of intertidal and nearshore environments through monitoring.
2. Identify data and research needs for ensuring an effective response to the consequences of climate change.

   a. Identify species and communities resilient/vulnerable to climate change impacts by partnering with regional efforts to conduct climate change vulnerability assessments.
   b. Improve the application of models through data collection and validation (as feasible and needed) and for using such science based models in environmental and natural resource management planning.
   c. Work in coordination with regional efforts to improve the graphical depiction of the potential impacts of climate change scenarios for NBC to address anticipated shifts in species ranges and population abundances in climate change vulnerability assessments.
3. To the extent feasible, adapt to the adverse consequences of climate change, including stresses on infrastructure, aquatic vegetation, erosion, and shifts in distributions of terrestrial endemic species and plant communities.
   a. Ensure that species/community conservation priorities and expenditures reflect climate change risks, such as those on the margins of their distribution patterns.
   b. Identify restoration projects to provide habitat elements for specific species which may be altered by climate change.
   c. Provide for the management of threatened, endangered, and other special status species such that changes in distribution and abundance may be understood in the context of climate change.
4. Address the anticipated increase in extreme events by emphasizing preventative technologies.
   a. Comply with project siting guidelines.
   b. Improve water conservation.
   c. Improve stormwater management through use of LID technologies.
   d. Improve coordination between natural resources, staff, and development project proponents to ensure more energy efficient design features.
5. Improve and strengthen governance with respect to climate change.
   a. Establish partnerships for collaboratively addressing climate change issues.
   b. Analyze project impacts and cumulative effects through NEPA in a consistent way.
   c. Incorporate climate change in Navy Encroachment Action planning.
   d. Develop science-based agency coordination to protect, maintain, and restore at-risk habitats.
6. Ensure that NBC personnel have access to climate change education and outreach in order to help minimize projections for global warming through modification of individual behavior and lifestyle consumption patterns that contribute to global warming.

11.2 Infrastructure and Facilities Management

On occasion there is a need to build new facilities to ensure the ability of the installation to fulfill its military mission. The DoD MILCON budget is a primary source of funds for construction. However, recent budget cuts have limited the MILCON project roster.

Current Management

By EO, the President has directed that Federal agencies shall design, use, or promote construction practices that minimize adverse effects on the natural habitat where cost-effective and to the extent practicable (EO 13112). Several other laws are pertinent: CWA, Clean Air Act, ESA, NEPA, and Soil Conservation Act. Routine maintenance activities that may affect drainages fall under the U.S. Army Corps of Engineers (USACE) authority from Section 404 of the CWA. Locations where roads cross drainages are likely to require coverage by a permit.

Routine maintenance of roads, buildings, utility lines, and other infrastructure is important for safeguarding access to facilities that are central to support the military mission, as well as the safety of those involved in implementing the mission. Proper maintenance also prevents erosion and associated non-point source and air pollution. Guidelines for maintenance are needed that allow for protection of sensitive environmental resources and the timely, cost-effective completion of environmental documentation requirements, while ensuring full accomplishment of the military mission.

Of necessity, roads and other infrastructure will traverse sensitive natural and cultural habitats. Advanced early coordination will keep from slowing down routine maintenance by the need to comply with requirements to protect these resources. With foresight and proper planning, delays and impacts can be avoided or minimized. However, this often requires a substantial change in the day-to-day business to which maintenance departments have become accustomed.

Several laws are pertinent to construction and maintenance activities including: CWA, Clean Air Act, ESA, NEPA, and Soil Conservation Act.

Management Objective and Strategy

11.2.1.1 Construction Management

Objective: Increase Natural Resources program coordination to avoid and minimize construction impacts to sensitive natural resources.

Strategies:

1. Develop or use proven BMPs for controlling soil erosion from construction and landscaping sites.
2. Ensure NEPA protocols are followed when selecting sites for new construction projects.
    a. Consult with USFWS on all new construction projects that could potentially affect federally listed or proposed species. Hold meetings early in the planning stages of a project to discuss with USFWS, NMFS, CDFW, EPA, RWQCB, ACOE, and CCC, as appropriate, to discuss potential environmental issues that need to be addressed.
    b. Review all in-water construction that may affect the California Least Tern to determine if it may fall under the MOU between the U.S. Navy and the USFWS.
    c. Try to locate new structures in previously disturbed areas.
3. If a project has the potential to affect nesting birds or nesting substrate (including trees used annually for nesting), a qualified biologist from NBC shall be contacted immediately to determine if there will be any violations of the MBTA.
4. Fish and wildlife conservation should be considered in all site feasibility studies and project planning, design and construction. Per DoD Instruction 4715.DD-R 1996 (Integrated Natural

Resources Management in the Department of Defense – Draft), appropriate conservation work and associated funding shall be included in project proposals and construction contracts and specifications.

11.2.1.2 Facilities Management

Objective: Minimize and avoid negative impacts to sensitive resources during facility maintenance while not impacting the military mission.

1. Ensure that the Recommended Plant List is followed, including gaining approval by the NBC wildlife biologist and botanist, when designing and installing vegetated landscapes.
2. Ensure incorporation of erosion control BMPs in the preliminary engineering, design, and construction of facilities involving ground disturbance.
3. Vehicular traffic associated with the construction activities and operational support activities will remain on established roads to the maximum extent practicable. Areas with highly erodible soils will be given special consideration when designing the proposed project to ensure incorporation of various erosion control techniques, such as, straw bales, silt fencing, aggregate materials, wetting compounds, and rehabilitation, where possible, to decrease erosion. Rehabilitation may include revegetating or the distribution of organic and geological materials (i.e., rocks) over the disturbed area to reduce erosion while allowing the area to naturally vegetate. Additionally, erosion control measures and appropriate BMPs, engineering designs will be implemented before, during, and after construction activities.
4. Construction equipment will be cleaned at the temporary staging areas, in accordance with BMPs, prior to entering and departing the project corridor to minimize the spread and establishment of non-native invasive plant species.

11.2.1.3 Routine Maintenance

Objective: Increase Natural Resources Program coordination to avoid and minimize impacts to natural resources when safeguarding Fleet readiness by maintaining access and operation of roads, utilities, and other infrastructures.

Strategies:

1. Infrastructure shall be aligned to contribute to Fleet readiness and protection of environmental values.
    a. Seek agreement between Public Works, Security, the Fire Department, and NAVFAC SW on the minimum network of roads needed to meet requirements for Fleet readiness, safety and security, fire control, and environmental protection.
    b. Public Works Office should develop a 5- to 10-year long maintenance plan. The reason is to prevent delays in performance of routine maintenance (such as culvert replacement or pipeline repair) due to environmental issues under the ESA and CWA. A long-term plan will also support a more programmatic approach to consultation with resource agencies.
2. Take migratory and resident bird populations into consideration when performing maintenance such as mowing, tree trimming, pruning, or removing trees.
    a. Projects should be timed to avoid disturbing nesting birds.

b. If nesting birds or eggs are encountered within a project area, the contractor must immediately notify the installation natural resources managers, contracting officer and project manager and not attempt to harass nesting adult birds or remove any young birds or eggs from the nest.

11.2.1.4 Emergency Maintenance

Emergency repairs need to be anticipated so environmental damage, which is typically worse in an emergency than during a planned repair, can be reduced. NBC should develop a clear understanding with USFWS about the extent of environmental damage that may be expected from disturbances such as plane crashes, emergency repairs, spills, and fire control. Habitat may be temporarily impacted but not lost.

Section 7 of the ESA provides for emergency consultation procedures as follows:

1. The emergency consultation procedures allow action agencies to incorporate endangered species concerns during an emergency.
    a. For the purposes of the Act, an emergency is a situation involving an act of God, a disaster, a casualty, national defense or security emergencies, etc.
    b. Security emergencies are only those emergencies that are immediate in time (e.g., a terrorist with a bomb in eagle habitat).
2. Initiation of formal consultation does not have to begin until the emergency is under control.
    a. The actions agency is required to notify the USFWS as soon as possible after a "may affect" has been determined and, commence informal consultation where adverse impacts are reasonably foreseeable.
    b. Although the formal consultation occurs after the response to the emergency has occurred, it is treated like any other formal consultation.
3. An action agency has to provide additional information to initiate a formal consultation following an emergency:
    a. Description of the nature of the emergency;
    b. Justification for the expedited consultation and
    c. Evaluation of the emergency or the response to the emergency on affected species and their habitats.

Objective: Maintain coordination with the Natural Resources Program in the planning process to anticipate and prevent emergency infrastructure incidents.

Strategies:

1. As a first priority, prevent emergencies with respect to utilities and other infrastructure.
    a. The NBC Public Works Officer should implement a mishap root cause analysis program to identify problems and correct them.
    b. Implement a mishap critique system to assess performance of the response team and feed results into making continuous improvements.
2. Develop and seek funding for an infrastructure replacement schedule.

a. Public Works Office should establish and maintain an equipment management program to ensure that necessary items are procured and properly maintained.

   i. Establish a complete inventory readiness list of all emergency response equipment including their location.

   ii. Develop a preventative maintenance schedule to ensure equipment readiness is maintained.

11.2.1.5 Road Maintenance

Objective: Improve the soundness of road maintenance practices to avoid and minimize environmental impacts, to control non-native species, enhance biodiversity, and protect sensitive species, soil productivity, watershed functioning, and water quality.

Strategies:

1. Comply with CWA Section 404 Permit and Section 401 State Water Quality Certification if a project may affect a floodplain, wetlands or watercourses, as appropriate. Ensure project proponents understand their responsibilities for obtaining and complying with CWA permits.
2. Develop and implement protocols for conducting maintenance activities on roads. Provide training on protocols to applicable personnel. For example, reducing mowing frequency and intensity based on ecological considerations (e.g., annual nesting season).

11.3 Stormwater Management

Stormwater discharge to navigable waters is prohibited unless a NPDES permit is obtained. The EPA has delegated responsibility for the NPDES program to the State Water Board.

Current Management

The U.S. Navy policy related to stormwater management is: "Develop, implement, and maintain current stormwater management plans, and comply with Federal, state, and local regulations and permit conditions, as applicable." The Navy has coverage under two general stormwater permits: the statewide General Industrial NPDES Storm Water Permit and the statewide General Construction NPDES Stormwater Permit. Regional General Permit for routine maintenance has been submitted to the USACE.

Management Objective and Strategy

Objective: Maintain Natural Resources Program involvement in stormwater management planning and implementation.

Strategies:

1. Implement Erosion Control Plan BMPs.
2. Implement recommendations for stormwater management contained within any NPDES permits maintained by NBC.
3. Investigate the use of LID for future development projects to minimize adverse impacts of surface runoff from impervious areas.
4. Develop an improved training program for appropriate government employees.

a. Support regular workshops on the need, design, and implementation of BMPs and

b. Provide training on LID to maintain pre-development hydrologic conditions.

11.4 Communications Towers, Wind Farms and Power Lines

Specific Concerns

- There is concern about growing impacts from communications towers, power lines, and wind farms to migratory birds protected under the MBTA of 1918, as amended. Nationwide communication towers may kill from 4-5 million birds per year. Nationwide- collisions with power transmission and distribution lines may kill anywhere from hundreds of thousands to 175 million birds annually, and power lines electrocute tens to hundreds of thousands more birds annually.
- The construction of new towers creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. Some of the species affected are also protected under the ESA and Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). Guidance on Communication towers is provided by the USFWS, such as the *Service Guidance on the Siting, Construction, Operation and Decommissioning of Communication Towers* (USFWS 2010), and the *Land Based Wind Energy Guidance* (USFWS 2012).

Management Objective and Strategy

Objective: Increase Natural Resources Program coordination to avoid and minimize impacts to sensitive natural resources when safeguarding Fleet readiness by constructing and maintaining communication towers and overhead power lines.

Strategies:

1. Comply with USFWS guidelines for reducing fatal bird strikes on communication towers, such as the Service guidance on the siting, construction, operation and decommissioning of communications towers, to the greatest extent practicable.
2. Develop an avian protection plan using information from the DoD Partners in Flight and the USFWS.

11.5 Consistency with Cultural Resources Management

Management Objective and Strategy

Objective: Reduce conflicts between Cultural and Natural Resources activities.

Strategies:

1. The Cultural and Natural resources programs will coordinate when natural or cultural resources projects have the potential to impact sensitive resources.

11.6 NEPA Compliance

Current Management

NBC INST 11013.3F establishes procedures for obtaining approval of new construction, alterations, space assignments, equipment installations, structure modifications, repairs and maintenance of class 1 (land) and class 2 (buildings) properties. It also provides criteria to be used for building designs, roads, parking areas, fencing, signs, painting, planting, etc. The following points are made in the Instruction:

1. The NBC Public Works Officer and or his/her staff will be responsible for the review and coordination of all Project Approvals. The Project Approval process will be used for all new construction, alteration, modification, repairs, maintenance, equipment installations and space assignments. A Publics Work Office Planning member reviews the request and determines what level of review is needed based on the scope of work. Basic guidance for site approval is listed below.

   New construction, larger scopes of work and projects requiring additional review will require the Site Approval Process (see **Figure 11-8**). Per NAVFACINST 11010.45, SARs are only required for projects:

   a. Any project site that will have explosives safety criteria implications associated with ammunitions and explosives.
   b. Any project that affects or is affected by airfield safety criteria.
   c. Any project that creates or is proposed to be in an area of electromagnetic illumination or involves electromagnetic transmission.
   d. Any project that proposes changing the use of a facility.
   e. Any project that changes or has the potential to change the land use or physical layout of an area.

2. The PWO Planner submits the project requiring a SAR to be reviewed to the following: Fed fire, Utilities, AirOps, Real Estate, Safety, and NEPA Coordinator. NEPA Coordinator then determines the level of NEPA and distributes to those who are applicable: natural resource, cultural resource, environmental compliance, community liaison, ERPM, legal, and coastal commission subject matter experts.
3. The Natural and Cultural Office will review for: threatened, endangered or sensitive species, wetlands, archeological issues and State Historic Preservation issues.
   a. If a federally listed species is known to occur in the project area the site approval should address direct and indirect impacts to these resources.
   b. A determination of no effect should be evaluated by the USFWS or NMFS.
4. The Environmental Office will review for: underground storage tanks, contaminated soils, ERP sites, Solid Waste Management Unit Sites, Hazardous Materials and ensure all appropriate permits are obtained.
5. Safety Review will ensure the Site is not encumbered by Airfield Safety, Explosive Safety (ordnance, etc.) or electromagnetic radiation (radar, etc.) safety issues.

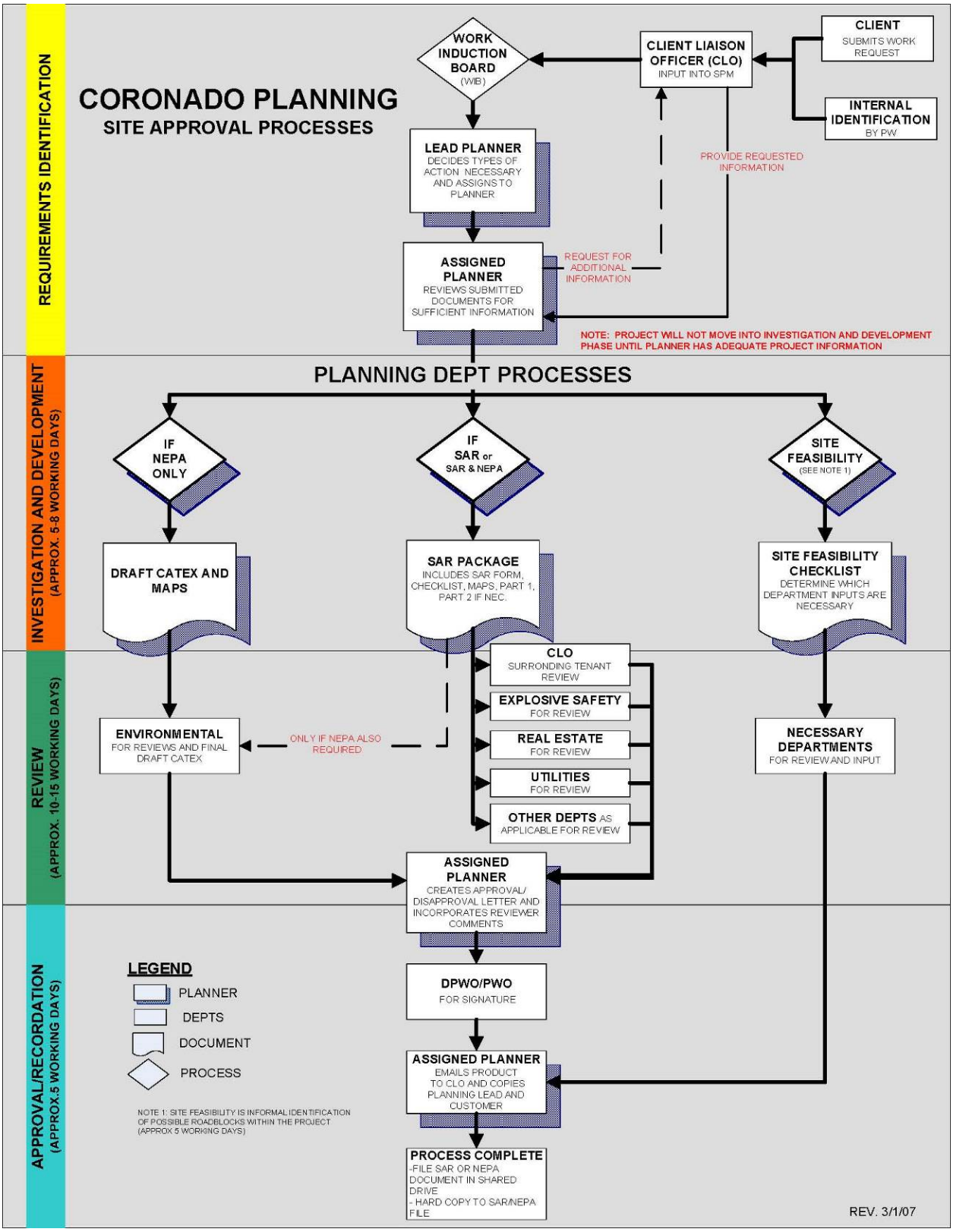


Figure 11-8: Site Approval Process

6. The Real Estate Office will ensure all Land Acquisitions (Purchase/Lease) have been identified, all Easements / Outgrants (Road & Railroad Crossings, Utility easements etc.) have been identified and changes, relocations and or cancellations of existing easements / outgrants have been identified.
7. The Navy will verify that activities that require NEPA (CATEX, EA, or EIS) documentation will be complete. All activities that require permits will be identified. Some activities may carry little risk of significant environmental effects such that there is no practical need for, or benefit from, preparing and signing a record of CATEX.

Management Objective and Strategy

Objective: Conduct planning of mission activities having potential environmental effects by applying NEPA's requirements and policies to enhance the mission-related use and the protection of natural resources.

Strategies:

1. Continue to comply with NBC INST 11013.3F.
2. Continue to assess the environmental consequences of each proposed action that could affect the natural environment, and address the significant impact of each action through analysis, planning and avoidance.
3. Implement established protocols to ensure that NEPA is integrated early in the planning process for project development.
4. Seek opportunities for streamlining environmental assessment procedures.

11.7 Oil Spill and Hazardous Substance Prevention and Cleanup

The Federal Water Pollution Control Act of 1972 (33 U.S.C. 1251, *et seq.*), as amended by the CWA of 1977, authorizes the President, in the case of an oil or hazardous substance release, to take any action necessary to mitigate damage to the public health and welfare; including, but not limited to fish, shellfish, wildlife, public and private property, shorelines and beaches. Natural Resource Trustees are authorized to recover damages for injury to, destruction of or loss of natural resources resulting from a discharge or the substantial threat of discharge, of oil into navigable waters.

The CWA prohibits spills, leaks or other discharges of pollutants into waters of the U.S. in quantities that may be harmful, which includes discharges of pollutants that: (1) violate applicable water quality standards; (2) cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines; or (3) cause sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

The Oil Pollution Prevention Act of 1990 amended the CWA to expand oil spill prevention activities, improve preparedness and response capabilities, and ensure that responsible parties are held accountable for damages from spills. The U.S.C.G is the lead agency for oil spill prevention and response, and is authorized to direct state and local agencies in controlling pollution in bays and coastal waters.

Hazardous substances other than oil are addressed by the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601, *et seq.*), which authorizes Natural Resource Trustees to recover damages for injury to, destruction of or loss of natural resources resulting from the release of a hazardous substance.

Designated trustees (e.g., NMFS) are assigned responsibility for performing a Natural Resources Damage Assessment (NRDA) from spills, and the Navy has adopted NMFS procedures for damage assessment (15 CFR 990). Similarly, the Department of Interior is in charge of damage assessment for hazardous substance spills under EO 12580. The baseline condition of the natural resources and services that would have existed had the oil or hazardous substance release not occurred is estimated using historical data, reference data, control data or data on incremental changes, alone or in combination, as appropriate. Navy guidance (OPNAVINST 5090.1C CH-1) suggests that this information may be obtained from INRMPs, NEPA Documents, or special studies.

DoD Instruction 4715.03 states that "All DoD Components shall develop and promulgate criteria and procedures for assessing natural resource damage claims in the event natural resources under DoD control are damaged [injured] by oil or a hazardous substance released by another party." Navy requirements (OPNAVINST 5090.1C CH-1), however, go beyond DoD Instruction 4715.03 and apply to natural resource injury occasioned by oil or hazardous substance releases from both DoD and non-DoD sources injure natural resources within Navy management or control, NMFS NRDA procedures serve to guide Navy activities in the mitigation, assessment and collection of natural resource damages occasioned by the spill. In the case of other hazardous substance releases, the U.S. Department of the Interior (USDOI) has established other types of natural resource damage assessment regulations. One method that calculates resource damages is called a Resource Equivalency Analysis (REA), also known as Habitat Equivalency Analysis (HEA), and is the most common method used in NRDA cases nationwide. The injury is assessed in terms of degree (percentage of baseline injured), duration (years until recovery), and size (number of acres, stream miles, birds, etc.). A trajectory estimating the recovery to baseline is also estimated. The injury may be described in terms of lost acre-years or stream mile-years or bird-years of lost ecological services. The benefits of a restoration project are quantified in similar terms: degree of benefit (e.g., percent services per unit area), duration of the project, and trajectory of the benefits over time. With this information, the size of the project is scaled until the benefit of the project is equal to the injury. The final step is to cost out the project. This cost becomes the measure of damages.

The baseline assessment compiled prior to a spill becomes essential to both pre-incident planning for response, as well as this post-incident assignment of damages. This baseline ecological information is required under OPNAVINST 5090.1C CH-1, Chapter 26 on behalf of the Navy Regional Environmental Coordinator. Baseline data specifically includes this INRMP.

The CDFW Office of Spill Prevention & Response (OSPR) is responsible for protecting California's natural resources by preventing, preparing for, and responding to spills of oil and other deleterious materials, and through restoring and enhancing affected resources. The OSPR was formed after the Exxon Valdez oil spill in 1989 and the spill off of Huntington Beach by the American Trader in 1990. These events inspired the California Legislature to enact legislation in 1990 called the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act. The Act also gave the State Lands Commission certain authority over marine terminals. The OSPR’s responsibilities under the Act are:

- Development of contingency plans for the protection of fish and wildlife;
- Establishment of rescue and rehabilitation facilities;
- Establishment and funding of a network of rescue and rehabilitation facilities, known as the Oiled Wildlife Care Network;
- Assessment of injuries to natural resources from a spill and
- Development of restoration plans to compensate for adversely affected wildlife resources and habitats.

Both the Federal and state statutes (Oil Pollution Prevention Act 1990 and Senate Bill 2040) were enacted in consequence of the catastrophic oil spills of 1989, and both required contingency planning for both state and Federal governments. The USCG and CDFW-OSPR agreed to joint preparation of contingency plans through co-chairing the three Port Area Committees for Contingency Planning: USCG Port Areas for San Francisco, Los Angeles/Long Beach, and San Diego.

The OSPR's Resource Assessment Program conducts NRDA of pollution events that result in significant injuries to wildlife and/or habitat. The goal of OSPR's NRDA program is to quantify the damages, to seek compensation from the responsible parties, and to both restore the injured resources and compensate the public for the lost interim ecological benefits and uses of these resources 2005) to augment the ACP. The California Wildlife Response Plan details the Wildlife Operations Branch purposes, goals, objectives, responsibilities, and structure. The Wildlife Operations Branch is in the Operations Section of the Incident Command System for oil spill response. The Wildlife Operations Branch structure needed in California and detailed in this plan is expanded beyond that described in the U.S.C.G Incident Management Handbook. The CDFW normally leads wildlife response during a spill in California.

In 2003, NBC developed the *Emergency Response Action Plan Summary, Oil and Hazardous Substance Integrated Contingency Plan*, otherwise known as *The Red Plan*. The purpose of the plan is to inform tenant and installation personnel on the proper procedures to follow in the early stages of a spill (U.S. Navy 2003b). Components of the plan include notification information for both military and nonmilitary responders, spill response strategy, evacuation plan, and the oil and hazardous substance discharge telephone report sheet.

The Navy follows regional stranding and injured wildlife protocol established by the Southwest Region Marine Mammal Stranding Network. An MOU between the NMFS and the U.S. Navy, *Assist in Marine Mammal Stranding Investigations* (Agreement No. PR-055) requires the development of Regional Stranding Investigation Assistance Plans. The Regional Stranding Investigation Assistance Plan is being developed at the regional level with the Navy Stranding Response Coordinators. NMFS SWR offers their assistance to review the stranding protocol to ensure it is consistent with our marine mammal stranding protocols and is up to date. The Wildlife Branch assesses wildlife issues and contacts appropriate network response facilities to assist the Navy in mitigating wildlife impacts including the Stranding Response Network (Sea World).

Specific Concerns

- Cumulative effects of small, medium, and large oil spills from boats, personal watercraft, and ships can contaminate NBC waters and affect natural resources;
- Coordinated planning for oil spill cleanup activities should be integrated with conservation priorities of this INRMP;
- The collection and maintenance of ecological information required by OPNAVINST 5090.1C CH-1 (Chapter 22) are essential to pre-incident planning on behalf of the Navy's Regional Environmental Coordinator and
- There is a need to incorporate planning for NRDA under both Federal and state oil spill prevention regulation, as well as to establish a quantitative baseline to support natural resources management decisions, habitat mitigation and enhancement planning, and sustainability planning.

Management Objective and Strategy

Objective: Reduce and prevent oil and other hazardous substance spills impacts to natural resources.

Strategies:

1. Continue to comply with NBC established procedures for managing petroleum, oil, lubricants, and hazardous wastes.
2. Integrate the protection priorities of this INRMP into contingency spill planning.
    a. Update GIS layers of natural resources to support preparedness planning.
    b. Integrate baseline ecological surveys into preparedness planning.
    c. Integrate invasive exotic species response planning with oil spill contingency plans.

11.8 Real Estate Outgrants and Agricultural Outleasing

OPNAVINST 5090.1C CH-1 requires the Navy to identify areas that may be suitable and available for agricultural/grazing outleasing or commercial forestry. More specifically, the Military Construction Authorization Act and 10 U.S.C. 2665 and 2667 provide for the use of DoD lands under a lease to an agency, organization, or person for the purpose of agricultural/grazing outleasing or the production of and sale of forest products that have commercial value. All real estate transactions go through the NEPA process. In addition, all real estate transactions go through the Site Approval Process for review by an interdisciplinary team including the installation biologist Natural Resource staff provide requirements if needed. As of May 2012, NBC has entered into 7 agreements, 4 easements, 2 leases, 3 licenses, and 8 permits with another entity for entry and/or use of property for a specific use. The Navy has granted 6 agreements, 10 easements, 8 leases, and 18 licenses with another entity for entry and/or use of Navy property for a specific purpose.

NOLF IB leases 52 hectares (128 acres) of land for agriculture. All pest management activities for agriculture shall be conducted in compliance with Federal, state, and local regulations and in accordance with the installation Integrated Pest Management Plan, the lease agreement and the Soil and Water Conservation Plan.

Specific Concerns

- The agricultural outlease at NOLF IB should be reviewed for its compatibility with current management direction of NBC. These agricultural fields are potential wintering habitat for the mountain plover, which has been proposed for Federal listing as threatened, and management measures that are incompatible or incompatible with that species should be identified. Burned agricultural fields tend to favor the species.

Management Objective and Strategy

Objective: Ensure that natural resources oversight is incorporated into current and future real estate transactions.

Strategies:

1. When required, as described above, real estate transactions go through the Site Approval Process.
2. Compile and maintain all natural resource documentation for all past real estate transactions.
3. Provide oversight, inspection and monitoring of outgrants for compliance with environmental protection laws.

4. Examine all current NBC leases for compatibility with current natural resources management direction of this INRMP.
    a. On NOLF IB, ensure that all required topics of this INRMP and the Sikes Act are addressed in management of agricultural lands.
        i. Ensure all data and reports related to U.S. Navy lands are provided to NBC.
        ii. Ensure invasive species issues are addressed.
        iii. Work with the Tijuana River Valley Trails Committee to ensure that the location of equestrian trails on NOLF are not in conflict with the Navy mission or agricultural lease.
        iv. Identify agricultural practices that are compatible (such as burning) and incompatible with wildlife activity. Consider adding burning as a desirable agricultural practice to the lease agreement.
        v. All pesticide applicators shall be properly trained and qualified in accordance with State regulations. Restricted use pesticides shall only be applied by certified applicators or be under direct supervision of a certified applicator.
        vi. Only pesticides listed on the installation pesticide authorized use list shall be applied.
        vii. All pesticide use shall be reported to the installation IPM Coordinator.
    b. For YMCA Surf Camp, provide management recommendations to the YMCA consistent with the management direction for all NBC properties.
        i. Conduct baseline inventories.
        ii. Educate on sensitive species and what activities may or may not be conducted in order to protect these species.
        iii. Provide invasive species management recommendations and direction for what may be accomplished by the YMCA versus what should be undertaken by the U.S. Navy. Provide reports of removal so it may be tracked as a contribution and benefit under a mitigation banking agreement.
        iv. Ensure that no YMCA activities violate any laws or guidance, such as the ESA or CWA, which apply to Federal agencies. Ensure camp managers are familiar with and comply with the NBC site approval process.
        v. Continue to document the baseline condition of Camp Surf's natural resources and enter into a mitigation-style banking agreement with USFWS for its enhancement. This enhancement could occur by simply turning off the pump that currently diverts what is apparently natural spring water to the ocean.
    c. The Navy is responsible for conducting NEPA analysis and ESA consultations for all new activities conducted at CMM and RTSWS. All NEPA assessments must be coordinated with the appropriate landowners (BLM, VID, and U.S. Forest Service property at RTSWS and BLM at CMM).
        i. RTSWS activities on USFS property must comply with the Special Use Permit Operating Plan (U.S. Navy 2010i).
            1. Implement and ensure compliance of management and conservation measures.

2. Implement and ensure compliance of best management practices.
3. Ensure compliance with Inspection, Repair, Monitoring, and Reporting protocols:
    a. Conduct periodic inspections of training areas, share results with the Palomar Ranger District Special Use Administrator. Repair damages to USFS specifications. Review areas in need of restoration annually for environmental planning and management purposes.
    b. Restrict all motor vehicle use to authorized roads.
4. Cooperate with the USFWS and the CDFW on issues regarding wildlife management, including conditions set forth in the Navy Environmental Assessment and USFWS Biological Opinion. Meet with the USFS, USFWS, and CDFW to coordinate wildlife management within Navy training areas.
5. Federal Protected Plant and Wildlife Species:
    a. Make every effort to ensure the protection and preservation of threatened, endangered, sensitive, and conservation species for both plants and animals within the authorized area.
    b. Ensure compliance that military personnel will not initiate any action that may disrupt, endanger, or damage to any degree a threatened, endangered, sensitive, and conservation species, or their habitat without consultation with USFWS.
    c. Ensure compliance with the 2010 Environmental Assessment for the following species: arroyo toad (*Anaxyrus californicus*), Stephens' kangaroo rat (*Dipodomys stephensi*), Southwestern Willow Flycatcher (*Empidonax traillii extimus*), Quino checkerspot butterfly (*Eupydryas editha quino*), and the slender-horned spineflower (*Dodecahema leptoceras*).
    d. Maintain consistency and compliance with Cleveland National Forest Land Management Plan and existing Federal and state laws.
    e. Comply with USFS determination of Bald (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos canadensis*) nesting status on USFS land. Comply with closure regulations from December 1 through March 15 for the Golden Eagle nest site located on USFS land north of Fink Road annually.
6. The USFS has responsibility for maintenance, preservation, and management of fish and wildlife habitats on USFS lands. Comply with the Cleveland National Forest Land Management Plan and existing Federal and state laws for sensitive species habitat management.
7. Conduct vegetation management:
    a. Protect and preserve soil and vegetative cover to maximum extent possible.

b. Do not cut or clear vegetation or disturb soil within the authorized area without prior USFS approval.

c. Institute erosion control in disturbed areas as specified by the USFS.

d. Comply with all applicable Federal, state and local water and air quality regulations.

e. Utilize water subject to existing water rights.

f. Prevent unnecessary damage to tree seedlings, saplings and trees.

g. Do not cut live vegetation for survival shelters.

8. Use of pesticides is not authorized on USFS lands.

ii. RTSWS activities on BLM right-of-way (ROW) must comply with the ROW agreement CACA 047350 (U.S. Navy 2010j).

1. No pets, specifically cats and dogs, will be allowed at the RTSWS SERE compound or in the field.

2. Unused roads and trails may be blocked with natural debris, such as large dead trees or boulders, and additional measures implemented to promote reestablishment of native vegetation in these areas. IN coordination with the land owner (VID, BLM, or USFS).

3. Active habitat restoration of established trails or other impacted areas is included as a management recommendation in this NBC INRMP.

4. Educational materials such as a brochure will be funded through the Navy funding processes and developed with information on, and a recognition guide to, the threatened and endangered animal species and the special status plant species present in the training areas.

5. Long-term natural resource management and monitoring procedures to be followed by the Navy are detailed in this NBC INRMP.

6. Conduct surveys to locate and treat invasive non-native plants/weeds. Weed searches and spot treatment control efforts will be prioritized in areas of higher levels of training activity.

7. Tamarisk (*Tamarix ramosissima*) and pampas grass (*Cortaderia jubata*) will be controlled using methods modeled after successes already achieved in southern California.

8. Comply with BLM policy and avoid potential impacts to listed species due to herbicide drift, by not allowing broadcast spray of herbicides on RTSWS. Spot treatments will be conducted during periods when animals are hibernating in burrows. Within riparian area, wetlands, and aquatic habitats, herbicide treatments will be conducted only with herbicides that are approved for use in those areas. All instructions and standard operating procedures will be followed to avoid spill and direct spray scenarios into aquatic habitats that support federally listed species.

9. Maps and overlays of the training areas will be developed, identifying locations and habitat boundaries of special status plant species [Orcutt's brodiaea (*Brodiaea orcuttii*), long-spined spineflower (*Chorizanthe*

polygonoides var. *longispina*), Mojave tarplant (*Deinandra mohavensis*), Engelmann oak (*Quercus engelmanii*)] confirmed to be present and those animal species list as fully protected, threatened, or endangered by the California state or Federal government.

10. Perform routine interagency coordination with the USFS and BLM for current information regarding the status of Bald and Golden Eagle sightings in the area, USFS policy for managing the presence of eagles in the area will be adopted.
11. No activity shall occur within 0.8-kilometer (0.5-mile) of a Bald or Golden Eagle nest between December 1 and July 1 if a nest is established in the project area.
12. The following special status species will not be taken as part of survival training, if captured inadvertently, these species will be released:
    a. Arroyo chub (*Gilla orcutti*);
    b. Coast horned lizard (*Phrynosoma coronatum blainvilli*);
    c. California legless lizard (*Anniella pulchra pulchra*);
    d. Coastal rosy boa [*Charina* (*Lichanura*) *trivirgata roseofusca*];
    e. Coronado Island skink (*Plestiodon skiltonianus interparietalis*);
    f. San Bernardino mountain kingsnake (*Lampropeltis zonata parvirubra*);
    g. San Diego mountain kingsnake (*Diadophis punctatus similis*);
    h. Southwestern pond turtle (*Clemmys marmorata pallid*);
    i. Two-striped garter snake (*Thamnophis hammondii*);
    j. Western spadefoot toad [*Spea* (*Scaphiopus*) *hammondii intermontanus*];
    k. All non-game bird species (game birds include quail, turkey, pigeon, dove, and pheasant);
    l. American badger (*Taxidea taxus*) and
    m. All bat species.
13. Maintain the Arroyo Toad Management Area (ATMA) that was established to avoid or minimize impacts to the 29 site population.
14. Install and maintain information signage at the access points to the ATMA.
15. Ensure compliance with the nighttime (sunset to sunrise) speed limit of 24 kilometers per hour (15 miles per hour) within the ATMA.
16. Prohibit the killing or capturing of any toad species for the purpose of survival training within the ATMA.
17. Continue to fund the control and removal program for non-native bullfrogs.

18. Install and maintain information signage in Fink Road on VID land west of SR-79 that passes occupied Stephens' kangaroo rat habitat.
19. Site areas where students will congregate away from mapped occupied Stephens' kangaroo rat habitat. In these areas foot traffic should generally remain dispersed and light with rotation of areas of activity.
20. Ensure compliance with the nighttime (sunset to sunrise) speed limit 24 kilometers per hour (15 miles per hour) in occupied Stephens' kangaroo rat habitat.
21. Prohibit the killing or capturing of any kangaroo rat species for the purpose of survival training within occupied Stephens' kangaroo rat habitat.
22. Prohibit the establishment of navigation points on a burrow that could belong to a Stephens' kangaroo rat.
23. No specific management measures are in place for the Southwestern Willow Flycatcher/Willow Flycatcher (*Empidonax traillii brewsteri*). Ensure compliance with general management measures, including management measures designed to protect wetlands and control invasive plants/weeds.
24. No specific management measures are in place for Quino checkerspot butterfly. Ensure compliance with general management measures that will avoid or minimize adverse impacts on Quino checkerspot butterfly suitable habitat and potential host plants. Conduct surveys for Quino checkerspot butterfly that are focused in areas with the greatest potential to support this species and those in which suitable habitat overlaps with areas of the most intensive military use.
25. No specific management measures are in place for slender-horned spineflower. Ensure compliance with general management measures that will avoid or minimize adverse impacts on slender-horned spineflower habitat. Conduct remapping of distribution of special status plant species.

iii. The Navy will prepare and file with VID an annual "Mitigation Monitoring Report" (VID 2010).

12. Implementation

12.1 Project Prescription Development

The most recent policy on Integrated Natural Resources Management Plan (INRMP) implementation is contained in Department of Defense (DoD) Memorandum *Implementation of the Sikes Act Improvement Act: Updated Guidance* (DUSD [I&E] 2002). According to the memorandum, an INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for "must fund" projects and activities;
- Ensures that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP;
- Coordinates annually with all cooperating offices and
- Documents specific INRMP action accomplishments undertaken each year.

Key elements of INRMP implementation (e.g., projects) are addressed in **Appendix C, Tables C-1** through **C-8**.

12.2 Priority Setting and Funding Classification

Project priority within this INRMP is initially determined by funding classification, as defined in Department of Defense Instruction 4715.03, *Natural Resources Conservation Program* (DoD 2011). The recurring and non-recurring conservation requirements in Department of Defense Instruction 4715.03 and in OPNAVINST 5090.1C CH-1 are as follows:

Recurring and Non-Recurring Conservation Requirements *(DoD 4715.03, 2011)*

Recurring Natural Resources Conservation Management Requirements.

a. 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, Executive Orders (Eos), and DoD policies, or in direct support of the military mission.

b. 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 recordkeeping, maintenance of natural resources conservation equipment, and compliance self-assessments.

Non-Recurring Natural Resources Management Requirements. Current Compliance. Includes installation projects and activities to support:

a. Installations currently out of compliance (e.g., received an enforcement action from an authorized Federal or state agency or local authority).

b. Signed compliance agreement or consent order.

c. Meeting requirements with applicable Federal or state laws, regulations, standards, EOs, or DoD policies.

d. Immediate and essential maintenance of operational integrity or military mission sustainment.

e. Projects or activities that will be out of compliance if not implemented in the current program year. Those activities include:

   i. Environmental analyses for natural resources conservation projects, and monitoring and studies required to assess and mitigate potential impacts of the military mission on conservation resources.

   ii. Planning documentation, master plans, compatible development planning, and INRMPs.

   iii. Natural resources planning-level surveys.

   iv. Reasonable and prudent measures included in incidental take statements of biological opinions, biological assessments, surveys, monitoring, reporting of assessment results, or habitat protection for listed, at-risk, and candidate species so that proposed or continuing actions can be modified in consultation with the USFWS or National Marine Fisheries Service (NMFS) Fisheries Service.

   v. Mitigation to meet existing regulatory permit conditions or written agreements.

   vi. Nonpoint source pollution or watershed management studies or actions needed to meet compliance dates cited in approved state coastal nonpoint source pollution control plans, as required to meet consistency determinations consistent with Coastal Zone Management.

   vii. Wetlands delineation critical for the prevention of adverse impacts to wetlands, so that continuing actions can be modified to ensure mission continuity.

   viii. Compliance with missed deadlines established in DoD-executed agreements.

Non-Recurring Natural Resources Management Requirements. Maintenance Requirements. Includes those projects and activities needed to meet an established deadline beyond the current program year and maintain compliance. Examples include:

a. Compliance with future deadlines.

b. Conservation, GIS mapping, and data management to comply with Federal, state, and local regulations, EOs, and DoD policy.

c. Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives.

d. Wetlands enhancement to minimize wetlands loss and enhance existing degraded wetlands.

e. Conservation recommendations in biological opinions issued pursuant to the ESA.

Non-Recurring Natural Resources Management Requirements. Enhancement Actions Beyond Compliance. Includes those projects and activities that 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:

a. Community outreach activities, such as International Migratory Bird Day, Earth Day, National Public Lands Day, Pollinator Week, and Arbor Day activities.

b. Educational and public awareness projects, such as interpretive displays, oral histories, Watchable Wildlife areas, nature trails, wildlife checklists, and conservation teaching materials.

c. Restoration or enhancement of natural resources when no specific compliance requirement dictates a course or timing of action.

d. Management and execution of volunteer and partnership programs.

Navy Environmental Readiness Levels *(OPNAVINST 5090.1C CH-1)*

Environmental Readiness Level 4 **(**absolute minimum level of environmental readiness capability required to maintain compliance with applicable legal requirements)**:**

a. Supports all actions specifically required by law, regulation or Executive Order (DoD Class I and II requirements) just in time.

b. 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;.

c. Supports recurring administrative, personnel and other costs associated with managing environmental programs that are necessary to meet applicable compliance requirements (DoD Class 0).

d. Supports minimum feasible Navy executive agent responsibilities, participation in Office of the Secretary of Defense (OSD) sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts.

Environmental Readiness Level 3:

a. Supports all capabilities provided by ERL4.

b. Supports existing level of Navy executive agent responsibilities, participation in OSD sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts.

c. 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.

d. Supports proactive initiatives critical to the protection of Navy operational readiness.

Environmental Readiness Level 2:

a. Supports all capabilities provided under ERL3.

b. Supports enhanced proactive initiatives critical to the protection of Navy operational readiness.

c. Supports all Navy and DoD policy requirements.

d. Supports investments in pollution reduction, compliance enhancement, energy conservation and cost reduction.

Environmental Readiness Level 1:

a. Supports all capabilities provided under ERL2.

b. 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.

c. Supports investments that demonstrate Navy environmental leadership and proactive environmental stewardship.

12.3 Project Development and Tracking

Natural resources projects are tracked and allocated funding via the Navy Environmental Program Requirements EPR-web (U.S. Navy 2006a). The database is used by the Navy to determine programming and budgeting requirements for projects under the Planning, Programming, Budget, and Execution System (PPBES) process (DoN 2007b). The information in the database is also used by the Navy to develop their annual Environmental Quality Report (EQR) for Congress (DoN 2007b).

Projects identified in **Appendix C** will need to be entered into the EPR-web to ensure that natural resources management prescriptions identified in this revised INRMP are reviewed by the chain of command, and are documented for inclusion in the annual EQR report to Congress (U.S. Navy 2006a). Once funding is allocated, natural resources personnel at NAVFAC SW Region are responsible for ensuring that EPR-web is updated with the date project funding was received, and progress made towards project completion (U.S. Navy 2006a).

In addition, the U.S. Navy (Navy) has developed two programs to assist installations in developing their INRMPs and tracking progress on INRMP implementation. The Navy INRMP Builder program was designed to assist installation personnel with developing, or revising, their installation INRMP. The Navy Metrics Builder Program was developed to assist installations evaluate INRMP implementation. Annually, each installation receives a report card informing them on where they stand in regards to INRMP implementation. The program also requires each installation to address specific questions related to implementation to ensure that the implemented INRMP meets all regulatory requirements. Navy guidance suggests that projects progress be updated at least twice per year in EPR-web, and the information will be used to answer questions in the Navy Conservation Website, which will be used to evaluate INRMP implementation (U.S. Navy 2006a).

12.4 Funding Sources and Mechanisms

The PPBES budget process employed by the DoD is an ongoing, continuously reviewed process that can be summarized as follows (DoD 2005a):

- The PPBES process consists of long-range planning to anticipate and secure requirements to meet security threats and accomplish program goals.
- Resources to meet these requirements are estimated and programmed by program managers in the Future Year Defense Plan (FYDP). The FYDP is a list of resource requirements for the next 6 years. Specifically, the FYDP comprises the subsequent fiscal year budget and funding requirements projected out 5 years.
- The FYDP resources are then analyzed via the Programming Process. In the Programming Process, program managers reassess their requirements, reprioritize planned activity, reevaluate existing funding guidance, and estimate their funding needs for the next budget year, plus the subsequent 5 fiscal years (referred to as Program Objectives Memoranda [POMs] 1–5).
- The POM process takes place within Defense Components beginning in the fall of each year. Then each DoD component submits the POM in the spring to the OSD. The OSD reviews the budget submissions and develops the President's budget that will be submitted to Congress. At the installation level, data submissions to support this are made to the Major Commands twice annually, in fall and spring.

- Based on POM decisions of each component, budget controls are issued to the field commands for budget preparation.

The time scale of an INRMP fits well into the DoD PPBES forecasting process. One full cycle of the DoD budget process includes the next budgeted fiscal year and projections for the following 5 fiscal years. One full cycle of the INRMP, with upper command reapproval, covers a 5-year period. This means that by relying on an INRMP that is updated regularly, natural resource managers should be able to project relatively accurate funding requirements for 5-year periods, at a minimum (DoD 2005a).

The Regional Commander or Commanding Officer is responsible for ensuring that NBC has sufficient staff to implement the INRMP. Each NBC facility environmental office and NAVFAC SW is responsible for annual coordination with USFWS and CDFW, requesting funds for INRMP implementation, and documenting implementation actions. However, neither is responsible for whether or not funding is allocated for a specific project. Consequently, the projects and schedules proposed in this revised INRMP are targets to facilitate natural resources program planning. When requested funds are not received, natural resource management prescriptions and the programming schedule may be reexamined. In addition, plans may be adapted to account for the revised project schedule and the proposed budget may be adjusted to account for available funding.

12.4.1 Funding Sources

Once a project has been placed into the EPR-web, a funding evaluation is completed on a case by case basis and a funding source is determined. In general, ERL 3 and 4 projects will receive funding, but it is up to natural resource managers to find funds for ERL 1 and 2 projects (U.S. Navy 2006a). The following are the primary funding sources for Navy natural resources programs (U.S. Navy 2006a):

1. **O&MN Environmental Funds**. The majority of natural resource projects are funded with Operations and Maintenance, Navy (O&MN) environmental funds. These appropriated funds are the primary source of resources to support must-fund, just-in-time environmental compliance (i.e., Navy ERL 4 projects). O&MN funds are generally not available for Navy Environmental Readiness Level 3 - 1 projects. In addition to the restriction to Environmental Readiness Level 4 requirements, there are other limitations placed on the use of O&MN funds:
    a. Only the initial procurement, construction, and modification of a facility or project are considered valid environmental funding requirements. The subsequent operation, modification due to mission requirements, maintenance, repair, and eventual replacement is considered a Real Property Maintenance (RPM) funding requirement. For example, the cost of initially installing a BMP can be funded through O&MN, but future maintenance or repair of that BMP must be paid by RPM funds.
    b. When natural resource requirements are tied to a specific construction project or other action, funds for the natural resource requirements should be included in the overall project costs. For example, if a permit for filling wetlands is required as part of a military construction (MILCON) project, the costs of obtaining the permit and implementing required mitigation should be paid by MILCON funds as part of the overall construction project costs.
2. **Legacy Funds.** The Legacy Resource Management Program (Legacy Program) is a special congressionally mandated initiative to fund military conservation projects. The Legacy Program can provide funding for a variety of conservation projects, such as regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, monitoring and predicting migratory patterns of birds and animals, and national

partnerships and initiatives, such as National Public Lands Day. If the installation plans to request Legacy Program funds, it should be aware of the following:

a. The availability of Legacy funds is generally uncertain early in the year and Legacy funds are generally not awarded for single-installation or compliance-driven projects.

b. Pre-proposals for Legacy projects are due in March and submitted using the Legacy Tracker Website: *http://www.dodlegacy.org/*.

c. Project proposals are reviewed by the Navy chain of command before being submitted to the DoD Legacy Resources Management Office for final project selection.

d. The Legacy Website provides further guidance on the proposal process and types of projects requested.

3. **Agricultural Outleasing.** Money collected through the leasing of Navy-owned property for agricultural use is directed back into the natural resources program and reallocated throughout the Navy by NAVFAC HQ. These funds are available to natural resource managers primarily for agricultural outlease improvements, and potentially for natural resources management and stewardship projects once the primary objective is met. These funds would apply to the agricultural outlease at NOLF IB. Agricultural and grazing outlease revenues are available for the following:

   a. Administrative expenses of lease (salaries of professional and technical support of the grazing and cropland programs in direct support of agricultural or grazing outlease which meet INRMP goals and objectives, training, scientific meetings, parts and supplies).

   b. Initiation, improvement, and perpetuation of agricultural or grazing outleases (increased productivity, reduced soil erosion, and fencing).

   c. Implementation of INRMP Stewardship Projects (compliance measures should be budgeted from O&MN Conservation POM process).

   d. The NAVFAC field office sends a request for project proposals for agricultural or grazing outleasing funds to the regions and installations in November of each year. Proposals are submitted to the field office and reviewed. Recommended projects are forwarded to NAVFAC HQ for final review and project selection. While the available funding varies from year to year, this is one of the more consistent funding sources for implementing INRMP projects that are not Level 1 requirements. The installation should contact the field office for additional information on funding availability and timeline.

4. **Recycling Funds.** An installation with a Qualified Recycling Program (QRP) may use proceeds for some types of natural resource projects. Proceeds must first be used to cover QRP costs. Up to 50 percent of net proceeds may then be used for pollution abatement, pollution prevention, composting, alternative fueled vehicle infrastructure support, vehicle conversion, energy conversion, or occupational safety and health projects, with first consideration given to projects included in the installation's pollution-prevention plans. Remaining funds may be transferred to the non-appropriated MWR account for approved programs, or retained to cover anticipated future program costs. Natural resource projects can be funded as pollution prevention/abatement (e.g., wetlands or riparian forest restoration) or MWR projects (e.g., trail construction and maintenance).

5. **Strategic Environmental Research and Development Program (SERDP) Funds:** SERDP is DoD's corporate environmental R&D program, planned and executing in full partnership with the Department of Energy (DOE) and EPA, with participation by numerous other Federal and

non-Federal organizations. SERDP funds for environmental and conservation are allocated through a competitive process. Within its broad areas of interest the SERDP focuses on Cleanup, Compliance, Conservation, and Pollution Preventions technologies. The purpose of the conservation technology program is to use research and development to provide improved inventory and monitoring capabilities; develop more effective impact and risk assessment techniques; and provide improved mitigation and rehabilitation capabilities. Recently, the program solicited Statements of Need for conservation technology proposals to research indicators of stress on threatened and endangered species and to develop techniques to inventory and monitor threatened and endangered species in accessible areas.

6. **Non-DoD Funds.** Many grant programs are available for natural resources 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 partner with other groups to propose eligible projects. Below is one example of a grant program:

    a. The Five-Star Restoration Challenge Grants Program is sponsored by the National Association of Counties, National Association of Service and Conservation Corps, National Fish and Wildlife Foundation, and Wildlife Habitat Council in cooperation with EPA, NMFS, and other sponsors. This program provides modest financial assistance ($5,000-$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/*. INRMPs should include valid Class 2 and 3 projects and actions that would enhance an installation's natural resources.

    b. National Public Lands Day Grants. Installations are eligible to receive DoD Legacy funds in support of National Public Lands Day. Project eligible for funds include habitat restoration, wetland restoration, and stream cleanup.

12.4.2 Beneficial Partnerships and Collaborative Resources Planning

Effective communication among personnel from different offices is vital for ensuring that site activities are implemented as planned under the INRMP. An ecosystem approach to natural resources management also requires managers to look beyond site boundaries to non-DoD partners. There are many agencies, organizations, and other institutions that can assist in implementing an INRMP. It is Navy policy to encourage local and regional partnerships to implement an INRMP. The following sections discuss other potential organizations that could provide support with INRMP implementation.

12.4.3 Other DoD Organizations and Programs

12.4.3.1 DoD Partners in Flight

It is DoD policy to promote and support the Partners in Flight (PIF) initiative that protects and conserves neotropical migratory birds and their habitats. The DoD and its components support PIF by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems on their lands, consistent with military missions. DoD PIF includes national working groups to deal with local and regional problems. NBC can coordinate with and seek assistance from the DoD PIF West Region Working Group to manage for particular migratory birds species.

12.4.3.2 DoD Legacy Resource Management Program

Congress instituted the DoD Legacy Resources Management Program in 1991 to promote stewardship of natural and cultural resources on DoD lands. The intent of the Program is to fund natural and cultural resources management projects that may go unfunded through normal funding procedures. Legacy projects typically demonstrate innovative techniques for management, conservation, and preservation of natural and cultural resources. Legacy funds may be requested annually in accordance with instructions provided by the Office of the Deputy Under Secretary of Defense for Installations and Environment (DUSD[I&E]) and CNO.

12.4.3.3 U.S. Army Corps of Engineers

The USACE provides contract management, construction management, and technical support. NBC has the option to use USACE contracts as vehicles for natural resource management and to access USACE organizations, such as the U.S. Army Engineer Research and Development Center for technical assistance and support for natural resources projects.

In addition, the USACE has regulatory authority over waters of the United States (navigable waters and ephemeral streams with a significant nexus to navigable waters), which include activities within perennial and intermittent streams, and wetlands. Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill materials into the waters of the United States, including wetlands. Therefore, even an inadvertent encroachment into wetlands or other waters of the United States resulting in displacement or movement of soil or fill materials has the potential to be viewed as a violation of the CWA if an appropriate permit has not been issued by the USACE.

12.4.3.4 Armed Forces Pest Management Board

The Armed Forces Pest Management Board (AFPMB) recommends policy, provides guidance, and coordinates the exchange of information on all matters related to pest management throughout the DoD. The AFPMB's mission is to ensure that environmentally sound and effective programs are present to prevent pests and disease vectors from adversely affecting DoD operations. The AFPMB Natural Resources Committee provides guidance on integrating pest management and natural resource management programs including:

1. Addressing wildlife damage management and pest management requirements in aquatic, riparian, and wetland environments.
2. Identifying conflicts between threatened and endangered species and pest management actions.
3. Integrating pest management considerations with natural resources program responsibilities regarding vegetation management, forest insect and disease damage, and pest damage to ornamentals.
4. Coordinating approval and use of pesticides for vegetation management and other natural resources programs.
5. Initiating and/or reviewing research regarding natural resource pest management requirements/considerations.

12.4.4 Other Federal Agencies and Programs

12.4.4.1 U.S. Environmental Protection Agency

The EPA leads the nation's environmental science, research, education and assessment efforts. Its activities include developing and enforcing environmental regulations, providing financial assistance to state environmental programs, non-profits and educational institutions, performing environmental research at laboratories located nationwide, sponsoring voluntary partnerships and programs, and providing environmental education (EPA 2009). The EPA also provides guidance for managing wetlands and ERP sites.

12.4.4.2 Natural Resources Conservation Service

The NRCS has several natural resources conservation programs that could assist NBC in managing resources including conserving soils, improving water quality, increasing wildlife habitat, and reducing damage resulting from floods, or other natural disasters (NRCS 2010).

- NBC, as part of DoD, benefits from the November 2006 MOU between DoD and USDA NRCS signed a MOU agreeing to coordinate activities to preserve land and improve water quality on lands surrounding government-owned military bases

12.4.4.3 U.S. Department of Agriculture – Wildlife Services

The mission of USDA-Wildlife Services (WS) is "to provide Federal leadership in managing problems caused by wildlife... [by] helping to solve problems that occur when human activity and wildlife are in conflict with one another" (USDA-WS 2009). The USDA-WS can be contracted by the Navy to monitor nuisance wildlife, and provide nuisance and non-native fauna control.

12.4.4.4 U.S. Geological Survey (USGS)

The USGS is a multi-disciplinary organization that provides scientific information on biology, geography, geology, geospatial information, and water, to minimize damage from natural disasters; and manage the nation's water, biological, energy, and mineral resources. The USGS could assist NBC by helping design biological, water quality, and hydrologic surveys, and facilitating the integration of NBC data into national or regional databases.

12.4.5 State Agencies

12.4.5.1 California Department of Water Resources

The California Department of Water Resources (CDWR) is responsible for managing the water resources within California to "benefit the State's people, and to protect, restore, and enhance the natural and human environments" (CDWR 2009). Strategic planning goals for the agency include (CDWR 2009):

1. Develop and assess strategies for managing the State's water resources, including development of the California Water Plan Update.

2. Plan, design, construct, operate, and maintain the State Water Project to achieve maximum flexibility, safety, and reliability.
3. Protect and improve the water resources and dependent ecosystems of statewide significance, including the Sacramento-San Joaquin Bay-Delta Estuary.
4. Protect lives and infrastructure as they relate to dams, floods, droughts, and watersheds impacted by fire and disasters, and assist in other emergencies.
5. Provide policy direction and legislative guidance on water and energy issues and educate the public on the importance, hazards, and efficient use of water.
6. Support local planning and integrated regional water management through technical and financial assistance.
7. Perform efficiently all statutory, legal, and fiduciary responsibilities regarding management of State long-term power contracts and servicing of power revenue bonds.
8. Provide professional, cost-effective, and timely services in support of DWR's programs, consistent with governmental regulatory and policy requirements.

12.4.5.2 California Environmental Protection Agency

San Diego County is included in California Environmental Protection Agency (Cal/EPA) Region 7 (Cal/EPA 2009). Stormwater is managed and permits are issued under California NPDES by the Colorado River Basin Regional Water Quality Control Board (Cal/EPA 2009). Through issuance of permits, Cal/EPA can assist NBC in maintaining healthy waters and streams, and ensure a no net loss of wetland acreage on base.

- NBC, as part of DoD, benefits from the 1996 MOU between the EPA and DoD for coordinating of Integrated Pest Management activities.

12.4.5.3 California Biodiversity Council

The California Biodiversity Council (CBC) was established in 1991 to "improve coordination and cooperation between the various resource management and environmental protection organizations at Federal, state, and local levels" (CBC 2009). The CBC is comprised of 42 members that represent Federal, state and local government agencies within California, and is co-chaired by the California Secretary for Natural Resources and BLM (CBC 2009). The goal of the CBC is to strengthen "ties between local communities and governments…by way of promoting strong local leadership and encouraging comprehensive solutions to regional issues" (CBC 2009).

12.4.6 Regional and Local Agencies

Local governments and agencies can also have an important role in implementing this INRMP, particularly with respect to helping NBC accomplish ecosystem and watershed management objectives. A couple of these local entities include the San Diego County Department of Planning and Land Use, and the cities of San Diego, Imperial Beach, and Coronado.

12.4.7 Colleges and Universities

Universities, state agencies, and non-profit organizations, may be contracted to provide technical support in natural resources management and technical expertise on specific resource issues. Twenty-three universities and research institutions, along with 12 Federal agencies (including DoD) comprise the California Cooperative Ecosystems Studies Unit (CA-CESU), and CDFW. DoD can participate in 14 of the 17 CESUs nation-wide (*http://www.cesu.psu.edu/default.htm*). The host institution for the CA-CESU is the University of California at Berkeley. The mission of the CA-CESU is "to provide research, technical assistance and education across the biological, physical, social, and cultural sciences to address natural and cultural resource management issues at multiple scales and in an ecosystem context in California and nationally as appropriate" (CA-CESU 2004). The CA-CESU was established in July 2003 through a cooperative agreement. Therefore, NBC has access to any of the partners in the CESU and can acquire their technical assistance through a task agreement.

12.4.8 Contractors

Contractors may be hired to perform specialized management projects or provide technical knowledge about natural resources management. Contractors must adhere to the requirements and management actions detailed in the INRMP. Examples of contractor support in the assistance of NBC natural resource goals implementation include:

- Endangered species surveys;
- Invasive species surveys;
- Soil surveys;
- Wetland delineations;
- Monitoring plan development and
- Habitat enhancement.

12.4.9 Nonprofit Organizations

12.4.9.1 The Nature Conservancy

The Nature Conservancy (TNC) and DoD signed a cooperative agreement in 1988. This agreement allows installation commanders to obtain technical assistance from TNC and to participate in programs and projects of mutual interest. It also permits TNC to study significant ecosystems under the Navy's control. Natural Resources staff at NBC can benefit from this agreement thru use of TNC resources and staff to manage natural resources on the installation.

- NBC, as part of DoD, benefits from the 1996 cooperative agreement between DoD and TNC for conducting natural resources inventories at installations.

12.4.9.2 NatureServe and State Heritage Programs

NatureServe is a non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action. NatureServe and its network of natural heritage programs are the leading source for information about rare and endangered species and threatened ecosystems.

NatureServe represents an international network of biological inventories-known as natural heritage programs or conservation data centers operating in all 50 United States, Canada, Latin America and the Caribbean. Together they not only collect and manage detailed local information on plants, animals, and ecosystems, but develop information products, data management tools, and conservation services to help meet local, national, and global conservation needs. The objective scientific information about species and ecosystems developed by NatureServe is used by conservation groups, government agencies, corporations, academia, and the public-to make informed decisions about managing our natural resources. NatureServe has a long history of working with DoD to accomplish mutual conservation goals, and natural resources managers can use the NatureServe resources to manage resources on NBC.

12.4.9.3 Trust for Public Land

The Trust for Public Land is a nonprofit agency whose mission is to "conserve land for people to enjoy as parks, community gardens, historic sites, rural lands, and other natural places, ensuring livable communities for generations to come (Trust for Public Land 2009). The agency has partnered with DoD to battle encroachment around military bases. The Navy and NBC can partner with the Trust for Public Land and acquire lands for conservation around NBC under the Encroachment Partnering Program.

12.5 Effectiveness of INRMP Providing No-Net-Loss to Military Mission

The Sikes Act as amended requires 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. The NBC Environmental Department (ED) is responsible for identifying natural resources personnel requirements to accomplish INRMP goals and objectives. The NBC ED is also responsible for allocating existing budgetary and personnel resources and then identifying staffing needs based on any additional current and future projects. 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. Staff coordination may include installation biologists, other Public Works Departments, other installation personnel, and Business Line Teams. In addition, contractual support, partnerships, and cooperative agreements are needed to support the conservation program. The following NBC ED staffing is required to implement this INRMP at NBC:

Current Positions

- Environmental Program Manager
- INRMP Program Manager
- Wildlife Biologist
- Botanist
- NEPA Coordinator

Positions Needed

- Field Technician.

Implementation of this INRMP by NBC will ensure that the natural resources on NBC will continue to support the NBC mission. This INRMP revision strives to integrate natural resources management with other base plans and activities. It also establishes goals that represent a long-term vision for the health and quality of NBC's natural resources. The INRMP goals may be revised over time to reflect changing missions and environmental conditions. Any future changes in mission, training activity, or technology should be analyzed to assess its impact on natural resources. As new plans and Navy guidance and regulations are developed, they will be integrated with the goals and management actions of this INRMP. The INRMP will be reviewed, assessed, and modified as needed on a regular basis to ensure continued integration with other management plans or changes in military mission.

12.6 Formal Adoption of INRMP by Regional Commander

By signing this revised INRMP, the Regional Commander or Commanding Officer is committing to "seek funding and execute, subject to the availability of funding, all ERL Level 4 projects and activities in accordance with specific timeframes identified in the INRMP" (U.S. Navy 2006a).

12.7 Annual Update and Review

Navy guidance directs installations to coordinate their annual program evaluation with the appropriate field-level offices of the USFWS and the state fish and wildlife agency (for NBC, CDFW), to enable partners to measure both the successes and issues resulting from INRMP implementation (U.S. Navy 2006a). Results of the evaluation are used by natural resources managers to determine the effectiveness of the installation natural resources management program, to facilitate annual coordination with USFWS and the state fish and wildlife agency, and to provide data for the Navy portion of the DoD annual report to Congress (U.S. Navy 2006a). For additional information on the evaluation process, refer to **Appendix J**.

12.8 Professional Education for Naval Base Coronado Staff

Continuing education, training courses, and workshops allow managers to stay up to date with the latest research findings and application techniques. Membership in professional societies is encouraged, including The Wildlife Society, Society of Range Management, National Military Fish and Wildlife Association (NMFWA), Society for Ecological Restoration, the California Native Plant Society, and the Society for Conservation Biology. These societies produce some of the best scientific publications in natural resources. Meetings of these societies also provide excellent ways to communicate with fellow professionals, and to maintain professional standards.

Environmental personnel are encouraged to join professional societies and become active members. Personnel are sent to as many meetings as feasible to meet with other professionals to exchange ideas and attend technical meetings. Maintenance and enhancement of professional skills are emphasized.

At least one environmental staff person from NBC should, if funding allows, attend the following recommended annual workshops or professional conferences as funding permit (this is not an inclusive list and other relevant workshops or conferences may be attended):

- National Military Fish and Wildlife Association annual workshop;
- North American Natural Resources Conference;
- Western Association of Fish and Wildlife Agencies;
- The Wildlife Society Conference (national, section, and chapter levels);
- International Erosion Control Association Conference and
- Environmental Systems Research Institute (ESRI) Users GIS Conference.

Other conferences/workshops will be evaluated for their usefulness. Decisions will be made based on the appropriateness to ongoing projects and funding availability. Training that is especially useful includes endangered species workshops, GIS basic and advanced training, watchable wildlife workshops, wetlands training, and Partners in Flight workshops. It is especially useful to have as many people as possible attend NMFWA workshops, and efforts will be made to have more than minimal attendance at that meeting. Personnel will be trained in related environmental fields. NEPA training is required of all personnel who review or prepare NEPA documents.

It is important to provide training for enforcement officers assigned to Game Warden duties, a requirement of the Sikes Act Improvement Act. New personnel will attend basic enforcement training. Wardens will also receive training in enforcing the Archaeological Resources Protection Act, ESA, MBTA, and other laws relating to NBC. They will attend the NMFWA annual refresher training to the greatest extent possible.

13. List of Preparers

This INRMP was prepared by HDR under the direction of Naval Facilities Engineering Command, Southwest, N62473-07-D-3204. The individuals who contributed to the preparation of this document are listed below.

Summer Adleberg
B.S. Renewable Natural Resources, Rangeland, Watershed, and Wildlife Management
Years of Experience: 7

Brodie Ayers
Masters Certificate: GIS
B.S. Aeronautical Science
Years of Experience: 2 (GIS)

Kelly Butcher-Bridget
B.S. Biology
Years of Experience: 12

Shawn Carroll
B.S. Conservation Biology
Years of Experience: 6

Shannon Cauley
B.S. Geology
Graduate Studies Natural Resources
Graduate Studies Geology
USACE Certified Wetland Delineator
Certified Professional Soil Scientist
Years of Experience: 27

Chip Chadbourne
B.S. Geography
Years of Experience: 16

Rod Dossey
B.S. Ecology
Years of Experience: 19

Kelly Flickinger
B.S. Wildlife Management
Years of Experience: 2

Dustin Janeke
M.A. Biology
Years of Experience: 12

Jennifer LeClair
B.A. Biology
Years of Experience: 2

James (Ken) McCarron, PhD
B.S. Biology
M.S. Ecology
Ph.D. Plant Ecology
Years of Experience: 20

Christopher McJetters
B.A. English
Years of Experience: 4

Cheryl Myers
A.A.S. Nursing
Years of Experience: 20

Amanda Peyton
B.S. Biology/Environmental Science
Graduate Studies Natural Resources
Years of Experience: 12

Rebecca Ralston
B.S. Natural Resources/Environmental Science
M.S. Forestry
Years of Experience: 10

Joseph Schroeder
B.S. Rangeland Ecology and Management
Years of Experience: 7

Jason Smiley
M.S. Geography
B.S. Education
Years of Experience: 12

Michelle Striler
Non-degreed Professional
Years of Experience: 18

John Timpone
M.A. Wildlife Biology
Years of Experience: 7

In addition, the Navy and external stakeholders were invited to participate in the development of this document. The individuals who contributed to the preparation of this document are listed below.

Name	Affiliation
Adrianne Saboya*	Naval Special Warfare Command
Al Beaty	Naval Explosives Ordnance Disposal
Alex Bethke	NAVFAC, Historian
Alex Ibarra*	NAVFAC, Asset Management
Alex Stone	U.S. Commander Pacific Fleet, NEPA
Alex Wann	NBC, Command Judge Advocate
Andy Yatsko	NAVFAC, Archeologist
Angela Morrow	Vista Irrigation District
Angelic Dolan	NBC, Public Affairs Officer
Arlene Arnold*	NAVFAC, Ornithologist
Barry Francis	Naval Special Warfare Command
Betsy Miller	City of SD Parks and Recreation Dept.
Brenda Bautista	NBC, Public Works Planning Dept.
Brian Collins	USFWS, San Diego Wildlife Refuge Complex
Bruce Shaffer*	NBC, Community Plans Liaison
Bryan Munson*	NBC, Botanist
CDR Amerdev Jouhal	NBC, Air Operations
CDR Gerald Macenas	Navy SERE West
CDR Heather Watts	CNRSW, Counsel
Chris Cervantes	Naval Beach Group One
Chris Peregrine	California Department of Parks and Recreation
Chris Stathos	CNRSW, Regional Environmental Coordinator
Christopher Sund*	NBC, Executive Officer
CDR Heather Henderson *	CNRSW, Counsel
D Credico	Lincoln Property Company
Dan Barosso	NBC, Public Works Planning Dept.
Darius Randolph	Navy Maritime Expeditionary Security Group One
David Freeman	NBC, Environmental Program Hazardous Waste
David Zoutendyk	USFWS, Carlsbad Field Office
Dean Cummings	Naval Special Warfare Command
Deb McKay*	Space and Naval Warfare Systems Command, NEPA
Debbie Hobbs*	USFS, Cleveland National Forest
Dennis Gilbert	Naval Special Warfare Command
Dennis Schouten	NBC, Morale, Welfare, and Recreation
Derek Watson	NBC, Air Operations
Don Johnson	Naval Beach Group One
Don Smith*	Vista Irrigation District
Edd Sandusky	NBC, Public Works

Eric Chavez	NOAA
Gary Mayes	NBC, Commanding Officer
Joyce Schlacter*	DoI, Bureau of Land Management
Jacqueline Rice*	Commander U.S. Pacific Fleet, Natural Resources
Jeff Wells	USFS, Cleveland National Forest
Jennifer Edwards*	California Department of Fish and Wildlife
Jennifer Thomas	NBC, Public Works Planning Dept.
Jere Diersing	NAVFAC, Counsel
Jessica Bredvick*	NAVFAC, Marine Biologist
Jim Bailey	NBC, Public Works Facilities
Jim John	NBC, Air Operations
Jim Nakagawa*	City of Imperial Beach, City Planner
Joan Friedlander	USFS, Cleveland National Forest
John Locke	NBC, Water Quality
Karen Goebel	USFWS, Carlsbad Field Office
Kari Coler*	NAVFAC, NEPA Planner
Kirsten Winter*	USFS, Cleveland National Forest
Kurt Roblek	USFWS, San Diego Wildlife Refuge Complex
LCDR Eric Powell	NBC, Air Operations
LCDR Greg Milicic	Navy Beach Master Unit 1
Lee Fox	NBC, NAB Officer in Charge
Lee Lunsway	NBC, Environmental Air Quality
Lee Troupe	Naval Special Warfare Command
Linda Bergum	Expeditionary Warfare Training Group, Pacific
Lisa Seneca	NAVFAC, NEPA
Luis Perez	NBC, Installation Environmental Program Manager
Luke Greene	Naval Amphibious Construction Battalion One
Malissia Chitwood	NBC, NOLF Officer in Charge
Marco Vides	NBC, Security Officer
Matthew Wright	Naval Special Warfare Command
Melanie Ravan	CNRSW, Counsel
Meredith Osborne	California Department of Fish and Wildlife
Michael Medina*	NAVFAC, Integrated Pest Management
Michael Pound*	NAVFAC, Environmental Restoration
Michelle Cox*	NAVFAC, Natural Resources Specialist
Miles Ford	NBC, Small Arms Range
Mindy Fogg	San Diego County, Environmental Planner
Monica DeAngelis*	NOAA
Nancy Ferguson*	USFWS, Carlsbad Field Office
Noah Bellringer	Navy Maritime Expeditionary Security Group One
Patrick McCay*	NBC, Planning

Regina Clifford	Lincoln Property Company
Rachel Hurst	City of Coronado, Director of Community Development, Redevelopment & Housing Services
Randy Jackson	Naval Special Warfare Command
Rebecca Kelly	NAVFAC, Real Estate
Rebecca Loomis	NAVFAC, NEPA
Rene Sandoval	NBC, Physical Security
Rich Johnston	NBC Public Works Deputy
Rick Basinet	NAVFAC, Business Line Team Lead
Robert Duncan*	NBC RTSWS Facilities
Sandy Vissman*	USFWS, Carlsbad Field Office
Scott Goodman*	NBC, Physical Security
Scott Penwell*	Naval Special Warfare Command
Shannon Shea*	NAVFAC, INRMP Coordinator
Sherry Ashbaugh	Space and Naval Warfare Systems Command, NEPA
Slader Buck*	USFWS, San Diego Wildlife Refuge Complex
Stephen Jackson	NBC, Public Works Officer
Steve Eastwood*	USFS, Cleveland National Forest
Susan North*	CFWO
Suzanne Smith	CNRSW, NEPA
Tammy Conkle*	NAVFAC HQ, Biology Program Lead
Teresa Bresler*	NAVFAC, NEPA
Teresa Rios	NAVFAC, Real Estate
Tiffany Shepherd*	NBC, Wildlife Biologist
Timothy Latas*	NBC, Range Coordinator
Tinina Guzman*	NAVFAC, Environmental Restoration
Tom Augustine	NBC, Range Safety Officer
Valerie Cook	Naval Special Warfare Command
Vicky Ngo*	NBC, NEPA Planner
Victoria Touchstone	USFWS, San Diego Wildlife Refuge Complex
Walt Wilson*	CNRSW, Marine Biologist
Zayanne Gardner	YMCA Camp Surf Director

* These individuals contributed to or provided input on the 2013 revision of the NBC INRMP.

14. References

14.1 Report References

Allen 1999 — Allen, L.G. 1999. Fisheries Inventory and Utilization of San Diego Bay, 5th Annual Report, FY 1997–99. California State University Northridge Nearshore Marine Fish Research Program, under Contract with U.S. Department of the Navy Southwest Division Naval Facilities Engineering Command, San Diego, CA. 1999.

Bailey 1995 — Bailey, R.G. 1995. Descriptions of the Ecoregions of the United States, Second Edition. Pub. No. 1391 (rev.), Washington, D.C.: USDA Forest Service. 1995.

Barnhill 2001 — Barnhill, Stephen, Natural Resources Office, Commander Navy Region Southwest. 2001. Interview. 2001.

Benton et. al. 2008 — Benton, N. J.D. Ripley, and F. Powledge, eds. 2008. Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers. 2008 edition. Available online <http://www.dodbiodiversity.org>. Arlington, Virginia: NatureServe. 2008.

BLM 1994 — Bureau of Land Management. South Coast Resource Management Plan and Record of Decision. June 1994

Bond 1977 — Bond, S. I. 1977. An Annotated List of the Mammals of San Diego County, California. San Diego Society of Natural History Transactions 18(14):229-248.

Brehme et al. 2011 — Brehme, C.S., Clark, D.R., and R.N. Fisher. 2012. Stephens' Kangaroo Rat Monitoring Results on Naval Base Coronado, Remote Training Site, Warner Springs, 2010/2011 Data Summary prepared for Environmental Department, Naval Base Coronado. 24pp.

Brown and Caldwel 2009 — Brown and Caldwell/ Accord Engineering, Inc, July 2009. Final Site Management Plan, July 2005-June 2008, Naval Air Station North Island, Coronado, California.

Burns 1997 — Burns, D. M. (ed.). 1997. Geology of San Diego County. San Diego: Sunbelt Publications.

CA-CESU 2004 — Californian Cooperative Ecosystem Studies Unit (CA-CESU). 2004. Californian Cooperative Ecosystem Studies Unit Strategic Plan. November 2004.

Cal/EPA 2009 — California Environmental Protection Agency (Cal/EPA). 2009. Colorado River Basin Regional Water Quality Control Board: Fact Sheet. Available online <http://www.waterboards.ca.gov/coloradoriver/water_issues/available_documents/docs/r7_facts.pdf>. Accessed 01 July 2009.

California Coastal Commission 2006 — California Coastal Commission. 2006. "Tijuana River Estuary CCA." California's Critical Coastal Areas State of the CCAs Report. 2 June 2006.

California State Parks 2009 — California State Parks. 2009. "Tijuana Estuary NP Point of Interest." Available online: <http://www.parks.ca.gov/?page_id=669>. Accessed 8 October 2010.

Cal-IPC 2006 — California Invasive Plant Council (Cal-IPC). 2006. California Invasive Plant Inventory. February 2006.

CA LCC 2013 — California Landscape Conservation Cooperative. Accessed Febraury 02, 2013: <http://californialcc.org/about-us/our-mission-and-goals>.

CA-NRCS 2007 — California Natural Resources Conservation Service (CA-NRCS). 2007 Drought Help – California. Available online <http://www.ca.nrcs.usda.gov/features/cadrought.html>. Accessed 27 March 2009.

Carretta et al. 2007 — Carretta, J.V., K.A. Forney, M.M. Muto, J. Barlow, J. Baker, B. Hanson, and M.S. Lowry. 2007. U.S. Pacific marine mammal stock assessments: 2006. NOAA-TM-NMFS-SWFSC-398. 321 pp. 2007.

CBC 2009 — California Biodiversity Council (CBC). 2009. Home Page. Available online <http://biodiversity.ca.gov/>. Accessed 01 July 2009.

CBI 2003 — Conservation Biology Institute (CBI). 2003. La Posta Linkage Portfolio, San Diego County, California. July 2003.

CCCC 2006 — California Climate Change Center (CCCC). Our Changing Climate: Assessing the Risks to California. July 2006.

CCE 2005 — University of California Cooperative Extension (CCE). 2005. Native California oaks losing leaves early. Available online <http://news.ucanr.org/newsstorymain.cfm?story=698>. Accessed 15 April 2009.

CDFG 2007 — California Wildlife Conservation Challenges: California's Wildlife Action Plan. Available online <http://www.dfg/ca.gov/habitats/wdp/>. 2007.

CDFG 2009a — About the California Department of Fish and Game. Available online <http://www.dfg.ca.gov/about/>. Accessed 11 May 2009.

CDFG 2009b — Resource Management: Wildlife Action Plan. Available online <http://www.dfg.ca.gov/wildlife/WAP/>. Accessed 23 June 2009.

CDFG 2009c — Invasive Species in California. Available online <http://www.dfg.ca.gov/invasives/>. Accessed 27 March 2009.

CDFG 2010a — State and Federally Listed Endangered, Threatened, and Rare Plants of California. July 2010.

CDFG 2010b — State and Federally Listed Endangered and Threatened Animals of California. January 2010.

CDFG 2010c	"San Luis Rey River Watershed." Coastal Watershed Planning and Assessment Program. Available online: <http://coastalwatersheds.ca.gov/Watersheds/SouthCoast/SanLuisReyRiver/tabit/432/Default.aspx>. Accessed 26 October 2010.
CDPR 1984	California Department of Parks and Recreation (CDPR). 1984. Silver Strand Beach General Plan. 1984.
CDPR 1999	California Department of Parks and Recreation (CDPR) 1999. U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration. Comprehensive Management Plan for Tijuana River National Estuarine Research Reserve and Tijuana Slough National Wildlife Refuge. Prepared by CONCUR, Inc., Berkeley, CA. - Cited from U.S. Navy 2002a
CDWR 2003	California Department of Water Resources (CDWR). 2003. California's Groundwater. Bulletin 118 update 2003. Available online: <http://www.water.ca.gov/groundwater/bulletin118/bulletin118update2003.cfm> Accessed 26 October 2010.
CDWR 2009	Mission and Goals. <http://wwwdwr.water.ca.gov/about/mission.cfm>. Accessed 01 July 2009.
City of San Diego 1998	Final Multiple Species Conservation Program: MSCP Plan. August 1998.
City of San Diego 2011	MSCP Management Actions Report, City of San Diego, Parks and Recreation Department and Public Utilities Department. 2011
Clark et al. 2011	Clark, D. R., C. S. Brehme and R. N. Fisher. 2011. Arroyo Toad Monitoring Results at Naval Base Coronado, Remote Training Site, Warner Springs, 2010. U.S. Geological Survey Data Summary prepared for Environmental Department, Naval Base Coronado. 31 pp.
CMM TCDP 2011	Training Complex Development Plan. Prepared by NAVFAC. 2011
CNDDB 2009	California Natural Diversity Database. 2009. Available online <http://www.calflora.org>. 2009.
CNIC 2012	Commander, Naval Installation Command (CNIC). 2009. Available online < http://www.cnic.navy.mil/Coronado/About/MissionAndVision/index.htm>. Accessed 07 May 2012.
CNPS 2010	California Native Plant Society (CNPS). Inventory of Rare and Endangered Plants. Available online <http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi/Home>. Accessed August 20, 2010.
COMTF 2009	California Oak Mortality Task Force (COMTF). History and Background. Available online <http://www.suddenoakdeath.org/html/history___background.html>. Accessed 15 April 2009.

Conkle 2004	Conkle, T. 2004. Email from Ms. Tamara Conkle (CNRSW Environmental Department) to Commander Michael D Phillips (NRSW N3A1) and Commander Julius Washington (FACILITIES) regarding a Burrowing Owl Marked on NOLF IB. 2 February 2004.
DoD 2005a	Department of Defense (DoD). 2005a. Implementation of Sikes Act Improvement Amendments: Supplemental Guidance Concerning Leased Lands. May 2005.
DoD 2007	DoD. 2007. Guidance to Implement the Memorandum of Understanding to Promote the Conservation of Migratory Birds. 03 April 2007.
DoD 2011	DoD. 2011. Department of Defense Directive 4715.03, Environmental Conservation Program. 2011.
DoD 2012	DoD 2012. Unified Facilities Criteria, DoD Minimum Antiterrorism Standards for Buildings. 09 Febraury 2012.
DoD et al. 2006	DoD, U.S. Fish and Wildlife Service, and the International Association of Fish and Wildlife Agencies. 2006. Cooperative Integrated Natural Resource Management Program on Military Installations. January 2006.
DoD Legacy 2010a	DoD Legacy Resource Management Program. 2010a. Natural Resource Conservation Program: The Facts About Pollinators. Available online <https://www.denix.osd.mil/portal/page/portal/NaturalResources/OtherConservationTools/EcosystemServices/Pollinator_-_General_Factsheet_8-7-09(4).pdf.> Accessed 05 August 2010.
DoD Legacy 2010b	DoD Legacy Resource Management Program. 2010b. Pollinator Habitat Restoration for DoD Land Managers. Available online <http://www.dodpollinatorworkshop.com/Legacy.html> Accessed 02 February 2010.
DoN 2007	Department of Navy (DoN). OPNAVINST 11010.40 Encroachment Management Program. 27 March 2007.
DoN 2007a	DoN. 2007a. Chief of Naval Operational Instructions (OPNAVINST) 5090.1C CH-1 Navy Environmental and Natural Resources Program Manual. Chapter 24: Natural Resources. October 2007.
DoN 2007b	DoN. 2007b. OPNAVINST 5090.1C CH-1 Navy Environmental and Natural Resources Program Manual. Chapter 2: Funding. October 2007.
DoN 2008	DoN. 2008. Draft Environmental Impact Statement/Overseas Environmental Impact Statement for the Southern California Range Complex. April 2008.
DoN 2009	DoN. 2009. OPNAVINST 5530.14E Navy Physical Security and Law Enforcement Program. January 2009.
DON 2012	DoN 2012, Department of Navy (DoN). 2012. Chief of Naval Operational Instructions (OPNAVINST) 6250.4C Navy Pest Management Programs. 11 April 2012."

DoN WESTDIV 1989	DoN WESTDIV. 1989. Natural Resource Management Plan Naval Amphibious Base, Coronado, California. Prepared by U.S. Department of Agriculture Soil Conservation Service. San Bruno, CA. 1989.
DUSD (I&E) 2002	Deputy Under Secretary of Defense (Installations and Environment) (DUSD [I&E]) Memo, Implementation of the Sikes Act Improvement Act: Updated Guidance, 10 October 2002.
DUSD (I&E) 2005a	Deputy Under Secretary of Defense (Installations and Environment) Memo. 2005a. Memorandum providing policy on the applicability of the Sikes Act INRMP requirement for DoD lands leased to a non-DoD party, 17 May 2005.
DUSD (I&E) 2005b	Deputy Under Secretary of Defense (Installations and Environment) Memo. 2005b. Best practices for Integrated Natural Resources Management (INRMP) Implementation, August 2005
EDAW, Inc. 2002	Final Environmental Assessment: Fort Rosecrans National Cemetery Expansion. San Diego, CA. Page 51
EPA 2009	U.S. Environmental Protection Agency (EPA). 2006. About EPA. Available online <http://www.epa.gov/epahome/aboutepa.htm>. Accessed 29 June 2009.
Fairey et al. 1996	Fairey, R., C. Bretz, S. Lamerin, J. Hunt, B. Anderson, S. Tudor, C.J. Wilson, F. LeCaro, M. Stephenson, M. Puckett, and E.R. Long. 1996. Chemistry, toxicity and benthic community conditions in sediments of the San Diego Bay region. Final Rept. State Water Resources Control Board, NOAA, California Department of Fish and Wildlife, Marine Pollution Studies Laboratory, and Moss Landing Marine Lab. Sacramento, California. - Cited from U.S. Navy 2002a
Fellers et al. 2011	Fellers, G.M, R.A. Cole, D.M. Reintz, and P.M. Kleeman. Amphibian Chytrid Fungus (*Batrachochytrium dendrobatidis)* in Coastal and Montane California, USA Anurans. December 2011.
Ford 1968	Ford, R.F. 1968. Marine organisms of south San Diego Bay and the ecological effects of power station cooling water. A Pilot Study Conducted for San Diego Gas & Electric Co., San Diego, CA. Environmental Engineering Laboratory Technical Report under Contract C-188. 1968.
Ford and Chambers 1974	Ford, R.F. and R.L. Chambers. 1974. Thermal Distribution and Biological Studies for the South Bay Power Plant, vol. 5C, Biological Studies. Prepared for the San Diego Gas & Electric Co., San Diego, CA. Environmental Engineering Laboratory Technical Report under Contract P-25072. 1974.
Garcia and Conway 2007	Garcia, V. and C. J. Conway. 2007. Plan to Conserve and Manage Burrowing Owls on Naval Base Coronado, San Diego, CA. University of Arizona, Tucson, AZ. Naval Base Coronado EPR Number 00246NR026.
Garcia and Conway 2010	Garcia, V. and C.J. Conway. 2010. A plan to conserve and Manage Burrowing Owls on Naval Base Coronado, San Diego, CA. University of Arizona, Tucson, AZ.

Hall 1981	Hall, E. R. 1981. The Mammals of North America. 2nd ed., vol. 2. John Wiley & Sons, New York.
Haug et al. 1993	Haug, E. A., B. A. Millsap, and M. S. Martell. 1993. Burrowing Owl (*Speotyto cunicularia*). *In* Birds of North America, No. 61 (A. Poole, P. Stettenheim, and F. Gill, Eds.). The Birds of North America, Inc. Philadelphia, PA.
Hoffman 2007	Hoffman, S. M. 2007. Assessment of the Population Status of the Light-footed Clapper Rail (Rallus longirostris levipes) at Naval Base Coronado, San Diego, California. Prepared for Commander Navy Region Southwest Naval Base Coronado, San Diego, CA. 47 pp.
Holland 1986	Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished report. State of California, The Resources Agency, Department of Fish and Game, natural Heritage Division. Sacramento, California, USA. 1986.
Holland and Keil 1995	Holland, V.L. and D.J. Keil. 1995. California Vegetation. Dubuque, Iowa: Kendall/Hunt Publishing Company. 1995.
ICF 2012	ICF International. 2012. Results of Protocol Surveys for Listed Fairy Shrimp, Silver STtrand Training South, Naval Base Coronado. Draft. February. Prepared for Naval Facilities Engineering Command Southwest.
Keeley 1990	Keeley, J.E. 1990. The California valley grassland pp.I-23 in A.A. Schoenherr, ed. Endangered plant communities of southern California. Special Publication No.3, Southern California Botanists, Claremont, CA. 1990.
Keeley et al. 2008	Keeley, J.E., T. Brennan, and A.H. Pfaff. 2008. Fire severity and ecosystem responses following crown fires in California shrublands. Ecological Applications 18:1530-1546. doi: 10.1890/07-0836.1
Keppel 2003	Keppel, W. 2003. Basic ecosystem processes: a short introduction. Available online <http://www.managingwholes.com/ecoblocks.htm>. Accessed 02 April 2009.
Keystone Center 1996	Keystone Center 1996. Keystone Center Policy Dialogue on a Department of Defense Biodiversity Management Strategy, Final Report. Keystone, Colorado. January.
Leatherwood et al. 1982	Leatherwood S., R.R. Reeves, W.F. Perrin, and W.E. Evans. 1982. Whales, dolphins and porpoises of the eastern North Pacific and adjacent Arctic waters. NOAA technical report NMFS Circular, 444: 1- 245. 1982.
Leatherwood et al. 1988	Leatherwood, S., R.R. Reeves, W.F. Perrin, and W.E. Evans. 1988. Whales, dolphins, and porpoises of the eastern North Pacific and adjacent Arctic waters: A guide to their identification. New York, New York: Dover Publications, Inc. 1988.

MacDonald et al. 1990	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, California, and California State Coastal Conservancy. 1990.
MACTEC 2010	Grossman Healthcare District: Report of Geothechnical Investigation. Proposed Central Energy Plant. http://icboc.gafcon.net/bidding/Bid%20Package%20No%20002/Reference%20Documents/Appendix%20E%20Mactec%20January%2019,%202010.pdf
Marshall 2006	M. Marshall. 2006. The Geology and the Tectonic Setting of San Diego Bay, and That of the Peninsular Ranges and Salton Tough, Southern California. Professor Emeritus of Geology and Geophysics, San Diego State University. Accessed September 4, 2012 <*http://aese2006.geology-guy.com/sd_geology_marshall.htm*>.
McNab and Karl 1991	McNab, A.L., and T.R. Karl.1991. Climate and Droughts. Reproduced from Hanson, R.L., 1991, Evapotranspiration and Droughts, in Paulson, R.W., Chase, E.B., Roberts, R.S., and Moody, D.W., Compilers, National Water Summary 1988-89--Hydrologic Events and Floods and Droughts: U.S. Geological Survey Water-Supply Paper 2375, p. 99-104. Available online <http://geochange.er.usgs.gov/sw/changes/natural/drought/>. Accessed 01 April 2009.
Merkel 2010	Merkel & Associates, Inc. 2010. Characterization of Essential Fish Habitat in San Diego Bay
Millington 2003	J.D.A. Millington. 2003. Wildfire Frequency-Area Statistics and Their Ecological and Anthropogenic Drivers. 2003.
Munson Per. Comm.	Comment Response Matrix, NBC Pre Draft INRMP Consolidated CRM, 110111 ComprehensiveJan3_June29. Comment 388.
Navarro 1998	Navarro, E. 1998. California Department of Parks and Recreation, San Diego, CA. Interview. 1998.
NBII 2009	National Biological Information Infrastructure (NBII). 2009. Wildlife Disease: Hot Topics. Available online <http://wildlifedisease.nbii.gov/hottopics.jsp>. Accessed 15 April 2009.
NERRS 2009	National Estuarine Research Reserve System (NERRS). 2009. "Soils and Geology." NERRS Reserves: Tijuana River, CA. Last updated 7 August 2009. Available online: <http://nerrs.noaa.gov/NERRSReserve.aspx?ID=227&ResID=TJR>. Accessed 8 October 2010.
NOAA 2009a	National Oceanic and Atmospheric Administration (NOAA). 2009a. About NOAA. Available online <http://www.noaa.gov/about-noaa.html>. Accessed 11 May 2009.

NOAA 2009b	NOAA. 2009b. The Weather of Southwest California: A Climate Overview. Available online <http://www.wrh.noaa.gov/sgx/research/Guide/The_Weather_of_Southwest_California.pdf>. Accessed 02 April 2009.
NOAA 2010	NOAA. 2010. About National Marine Fisheries Service. Available online <http://www.nmfs.noaa.gov/>. Accessed 24 April 2010.
NOLF IB 2004	Naval Outlying Landing Field, Imperial Beach (NOLF IB). 2004. Species List for NOLF IB, Excel Spreadsheet.
NOLF IB undated	NOLF IB. Undated. Constraints Map for NOLF IB.
NRCS 2010	Natural Resources Conservation Service (NRCS). 2010. About NRCS. Available online <http://www.nrcs.usda.gov/about/> Accessed June 2009.
NRCS 2011	NRCS. 2011. National Soil Characterization Data, Database Descriptions. Available online < http://soils.usda.gov/survey/nscd/>. Accessed January 2011.
Ogden 1995	Ogden Environmental and Energy Services (Ogden). 1995. Waterbird Survey Central San Diego Bay, 1994. Prepared for U.S. Department of the Navy, Naval Air Station North Island, Coronado, CA. 1995.
Perez 2007	Perez, Louis. September 6th, 2007 Camp Morena Site Visit Report and Recommendations. 10 September 2007. Prepared for the Naval Special Warfare Command by Louis Perez.
Pers. Comm. D.A. Smith 2013	Per. Comm. 2013. Comment received via email on 01/08/13. Don A. Smith, Vista Irrigation District. 2013.
Pers. Comm. Eddson 2012	Eddson, A. Adam Eddson is the NBC BASH biologist. He works for USDA Wildlife Services.
Pers. Comm. Munson 2012	Munson, B. 2012. Email with comments on Draft INRMP Chapters. October 8, 2012.
Pers. Comm. Munson 2012b	Bryan Munson. Text received via Comment Response Matrix on Brand's Phacelia in Decmebr 2012.
Pers. Comm. Shepherd 2011	Shepherd, T. 2011. Email received 29 September 2011. Personal Communication from Tiffany Shepherd via Michelle Cox. Michelle.c.cox@navy.mil
Pondella et al. 2006	Pondella, D., J. Froeschke, and B. Young. 2006. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California for Surveys Conducted in April and July 2005. Vantuna Research Group. 2006.
Real Estate 2007	Second Amended and Restated Real Estate Ground Lease, dated October 1, 2007, by and between the United States of America, acting through the Department of the Navy, and San Diego Family Housing, LLC, Sections 1.1, 10.2, 11.1, 11.1.1, 11.18, 11.31, 12.1

Reeves et al. 2002	Reeves, R.R., B.S. Stewart, P.J. Clapham, and J.A. Powell. 2002. National Audubon Society guide to marine mammals of the world. New York: Alfred A. Knopf. 2002.
Reisen et. al. 2004	Reisen, W., H. Lothrop, R. Chiles, M. Madon, C. Cossen, L. Woods, S. Husted, V. Karmer, and J. Edman. 2004. West Nile Virus in California. From Emerging Infectious Diseases. Vol. 10. No. 8. Pgs. 1369-1378. August 2004.
RWMG 2007	San Diego Regional Water Management Group (RWMG). 2007. 2007 San Diego Regional Water Management Plan. October 2007.
RWQCB 2007	Regional Water Quality Control Board (RWQCB). 2007. 2006 CWA Section 303(d) List of Water Quality Limited Segments Requiring TMDLs. U.S. Environmental Protection Agency Approval Date: 28 June 2007.
RWQCB 2008	RWQCB. 2008. San Luis Rey River Watershed Urban Runoff Management Program. San Diego Region 9. March 2008.
RWQCB 2009	RWQCB. 2009. Order No. R9-2009-0081 as Modified by Order No. R9-2010-0057 NPDES No. CA0109185. Waste Discharge Requirements for the United States Department of the Navy Naval Base Coronado San Diego County.
RWQCB 2010	RWQCB. 2010. Water Quality Control Plan for the San Diego Basin. http://www.swrcb.ca.gov/rwqcb9/. Accessed December 2010.
Sawyer and Keeler-Wolf 1995	Sawyer, J.O., and T. Keeler-Wolf., A Manual of California Vegetation. 1997
Sawyer et al. 2009	Sawyer, J.K., Harris, N.J., Slep, K.C., Gaul, U., Peifer, M. (2009). The Drosophila afadin homologue Canoe regulates linkage of the actin cytoskeleton to adherens junctions during apical constriction. J. Cell Biol. 186(1): 57--73.
Schoenherr 1992	Schoenherr, A.A. 1992. Natural History of California. Berkeley: University of California Press. 1992.
SDNHM 2010	San Diego Natural History Museum (SDNHM) . 2010. Entomology, More About the Collection. Available online < http://www.sdnhm.org/research/entomology/entomore.html>. Accessed 1 November 2010.
The Pollinator Partnership/NAPPC 2010	The Pollinator Partnership™/North American Pollinator Protection Campaign (NAPPC). 2010. Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners in the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast. Available online <http://www.pollinator.org/PDFs/Calif.Coastal.Chaparral.rx2.pdf>. Accessed 05 August 2010.
TRNERR 2010	Tijuana River National Estuarine Research Reserve Comprehensive Management Plan. September 2010
Trust for Public Land 2009	Trust for Public Land. 2009. About TPL. Available online <http://www.tpl.org/tier2_sa.cfm?folder_id=170>. Accessed 27 July 2009.

U.S. Census Bureau 2009	U.S. Census Bureau. 2009. San Diego County, California. Available online <http://quickfacts.census.gov/qfd/states/06/06073.html>. Accessed 15 June 2009.
USFWS 2011	U.S. Fish and Wildlife Service (USFWS). 2011. Amendment to the Biological Opinion (FWS-SDG-4452) for the Land Withdrawal, Facilities Construction, and Operations at Naval Special Warfare, La Posta Mountain Training Facility (a.k.a. Camp Michael Monsoor, Campo, California. August 2011.
U.S. Navy 1982	Natural Resources Inventory of the Naval Amphibious Base Coronado San Diego, California. Prepared by WESTEC Services, Inc. San Bruno, CA. 1982.
U.S. Navy 1989	Naval Facilities Engineering Command Design Manual Two. 1989.
U.S. Navy 1992a	Memorandum of Understanding Between the Naval Air Station, North Island and the U.S. Fish and Wildlife Service Relating to the Protection of Natural Resources Within the Tijuana Marsh Naval Outlying Landing Field, Imperial Beach, California. 1992.
U.S. Navy 1992b	Environmental Assessment: MILCON Project O-187. Small craft berthing pier, Naval Amphibious Base Coronado, Coronado, California. April 1992.
U.S. Navy 1995	Record of Decision for the Development of Facilities in San Diego/Coronado, California to Support the Homeporting of One Nimitz-Class Aircraft Carrier, signed by Duncan Holiday on 13 Dec 1995.
U.S. Navy 1998	Final Integrated Natural Resources Management Plan for the Naval Amphibious Base, Coronado, California. 1998.
U.S. Navy 2002	Naval Base Coronado Integrated Natural Resources Management Plan. May 2002.
U.S. Navy 2003a	Predator Management to Protect the California Least Tern and Western Snowy Plover Nest Sites at Naval Base Coronado, 2004 Final Report. 2003.
U.S. Navy 2003b	Emergency Response Action Plan Summary, Oil and Hazardous Substance Integrated Contingency Plan. 20 June 2003.
U.S. Navy 2004a	Environmental Assessment Fiddler's Cove Marina Repairs and Improvement Project. November 2004.
U.S. Navy 2004b	Predator Management to Protect the California Least Tern and Western Snowy Plover Nest Sites at Naval Base Coronado, 2004 Final Report. 2004.
U.S. Navy 2004c	Final Biological Resources Survey Report for the Naval Radio Receiving Facility, Naval Base Coronado, San Diego, California. February 2004.
U.S. Navy 2004d	Final Biological Resources Survey Report for the Naval Radio Receiving Facility, Naval Base Coronado, San Diego, California. February 2004.
U.S. Navy 2005	Predator Management to Protect the California Least Tern and Western Snowy Plover Nest Sites at Naval Base Coronado, 2005 Final Report. 2005.

U.S. Navy 2006a	Integrated Natural Resources Management Program Guidance, and Integrated Natural Resources Management Plan Guidance. April 10, 2006.
U.S. Navy 2006b	Environmental Assessment for the Navy Lodge Complex Expansion Naval Air Station North Island. January 2006.
U.S. Navy 2006c	Natural Resources Inventory Report for Naval Air Station North Island, Naval Base Coronado, San Diego, California. April 12, 2006.
U.S. Navy 2006d	Naval Outlying Landing Field, Imperial Beach, Naval Base Coronado Natural Resources Inventory Final Report. June 2006.
U.S. Navy 2007	Biological Resources Surveys 2005-2006, Remote Training Site Warner Springs, CA. July 2007.
U.S. Navy 2008a	Naval Base Coronado Installation Appearance Plan. April 2008.
U.S. Navy 2008b	Final La Posta Mountain Warfare Training Facility Environmental Assessment. February 2008.
U.S. Navy 2008c	Sustaining our Environment, Protecting our Freedom. April 2008.
U.S. Navy 2008d	Bird/Animal Aircraft Strike Hazard (BASH) Plan. May 2008.
U.S. Navy 2008e	Categorical exclusion was issued for construction of alternative California Least Tern nesting sites. 2008.
U.S. Navy 2008f	Annual Report for TE Permit 789254-4. June 2009.
U.S. Navy 2008g	Programmatic Biological Assessment for the Silver Strand Training Complex. September 2008.
U.S. Navy 2008h	NOLF IB Natural Resource Management and Habitat Enhancement. 2008-2009 Proposal. August 2008.
U.S. Navy 2008i	Environmental Assessment for the Remote Training Site Warner Springs. Draft, Version 2. June 2008.
U.S. Navy 2009a	Integrated Pest Management Plan for the San Diego Metro Area, San Diego, California. September 2009.
U.S. Navy 2009b	Natural Resource Inventory, Camp Morena, California. July 2009.
U.S. Navy 2009c	Remote Training Site Warner Springs, California Wildland Fire Management Plan. Preliminary Draft. September 2009.
U.S. Navy 2009d	Fisheries Inventory and Utilization of San Diego Bay, San Diego, California for Surveys Conducted in April and July 2008. Febraury 2009.
U.S. Navy 2009e	La Posta Mountain Warfare Training Facility Campo, California, Wildland Fire Management Plan. Preliminary Draft. September 2009.

U.S. Navy 2009f Draft Final Report for the Natural Resources Baseline Inventory for the Navy San Diego Metro Housing Areas at Naval Base San Diego, Naval Base Coronado, and Naval Base Point Loma, San Diego County, California. November 2009.

U.S. Navy 2010a Final Encroachment Action Plan Naval Base Coronado. September 2010.

U.S. Navy 2010b Naval Base Coronado Activity Overview Plan, Pre-Final Submittal. September 2010.

U.S. Navy 2010c Silver Strand Training Complex Draft Environmental Impact Statement. January 2010.

U.S. Navy 2010d Environmental Assessment for the Remote Training Site Warner Springs. May 2010.

U.S. Navy 2010e Silver Strand Training Complex Final Version 3 Environmental Impact Statement. September 2010.

U.S. Navy 2010f Characterization of Essential Fish Habitat in San Diego Bay. Prepared by Merkel & Associates, Inc. September 2010.

U.S. Navy 2010g 2010 Plant Control on Naval Air Station North Island, Naval Base Coronado. Prepared by Agri Chemical & Supply, Inc. November 2010.

U.S. Navy 2010h Quino Checkerspot Butterfly Survey report, Camp Michael Monsoor, California. Prepared by ICF International. December 2010.

U.S. Navy 2010i Annual Operation and Maintenance Plan, Remote Training Site Warner Springs. October 30, 2010.

U.S. Navy 2010j Exhibit B Right-ofway Stipulations, CACA 047350. September 9, 2010.

U.S. Navy 2011a San Diego Bay Integrated Natural Resources Management Plan Draft. November 2011.

U.S. Navy 2011b Final Environmental Assessment for the Wullenweber Antenna Array Demolition at Naval Base Coronado. March 2011

U.S. Navy 2011c Environmental Assessment Helicopter Wings Realignment and MH-60R/S Helicopter Transition, Naval Base Coronado, California. August 2011

U.S. Navy 2011d Navy Bird/Animal Aircraft Strike Hazard Program Implementing Guidance. Department of Interior, July 2011.

U.S. Navy 2011e U.S. Navy 2011 unpublished data.

U.S. Navy 2011f Approved Plant List, Excel spreadsheet provided by the Navy September 13, 2011.

U.S. Navy 2011g Biological Resources Surveys 2009-2010. Naval Base Coronado, Naval Outlying Field Imperial Beach, California. Prepared by Tierra Data Inc. September 2011.

U.S. Navy 2011h	Draft Naval Base Coronado, Naval Outlying Landing Field Imperial Beach, Brown Headed Cowbird Trapping Program 2011. Prepared by RECON. September 2011.
U.S. Navy 2011i	Final Landscaping Guidelines, Remote Training Site Warner Springs, California. Prepared by APEX Contracting and Consulting, Inc. for Innovative Inclosures. January 2011.
U.S. Navy 2012a	La Posta Mountain Warfare Training Facility, Final Preliminary Jurisdictional Wetland Delineation Report. Prepared by Merkel & Associates, Inc. March 2012.
U.S. Navy 2012b	Integrated Cultural Resources Management Plan. February 2012.
U.S. Navy 2012c	U.S. Navy. 2012. Final Categorical Exclusion for Real Estate Acquisition/Ten-year Lease of Camp Morena, 3080 Buckman Springs Road, Campo, California. May 2012.
U.S. Navy 2012d	Heron and Egret Management Plan for Installations of the Navy Metro Area on the San Diego Bay, San Diego, CA. June 2012.
U.S. Navy 2012e	Naval Base Coronado Instructions 3750.4a Bird/Animal Aircraft Strike Hazard (BASH) Program. September 26, 2012.
U.S. Navy 2012f	Sensitive and listed plant species management for Naval Base Coronado. Final Report. August 2012
U.S. Navy 2012g	SSTC EIS Record of Decision for Final Environmental Impact Statement for the Silver Strand Training Complex, San Diego California. Signed 21 Aug 2012
U.S. Navy 2012h	Final Report, Quino Checkerspot Butterfly Survey Report, Remote Training Site Warner Springs, California. Prepared by ICF International, San Diego, CA. January 2012.
U.S. Navy 2013b	Public Review Draft Environmental Assessment Adressing the Integrated Natural Resources Management Plan for Naval Base Coronado, San Diego, California. February 2013.
U.S. Navy 2013b	<http://www.cnic.navy.mil/Coronado/index.htm>. Accessed January 213.
U.S. Navy and USFWS 1992	U.S. Navy and USFWS. 1992. Memorandum of Understanding between the Naval Air Station, North Island and the U.S. Fish and Wildlife Service Relating to the Protection of Natural Resources within the Tijuana Marsh, Naval Outlying Landing Field, Imperial Beach, California. 4 April 1992.
U.S. Navy et al. 2011	U.S. Department of the Navy Facilities Command Southwest and Port of San Diego Bay San Diego Bay Integrated Natural Resources Management Plan. November 2011.

U.S. Navy, U.S. Marine Corps and U.S. Coast Guard 2007	U.S. Navy, U.S. Marine Corps and U.S. Coast Guard. 2007. A Cooperative Strategy for 21st Century Seapower. October 2007.
UC Riverside 2012	UC Riverside The Goldspotted Oak Borer. Accessed on September 06, 2012 at: http://cisr.ucr.edu/goldspotted_oak_borer.html
Unitt 2004	Unitt, P. 2004. San Diego County Bird Atlas. San Diego Natural History Museum, San Diego, California, USA. 645pp. 2004.
USACE 1987	U.S. Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1
USACE 2003	USACE. 2003. Economic Technical Report, San Diego Harbor Deepening. 2003.
USACE 2008	Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). September 2008.
USDA 1969	U.S. Department of Agriculture (USDA). 1969. Soil Survey San Diego Area, California.
USDA 1973	USDA. 1973. Soil Survey San Diego Area, California. December.
USDA-WS 2009	U.S. Department of Agriculture –Wildlife Services (USDA-WS). 2009. About APHIS. Available online <http://www-mirror.aphis.usda.gov/about_aphis/programs_offices/wildlife_services/>. Accessed July 22, 2009.
USEPA 2009	United States Environmental Protection Agency (USEPA), Clean Water Act, Section 401 Certification. 2009. Available online <http://www.epa.gov/OWOW/ wetlands/regs/sec401.html> and "Summary of the Endangered Species Act" <http://www.epa.gov/lawsregs/laws/esa.html>.
USFS 2005a	U.S. Department of Agriculture Forest Service (USFS). 2005. Final Environmental Impact Statement Volume I Land Management Plans: Angeles National Forest, Cleveland National Forest, Los Padres National Forest, San Bernardino National Forest. U.S. Department of Agriculture, Forest Service, Pacific Southwest Region. R5-MB-074-A. September 2005.
USFS 2005b	U.S. Forest Service. Land Management Plan Part 2 Cleveland National Forest Strategy. September 2005.
USFWS 1992	U.S. Fish and Wildlife Service (USFWS). MOU Tijuana National Estuarine Research Reserve/Tijuana Slough National Wildlife Refuge. 1992.
USFWS 1995	Waterbirds of Central and South San Diego Bay 1993–1994. Prepared by J. Manning. 1995.
USFWS 2004	San Diego National Wildlife Refuge Complex, Fire Management Plan.

USFWS 2008	Vail Lake Ceanothus (*Ceanothus ophiocilus*) 5-Year Review: Summary and Evaluation. June 2008.
USFWS 2009a	Habitat Conservation Plans Under the Endangered Species Act. May 2009. Available online <http://www.fws.gov/Endangered/factsheets/hcp.pdf>. Accessed 24 June 2009.
USFWS 2009b	Berberis nevinii (Nevin's barberry) 5-Year Review: Summary and Evaluation. 14 August 2009.
USFWS 2010a	SSTC BO dated 7 July 2010
USFWS 2010b	"Listings and occurrences for California." Species Reports, Environmental Conservation Online System. Available online: <http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=CA&s>. Accessed 17 August 2010.
USFWS 2010c	Dodecahema leptoceras (slender-horned spineflower) 5-Year review: Summary and Evolution. 1 October 2010.
USFWS 2012	U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines. 23 March 2012.
USGS 2009	USGS. 2009. National Wildlife Health Center: West Nile Virus (WNV). Available online <http://www.nwhc.usgs.gov/disease_information/west_nile_virus/index.jsp>. Accessed on 02 April 2009.
USGS and USDA NRCS 2009	USGS and USDA, Natural Resources Conservation Service (NRCS). 2009. Federal guidelines, requirements, and procedures for the national Watershed Boundary Dataset: U.S. Geological Survey Techniques and Methods 11–A3, 55 p. 2009.
VID 2006	Vista Irrigation District (VID). 2006. "Our Water." Available online: <http://www.vid-h2o.org/aboutus/ourwater.asp>. Accessed 26 October 2010.
VID 2010	Vista Irrigation District, Lease Agreement N2247311RP0004. Novemebr 03, 2010.
VID 2011a	Vista Irrigation District 2011 Annual report. Accessed at: https://share.hdrinc.com/sites/NAVFACSW/Shared%20Documents/PROJECT%20MATERIAL%20TRANSFER%20FOLDER%20-%20INRMPs/NBC%20VID%202011_Annual_Report.pdf
VID 2011b	Vista Irrigation District Strategic Plan, January 2011.
Wells 1998	Wells, M. 1998. California Department of Parks and Recreation, San Diego, CA. Interview. 1998.
Winchell and Pavelka 2004	Winchell, C. S., and M. A. Pavelka. 2004. Surveys to determine the home range of Burrowing Owls on Naval Air Station North Island, Naval Base Coronado. US Fish and Wildlife Service. Coronado, CA

Winters et al. 2004 Winters, D.S. et al. 2004. Aquatic, Riparian and Wetland Ecosystem Assessment for the Bighorn National Forest. Report 1 of 3. Introduction and Ecological Driver Analysis. Denver: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. November 2004.

14.2 GIS References

All figures in this INRMP were compiled by HDR, except if noted, using data believed to be accurate at the time of publication. However, a degree of error is inherent in all figures. The figures are distributed "AS-IS," without warranties of any kind, expressed, or implied, including, but not limited to, warranties of suitability to a particular purpose or use. No attempt has been made in either the design or production of the figures to define the limits or jurisdiction of any Federal, territorial, commonwealth, or local government. The figures are intended for use only at the published scale. Detailed on-the-ground surveys and historical analyses of sites might differ from the figures.

GIS data sources for constraints maps are as follows:

Figure 11-1: Natural Resources Constraints on Naval Air Station North Island

Legend Item	Report Reference
• Naval Air Station North Island Boundary	• NAS North Island, boundaries.shp, provided by TDI, received July 2011, No metadata available.
• 2005-2012 Burrowing Owl Pair	• Sensitive Species, BurOwlNests05.shp, provided by TDI, received February 2010, April 2006 NASNI NR Inventory Final Report.
• 2010 Western Snowy Plover Nest • 2011 Western Snowy Plover Nest	• 2010_SP_nests.shp, provided by NAVFAC, received August 2011, No metadata available. • Data taken from file provided by Navy with pdf titled NBC_2011_Nests_Final.pdf. No metadata or attribution data provided.
• 2011 California Least Tern Nest	• Data taken from file provided by Navy with pdf titled NBC_2011_Nests_Final.pdf. No metadata or attribution data provided.
• Burrowing Owl Management Plan	• Main Burrowing Owl for Each Pair and Unpaired Adult in 2006-2011, NAS North Island, Naval Base Coronado, as amended by HDR per email received 06 September 2012, Tiffany Shepherd. No metadata available.
• Heron and Egret Nest Site	• Heron Nesting Locations, Coronado_NatResource_nonSDS\herons_report2010\heron_nesting_locations.shp, provided by NAVFAC, publication date 2010, as amended by HDR per Comment #85-2, in comment response matrix.
• WSP Management Area	• WSP Management Area, wspmanagementarea.shp, provided by TDI, received 08/2011, No metadata available.

Legend Item	Report Reference
• Isolated Wetland • USACE Wetland • USACE Non-wetland Waters of the U.S.	• Wetlands, wet.shp, provided by TDI, received February 2010. NASNI NR Inventory Final Report, Figure 19, 2006. No metadata available.
• Eelgrass Habitat • Potential Eelgrass Habitat	• Eelgrass, Eelgrass.shp, provided by TDI, received August 2011, No metadata available. • Fringe/Potential Habitat, Eelgrass.shp, provided by TDI, received August 2011, No metadata available.
• California Least Tern MAT Site	• California Least Tern MAT Site, veg.shp, provided by TDI, received February 2010, April 2006 NASNI NR Inventory Final Report. No metadata available.
• Brand's phacelia • Coast woolly-heads • Nuttall's lotus	• Rare Plants, rare_plants.shp, provided by TDI, received April 2011. NASNI NR Inventory Final Report, Figures 11a, 11b, and 11c, 2006. No metadata available.

Figure 11-2: Natural Resources Constraints on NAB Coronado and SSTC-N

Legend Item	Report Reference
• Naval Amphibious Bas Silver Strand Training Complex North	• NAB Coronado Silver Strand Training Complex North, boundaries.shp, provided by TDI, received July 2011. No metadata available. And data provided in Kelly_Amy_SSTC_Boundary_All_Figures
• 2002 Belding's Savannah Sparrow	• Sensitive Species, NABwldlf.shp, provided by NAVFAC, received August 2011, No metadata available.
• 2009 Brand's phacelia (0 -5 Individuals) • 2009 Brand's phacelia (> 5 Individuals)	• DataRequest_EIS_HDR/EISdraft_SilverStrandTraningCneter/NAB Sensitive Spp, Brants_Phacelia.shp. Data from Figure 3.11-8 Locations of Brand's Phacelia 2009 of the Silver Strand Training Complex Final Version 3 Environmental Impact Statement, September 2010.
• 2011 Western Snowy Plover Nest • 2011 California Least Tern Nest	• Data taken from file provided by Navy with pdf titled NBC_2011_Nests_Final.pdf. No metadata or attribution data provided.
• Nuttall's lotus • Coast woolly-heads	• DataRequest_EIS_HDR/EISdraft_SilverStrandTraningCneter/NAB Sensitive Spp, NABplnts.shp. Data from Figure 3.11-6 Special Status Species and Habitats of SSTC-N (NAB Coronado) of the Silver Strand Training Complex Final Version 3 Environmental Impact Statement, September 2010.
• Coastal Salt Marsh • Intertidal Mudflats	• DataRequest_EIS_HDR/EISdraft_SilverStrandTraningCneter/NAB Wetlands, coastal_salt_marsh.shp and intertidal_mudflats.shp. Data from Figure 3.11-12 Aquatic Habitats of SSTC-N and Their Jurisdictional Status of the Silver Strand Training Complex Final Version 3 Environmental Impact Statement, September 2010.

Figure 11-3: Natural Resources Constraints on SSTC-S

Legend Item	Report Reference
• Silver Strand Training Complex South	• Silver Strand Training Complex South, boundaries.shp, provided by TDI, received July 2011, No metadata available.
• 2005 Light-footed Clapper Rail	
• Belding's Savannah Sparrow • San Diego black-tailed jackrabbit • California Brown Pelican • California Least Tern • Loggerhead Shrike • Loggerhead Shrike (Pair) • Long-billed Curlew • Northern Harrier	• NRRF NR Inv GIS Files, sens_animals.shp. NRRF NR Inv GIS Files" did not have defined coordinate system, HDR amended. Final Biological Resources Survey Report for the Naval Radio Receiving Facility, Naval Base Coronado, San Diego, California. February 2004. Figure 7a and 7b.
• 2002 Western Snowy Plover Nest • 2007 Western Snowy Plover Nest • 2011 Western Snowy Plover Nest	• Sensitive Species, Sensitive_Wildlife.shp, Provided by NAVFAC, received August 2011, No metadata available. • Sensitive Species, Terns_and_Plovers_2007.shp, Provided by NAVFAC, received August 2011, No metadata available. • Data taken from file provided by Navy with pdf titled NBC_2011_Nests_Final.pdf. No metadata or attribution data provided.
• 2010-2011 San Diego fairy shrimp Not Present/Present	• 2010_2011_SSTCS_Vernal Pools uploaded to Sharepoint by Navy on 17 September 2012. Data representative of Figure 3 Fairy Shrimp Results, Vernal Pool 2010/2011 Survey of the Draft Report, Results of Protocol Surveys for Listed Fairy Shrimp, Silver Strand Training Complex-South, Naval Base Coronado. February 2012.
• Salt marsh bird's-beak • Variegated dudleya • Nuttall's lotus • Coast woolly-heads • Estuary seablite	• DataRequest_EIS_HDR/EISdraft_SilverStrandTraningCneter/NRRF Sensitive Spp, nrrf_rare_plants2004.shp and Sensitive_Wildlife.shp. Data from Figure 3.11-7Sensitive Species and Habitats of SSTC-S (NRRF) of the Silver Strand Training Complex Final Version 3 Environmental Impact Statement, September 2010.
• Non-Wetland Jurisdictional Waters of the U.S. • USACE Wetland	• DataRequest_EIS_HDR/EISdraft_SilverStrandTraningCneter/NAB Wetlands, wetalnds.shp. Data from Figure 3.11-13 Aquatic Habitats of SSTC-S and Their Jurisdictional Status of the Silver Strand Training Complex Final Version 3 Environmental Impact Statement, September 2010.
• Eelgrass Habitat • Potential Eelgrass Habitat	• Eelgrass, Eelgrass.shp, provided by TDI, received August 2011, No metadata available. • Fringe/Potential Habitat, Eelgrass.shp, provided by TDI, received August 2011, No metadata available.

Figure 11-4: Natural Resources Constraints on NOLF Imperial Beach

Legend Item	Report Reference
• NOLF Imperial Beach	• NOLF Imperial Beach, boundaries.shp, provided by TDI, received July 2011, No metadata available.
• Estuary seablite • Coronado Island skink • Orange-throated whiptail • Silvery legless lizard • San Diego black-tailed jackrabbit • 0-23, 2009 Light-footed Clapper Rails • 2009 Least Bell's Vireo Nest • 2009 Least Bell's Vireo Observation • 2009 Coastal Cactus Wren • 2009 Mountain Plover • SWWF Suitable Habitat • LBV Suitable Habitat • LFCR Suitable Pickleweed Habitat • LFCR Cordgrass Habitat • Salt marsh bird's-beak • 2008-2011 Cysts Present • 2008-2011 SDFS Present • Jurisdictional Wetlands • Jurisdictional Waters of the U.S. • Wetland/Non-Wetland Complex	• NOLF-IB Bio_Resources_GIS. Data represents figures provided in the Biological Resources Surveys 2009-2010, Naval Base Coronado Naval Outlying Field Imperial Beach, California, September 2011. Figures not labeled in document. No metadata available.

Figure 11-5: Natural Resources Constraints on Camp Michael Monsoor

Legend Item	Report Reference
• Camp Michael Monsoor	• Camp Michael Monsoor, boundaries.shp, provided by TDI, received July 2011, No metadata available.
• Freshwater Emergent Wetland • Freshwater Forested/Shrub Wetland • Freshwater Pond • Riverine	• Wetlands, CONUS_wet_poly.shp, provided by NAVFAC, received on October 2010, publication date October 2010.

Figure 11-6: Natural Resources Constraints on Morena

Legend Item	Report Reference
• Camp Morena	• Camp Morena, boundaries.shp, provided by TDI, received July 2011, No metadata available.
• Silvery legless lizard • Coronado Island skink • Dulzura pocket mouse • San Diego horned lizard	• GIS Data Camp_Moreno.gdb. Data representative of the Final Natural Resource Inventory, Camp Morena, California February 2012, Figure 5 Results Camp Morena.
• Freshwater Forested/Shrub Wetland • Freshwater Pond • Lake • Riverine	• Wetlands, CONUS_wet_poly.shp, provided by NAVFAC, received on October 2010, publication date October 2010.

Figure 11-7: Natural Resources Constraints on RTS Warner Springs

Legend Item	Report Reference
• RTS Warner Springs	• RTS Warner Springs, boundaries.shp, provided by TDI, received July 2011, No metadata available.
• Arroyo chub • Coast patch-nosed snake • Western spadefoot toad • Coast horned lizard • Western pond turtle	• Sensitive Species, herps2.shp, provided by NAVFAC, received July 2011, Map 5-10 Locations of Sensitive Herptofauna at RTS Warner Springs, Biological Resources Surveys 2005-2006, Remote Training Site Warner Springs, CA. No metadata available.
• Bell's Sage Sparrow • 2006 Willow Flycatcher	Sensitive Species, wifl locs.shp, provided by NAVFAC, received July 2011, No metadata available. • Map 5-15 Locations of Willow Flycatchers at RTS Warner Springs at RTS Warner Springs, Biological Resources Surveys 2005-2006, Remote Training Site Warner Springs, CA.
• SKR Not Occupied 2010 • SKR Occupied 2010 • 2010 SKR Potential Habitat	Emailed data on 13 August 2012, RTSWS_SKR_2010-11.shp. Representative of data presented in Stephans' Kangaroo Rat Monitoring Results at Naval Base Coronado, Remote Training Site, Warner Springs, 2010/2011. No metadata available. • Figure 4 SKR and DKR Detections on Monitoring Plots 2010-2011. • Figure 4 SKR and DKR Detections on Monitoring Plots 2010-2011. • Stephen's Kangaroo Rat habitat, skr areas.shp, provided by NAVFAC, received July 2011, No metadata available. Data representative of Map 5-17 Stephans' Kangaroo Rat Occupied Areas at RTSWS Warner Springs, Biological Resources Surveys 2005-2006, Remote Training Site Warner Springs, CA.

Legend Item	Report Reference
• Orcutt's brodiaea • Long-spined spineflower • Mojave tarplant	Data combined to represent 3-2 Locations of Four Rare Plant Species on RTS Warner Springs, Biological Resources Surveys 2005-2006, Remote Training Site Warner Springs, CA. No metadata available. • Rare Plant Species, cho_pol pnts.shp, provided by NAVFAC, received July 2011, No metadata available. • Rare Plant Species, bro_orc locs.shp, provided by NAVFAC, received July 2011, No metadata available. • Rare Plant Species, dei_moj_locs.shp, provided by NAVFAC, received July 2011, No metadata available. • Rare Plant Species, chopoll locs05.shp, provided by NAVFAC, received July 2011, No metadata available.
• Arroyo Toad Management Area • Arroyo Toad 2010 Present • Arroyo Toad Suitable Habitat • Arroyo Toad Habitat Use Area	GIS Data provide via email 03 November 2011. WS_Data2010_AT.Shp. Data representative of the Arroyo Toad Monitoring Results at Naval Base Coronado, Remote Training Site, Warner Springs, 2010. • Map 5-12 Arroyo Toad Occurrences and Estimated Habitat Use at RTS Warner Springs at RTS Warner Springs, Biological Resources Surveys 2005-2006, Remote Training Site Warner Springs, CA. No metadata available. • Figure 3. Arroyo Toad Results 2010. • Figure 1. Arroyo Toad Survey Area within RTSWS. • Map 5-12 Arroyo Toad Occurrences and Estimated Habitat Use at RTS Warner Springs at RTS Warner Springs, Biological Resources Surveys 2005-2006, Remote Training Site Warner Springs, CA. No metadata available.
• Wetlands	• Wetlands, CONUS_wet_poly.shp, provided by NAVFAC, received on October 2010, publication date October 2010.

THIS PAGE INTENTIONALLY LEFT BLANK