

**U. S. Fish and Wildlife Service
Biological Opinion
FWS- LA-09B0027-09F0040**

**San Clemente Island
Military Operations and
Fire Management Plan
2008**

Los Angeles, California



Carlsbad Fish and Wildlife Office
Carlsbad, California

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Acronyms and Abbreviations Used in the San Clemente Island Military Operations and Fire Management Plan Biological Opinion

A

AA	Assault Amphibian
AAV	Amphibious Assault Vehicles
ac	Acre or acres
Act	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 <i>et seq.</i>)
AFP	Artillery Firing Point
AMP	Artillery Maneuver Point
ASW	Anti-Submarine Warfare
ATACMS	Army Tactical Missile System
AVMA	Assault Vehicle Maneuver Area
AVMC	Assault Vehicle Maneuver Corridor

AVMR Assault Vehicle Maneuver Road

B

BA Biological Assessment
 BAT Ballistic Aerial Target
 BMP Best Management Practice
 BOMBEX Bombing Exercise
 BTS Basic Training Sites
 BUD/S Basic Underwater Demolition/SEAL
 BUDS Basic Underwater Demolition School

C

CAS Close Air Support
 CERCLA Comprehensive Environmental Response, Compensation and Liability Act
 cm centimeter or centimeters
 CNDDDB California Natural Diversity Database
 CNRSW Commander, Naval Region Southwest
 COMPUTEX Composite Training Unit Exercise
 CPF Commander, U.S. Pacific Fleet
 CQC Close quarter combat
 CRRC Combat Rubber Raiding Craft
 CSAR Combat Search and Rescue

D

DNA Deoxyribonucleic acid
 DPS Distinct Population Segment
 DT Developmental Testing
 DZ Drop Zone

E

EA Environmental Assessment
 EC Electronic Combat
 EFEX Expeditionary Firing Exercise
 EFV Expeditionary Fighting Vehicle
 EOD Explosive Ordnance Disposal

F

FCLP Fleet Carrier Landing Practice
 FDRS Fire Danger Rating System
 FIREX Firing Exercise
 FLETA HOT Fleet Training Area Hot
 FMP Fire Management Plan
 FOT&E Follow-on Test and Evaluation
 FR Federal Register
 FSCEX Fire Support Coordination Exercise

ft	foot or feet
FTX	Field training exercise
<u>G</u>	
g	gram or grams
GPS	Global Positioning Satellite
<u>H</u>	
ha	hectare or hectares
HMMWV	High mobility multipurpose wheeled vehicle
<u>I</u>	
IAD	Immediate Action Drills
in.	inch or inches
INLMA	Island Night Lizard Management Area
INRMP	Integrated Natural Resources Management Plan
INS	Inertial Navigation System
IOA	Infantry Operations Area
<u>J</u>	
JSOW	Joint Standoff Weapon
JTFEX	Joint Task Force Exercise
<u>K</u>	
kg	kilogram or kilograms
km	kilometer or kilometers
km/h	kilometers-per-hour
<u>L</u>	
LACA	Landing Craft Air-Cushion
LASW	Land Attack Standard Missile
LAW	Light Anti-tank Weapon
LAV	Light Armored Vehicles
lb	pound or pounds
LCU	Landing Craft Utilities
<u>M</u>	
m	meter or meters
MAROPS	Maritime Operations
MCBCP	Marine Corps Base Camp Pendleton
MPPEH	Munitions Potentially Possessing Explosive Hazards
MCM	Mine Counter-Measures
METT-T	Mission Enemy Terrain, Troops available and Time
MEU	Marine Expeditionary Unit
mi.	mile or miles

MIR	Missile Impact Range
MIST	Minimal impact suppression tactics
mm	millimeter or millimeters
MOUT	Military operations in urban terrain
mph	mile/s per hour
MU	Management Unit

N

NALF	Naval Auxiliary Landing Field
NECC	Navy Expeditionary Combat Command
NEPA	National Environmental Policy Act
NEW	Net Explosive Weight
nm	nautical mile
NOTS	Naval Ordnance Test Station
NRO	Natural Resource Office/Officer
NSFS	Naval Surface Fire Support
NSW	Naval Special Warfare

O

OP	Observation Point
OT	Operational Testing
OTB	Over-The-Beach
oz	ounce or ounces

P

POW	Prisoner of War
PVA	Population Viability Analysis

R

RAPD	Randomly Amplified Polymorphic DNA
RAW	Remote Automatic Weather
RCRA	Resource Conservation and Recovery Act
RDT&E	Research, development, test and evaluation
RIB	rigid-hulled inflatable boat
RPV	Remotely Piloted Vehicle
RSO	Range Safety Officer

S

SAIC	Science Applications International Corporation
SBT	Special Boat Team
SCB	Southern California Bight
SCIRC	San Clemente Island Range Complex
SCORE	Southern California Offshore Range
SDV	SEAL Delivery Vehicle
SEALS	Naval Special Warfare Forces

SHOBA	Shore Bombardment Area
SOAR	Southern California (SOCAL) ASW Range
SOC	Special Operations Craft
SOCAL	Southern California
SPAWAR	Space and Naval Warfare Systems Command
SQT	SEAL Qualification Training
SWAT	Naval Special Warfare Training Area
SWCC	Special Warfare Combatant Crew
SWS	SEAL Weapons Systems
 <u>T</u>	
t	metric tonne / tonnes
TAR	Training Area Range
TLAM	Tomahawk Land Attack Missiles
TTC	Terrorist Training Camp
 <u>U</u>	
UAS	Unmanned Aerial Systems
UAV	Unmanned Aerial Vehicle
UXO	Unexploded Ordnance
 <u>V</u>	
VC	
VLS	Vertical Launch System
VORTEX	A Population Viability Analysis software program
VSW	Very Shallow Water



United States Department of the Interior

FISH AND WILDLIFE SERVICE

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NOV 17 2008

In Reply Refer To:
FWS-LA-09B0027-09F0040

Captain Anthony Gaiani
Commanding Officer
Naval Base Coronado
P.O. Box 7033
San Diego, California 92132

Subject: Biological Opinion on the U.S. Navy's San Clemente Island Military Training Program and Fire Management Plan, Los Angeles, California

Dear Captain Gaiani:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion regarding effects on federally listed species of: 1) the existing and proposed U.S. Navy (Navy) military training program on San Clemente Island and 2) implementation of the proposed San Clemente Island Fire Management Plan (FMP), in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). This biological opinion is the result of a programmatic level consultation on Navy activities proposed for San Clemente Island.

Programmatic consultations evaluate planning documents or broad programs and may include actions where the best available scientific data may not support the determination of any anticipated incidental take (U.S. Fish and Wildlife Service and National Marine Fisheries Service Endangered Species Consultation Handbook, p.4-48). In such instances, actions are reexamined under the umbrella of the larger planning document during subsequent consultations on site-specific actions.

During consultation on the overall actions of the Navy to implement military training and their proposed fire management plan on San Clemente Island, we determined that adequate details were available to determine anticipated levels of incidental take for most of the proposed actions included in the Navy's military training program and proposed fire management plan. For these actions an incidental take statement is included in this biological opinion. Nonetheless, project-level consultation may be necessary in the future for some actions (*e.g.*, fuel break establishment, controlled burns, erosion control measures) as additional project-specific details become available. The Service will continue to coordinate with the Navy to determine if future activities require project-level consultation. We anticipate future consultations for site-specific actions under the umbrella of this programmatic consultation may be streamlined and any required incidental take statement appended to this biological opinion.

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IN AMERICA 

Eleven federally listed species that occur on the island are evaluated within this biological opinion including four federally threatened species: the island night lizard (*Xantusia riversiana*), San Clemente sage sparrow (*Amphispiza belli clementeae*), western snowy plover (*Charadrius alexandrinus nivosus*), and California brown pelican (*Pelecanus occidentalis californicus*) and seven federally endangered species: the San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*), San Clemente Island broom (*Lotus dendroideus* var. *traskiae*), San Clemente Island larkspur (*Delphinium variegatum* ssp. *kinkiense*), Santa Cruz Island rock-creep (*Sibara filifolia*), San Clemente Island woodland-star (*Lithophragma maximum*), San Clemente Island bush mallow (*Malacothamnus clementinus*), and San Clemente Island Indian paintbrush (*Castilleja grisea*).

We received your request for consultation on the FMP on February 28, 2007, and your request for consultation on military training operations on May 22, 2008. This biological opinion includes an analysis of the combined effects of military training and fire management.

This biological opinion is based on information provided in the draft San Clemente Island Wildland Fire Management Plan (September 2005 draft); San Clemente Island Wildland Fire Management Plan Biological Assessment (December 2005); draft Southern California Range Complex Environmental Impact Statement; Programmatic Terrestrial Biological Assessment for San Clemente Island (May 2008); previous biological opinions developed addressing operations and activities on San Clemente Island (biological opinions FWS 1-6-97-F-21, FWS 1-6-97-F-58, FWS 1-6-00-F-19, and FWS-2808); species-specific annual reports submitted to the Service; literature relevant to species and effects of the activities addressed; supplementary materials provided during the consultation process; site visits conducted before and during the consultation process; and on other available information.

This consultation supersedes biological opinions FWS 1-6-97-F-21, FWS 1-6-97-F-58, FWS 1-6-00-F-19, and FWS-2808.

CONSULTATION HISTORY

On February 28, 2007, the Service received a request from the Navy for consultation on a draft FMP, which included training and ignition sources that were not yet in existence, but would be forthcoming as part of proposed training actions.

Between Feb 2007 and April 2008 discussions between the Navy and Service focused on determining the scope of the consultation to include the future training actions. As a result of these discussions the Navy agreed to consult on the FMP and training activities simultaneously so that these actions could be covered in one comprehensive programmatic biological opinion.

Between April 9, 2008, and October 28, 2008, we met with Navy biologists at least monthly, but at times weekly, to conduct site visits and to discuss the proposed action, effects to species and associated incidental take, and conservation measures to avoid, minimize, and monitor impacts.

The Service provided draft effects analyses for the individual species addressed in this biological opinion for the Navy's review and comment beginning November 9, 2008, and until a completed draft was provided on November 16, 2008. The Navy provided comments on these draft effects analyses during this same time period and their final comments on November 17, 2008. The Navy's comments have been addressed or incorporated in this final biological opinion.

The complete administrative record for this consultation is on file at the Carlsbad Fish and Wildlife Service Office.

PROJECT DESCRIPTION

San Clemente Island has been administered by the Navy since 1934. The island is currently used for a variety of training and research and development activities and supports buildings, roads, an electrical distribution system, a sewage treatment plant, an airfield, and quarries as infrastructure for existing uses. The island lies within a larger area recently identified as the Southern California Range Complex (SOCAL).

The Navy has a history of consultation and coordination with the Service regarding the effects of various activities on federally listed species. The Service has consulted formally or informally on numerous activities on the island, including training activities and fire management, installation of wind turbines, installation of hydrophones, missile tests, maintenance and construction of Ridge Road and the Assault Vehicle Maneuver Route (AVMR), Island Night Lizard Management Area (INLMA) designation, construction of berthing buildings, and development and use of Training Area Ranges (TARs). The Service has also coordinated on an ongoing basis as the Navy monitors the island-wide status of listed plant and animal species on San Clemente Island and continues an active recovery program to improve the status of the San Clemente loggerhead shrike. The Navy has supported and managed several significant conservation programs on the island under the Integrated Natural Resources Management Plan (INRMP), and the Service has been involved in the development of this plan and review of plan implementation. The proposed action represents a comprehensive description of proposed training activities and includes proposed continuation of a variety of natural resource management programs that monitor species status and minimize adverse effects of proposed training.

Military activities on San Clemente Island have contributed to fires on the island, which may affect plants and wildlife. The Navy had developed a fire management plan as early as 1989. Between 1994 and 1997 several large-scale fires burned within occupied endangered species habitat on San Clemente Island. The location, magnitude, and frequency of these fires raised awareness of the potential for adverse effects to vegetation and wildlife, and in 1997, the Navy initiated formal section 7 consultation under the Act with the Service regarding the effects of military activity related fires on federally listed plant and animal species on San Clemente Island. Fire management on the island is linked to military training and other human activities/facilities on the island because these activities represent the primary source of ignitions. Efforts to prevent ignitions have included seasonal range modifications and seasonal training modification.

Prevention of ignition, containment, and suppression of fires were addressed in Biological Opinion FWS 1-6-97-F-21. The Navy re-initiated consultation on Biological Opinion FWS 1-6-97-F-21 in 2000 to address changes to proposed training that could increase ignition sources and associated management measures to reduce the potential spread of wildfire. Effects of these changes were addressed in Biological Opinion FWS-2808. The current proposed action will revise the operations addressed in Biological Opinion FWS-2808 because a more comprehensive description of ongoing and proposed training activities for San Clemente Island is now available. This biological opinion therefore supersedes biological opinions FWS 1-6-97-F-21 and FWS-2808.

Navy tenants on San Clemente Island include Navy Special Warfare (NSW) Groups. NSW Group 1 had proposed 22 TARs in the late 1990's. The initial proposal included 2 training areas along the West Shore (TAR 10 and TAR 17) that were of particular concern due to their potential impacts on the San Clemente sage sparrow. The Navy consulted with the Service in 1999 only on the designation, construction, and use of TARs 1, 4, 16, and the steel ranges (Biological Opinion FWS 1-6-00-F-19) to allow additional evaluation of proposed training areas along the West Shore. Since issuance of Biological Opinion FWS 1-6-00-F-19, the Navy has collected additional information to support assessment of the effects of training activities to the San Clemente sage sparrow. The current proposed action includes TAR 10 and 17, additional TARs, and revisions of proposed activities at TAR 4. Therefore, this biological opinion also supersedes Biological Opinion FWS 1-6-00-F-19.

The Navy proposes to increase the frequency of existing training operations on San Clemente Island and conduct new operations to support the Fleet Readiness Training Plan. The Navy also proposes to implement enhanced range complex capabilities to support training, which includes use of new live-fire ranges, construction of TAR range gates and TAR/Basic Training Sites (BTS) range buildings, use of an Infantry Operations Area (IOA), and use of an Assault Vehicle Maneuver Corridor (AVMC). The Navy recognizes that proposed uses are likely to increase ignition sources throughout the island and thereby proposes to implement a FMP to manage fire frequency on the island. Details pertaining to the proposed action are provided in the draft FMP, FMP Biological Assessment (BA), draft Southern California Range Complex Environmental Impact Statement, and the San Clemente Island Terrestrial BA. Throughout the course of this consultation, some components of the proposed action have been amended at the request, and/or with the concurrence, of the U.S. Navy, as identified in this document. A map of San Clemente Island (5 parts) depicting proposed training areas and the distribution of listed species in relationship to proposed training areas is provided as Figure 1a-1e.

The proposed action includes the following six components, each of which is described in more detail below:

- 1) Increase in the frequency of training operations in current training ranges; this includes construction of range buildings (TARs 1, 10, 18, 19, 21 and BTS 1, 3, 4, 5, 6) and range gates (TARs 5, 9, 10, 11, 12, and 17) to support TAR/BTS use;

Figure 1a-e. San Clemente Island Listed Species and Proposed Training Areas

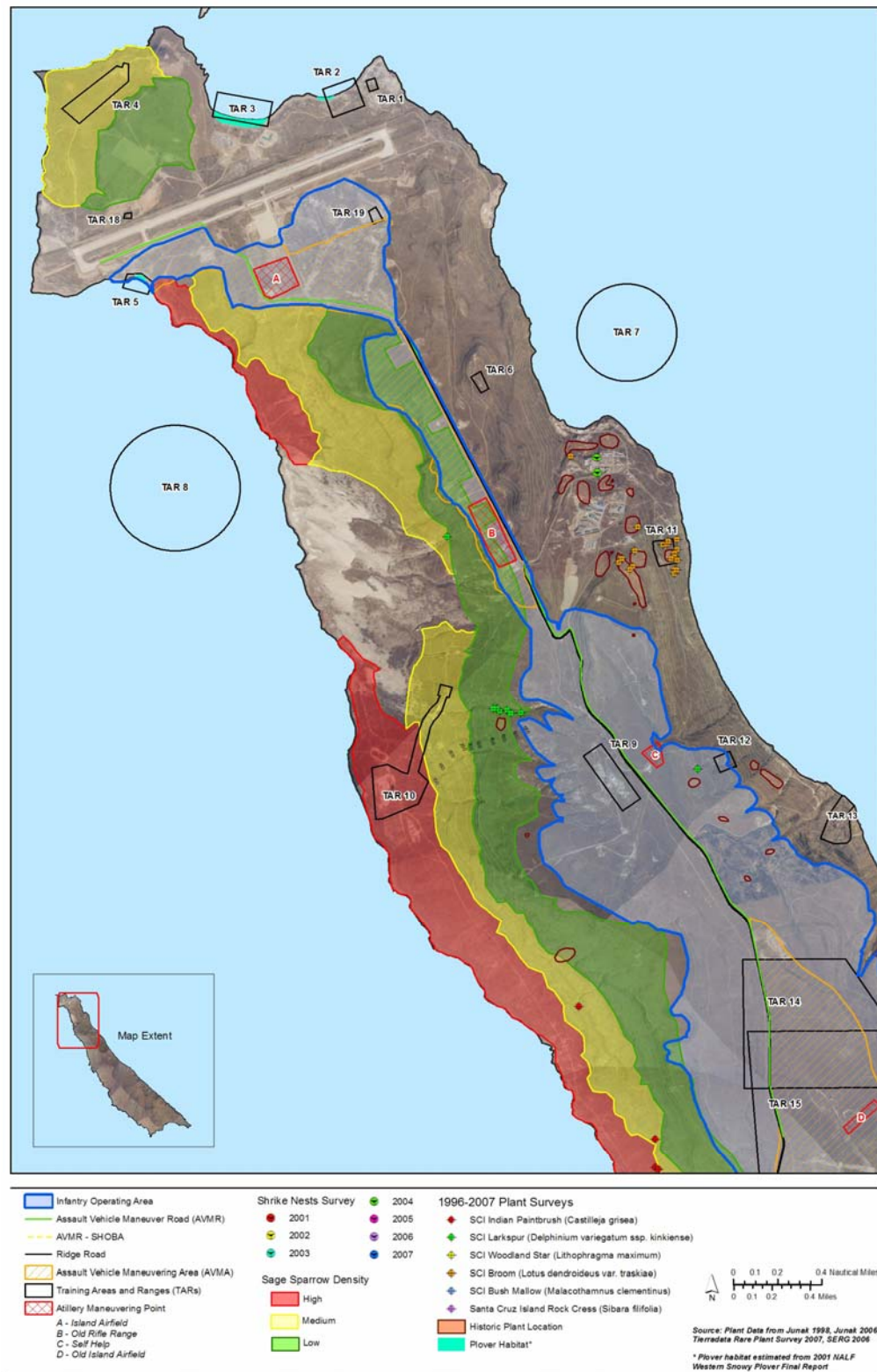


Figure 1b. San Clemente Island Listed Species and Proposed Training Areas

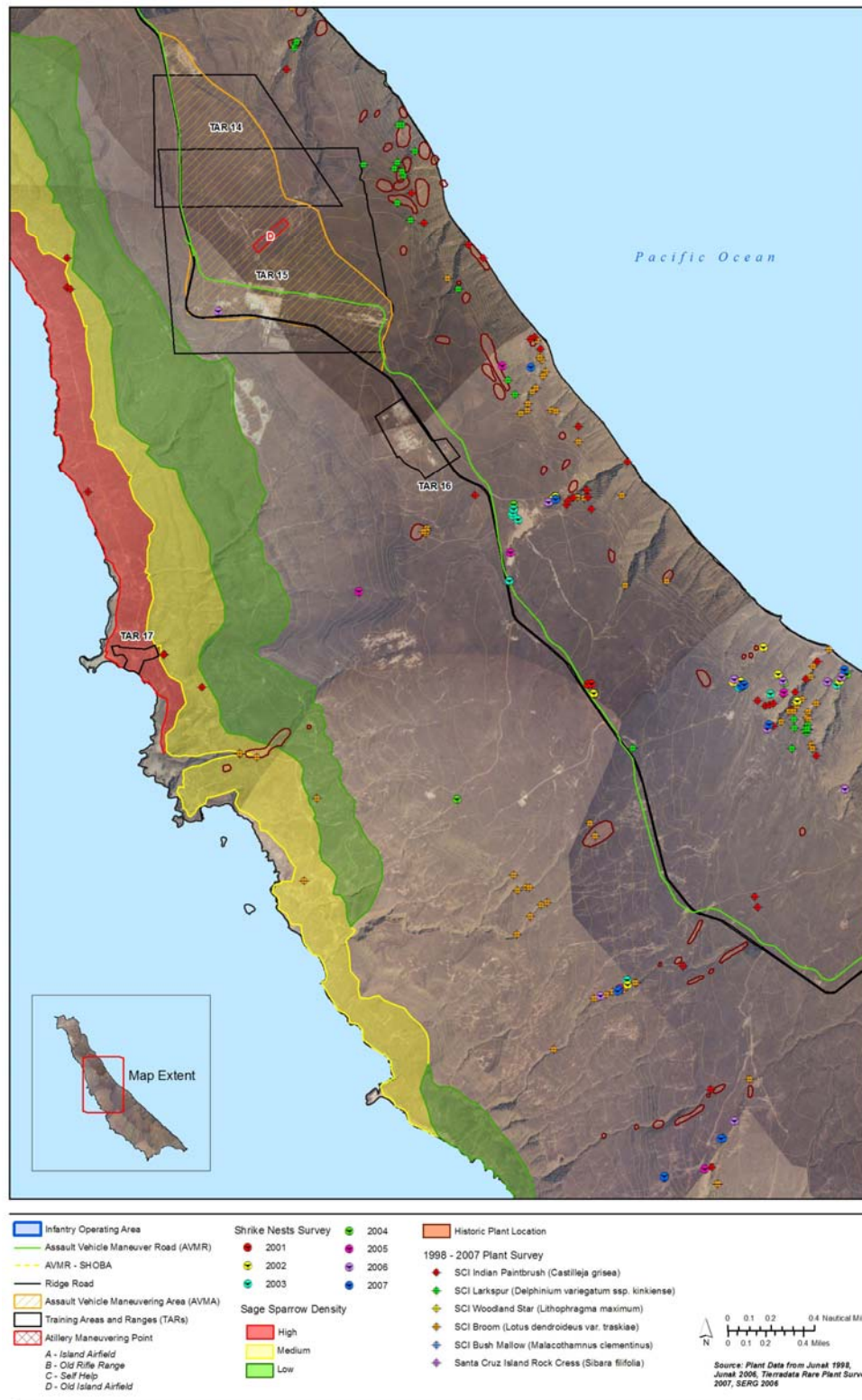


Figure 1c. San Clemente Island Listed Species and Proposed Training Areas

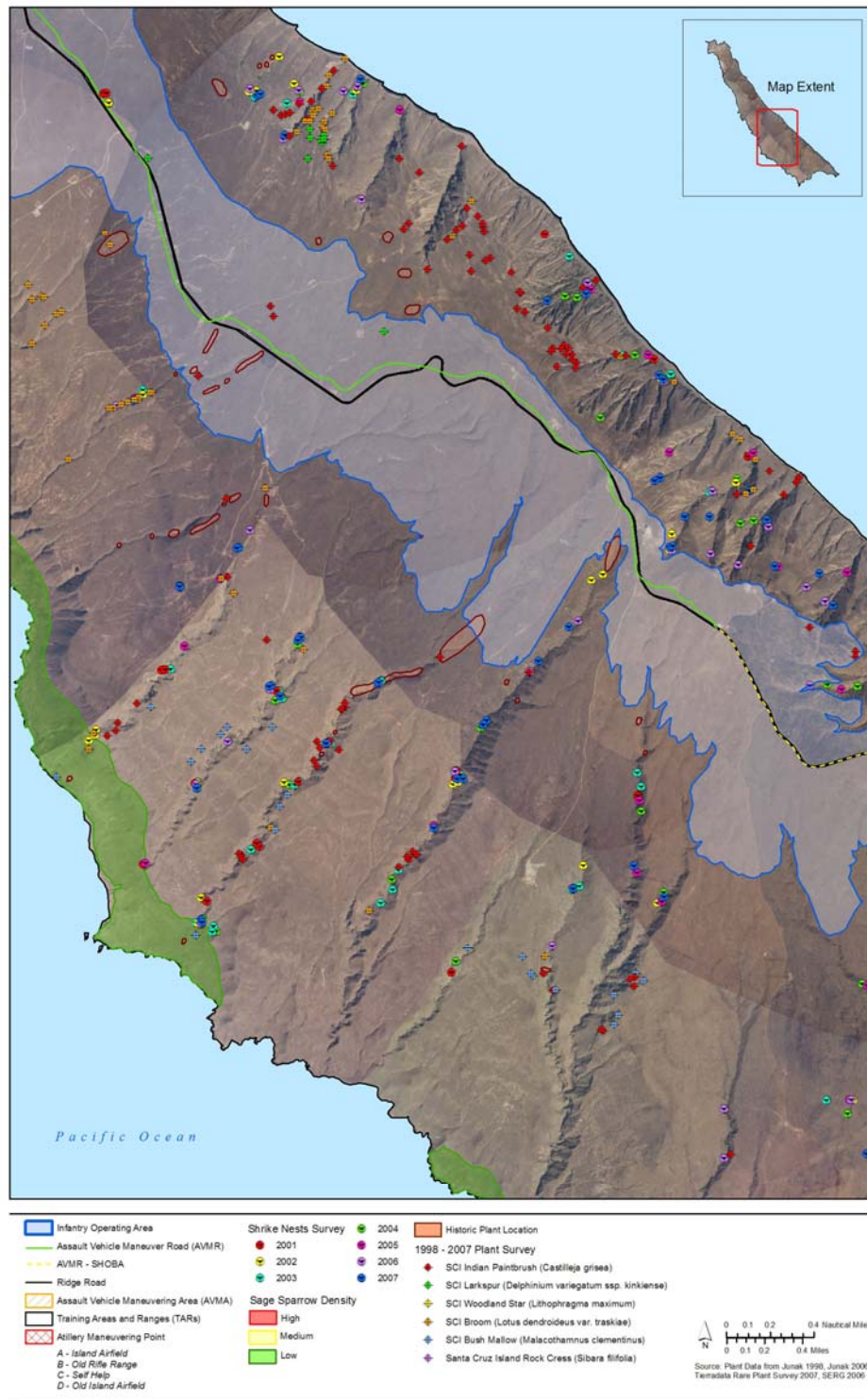


Figure 1d. San Clemente Island Listed Species and Proposed Training Areas

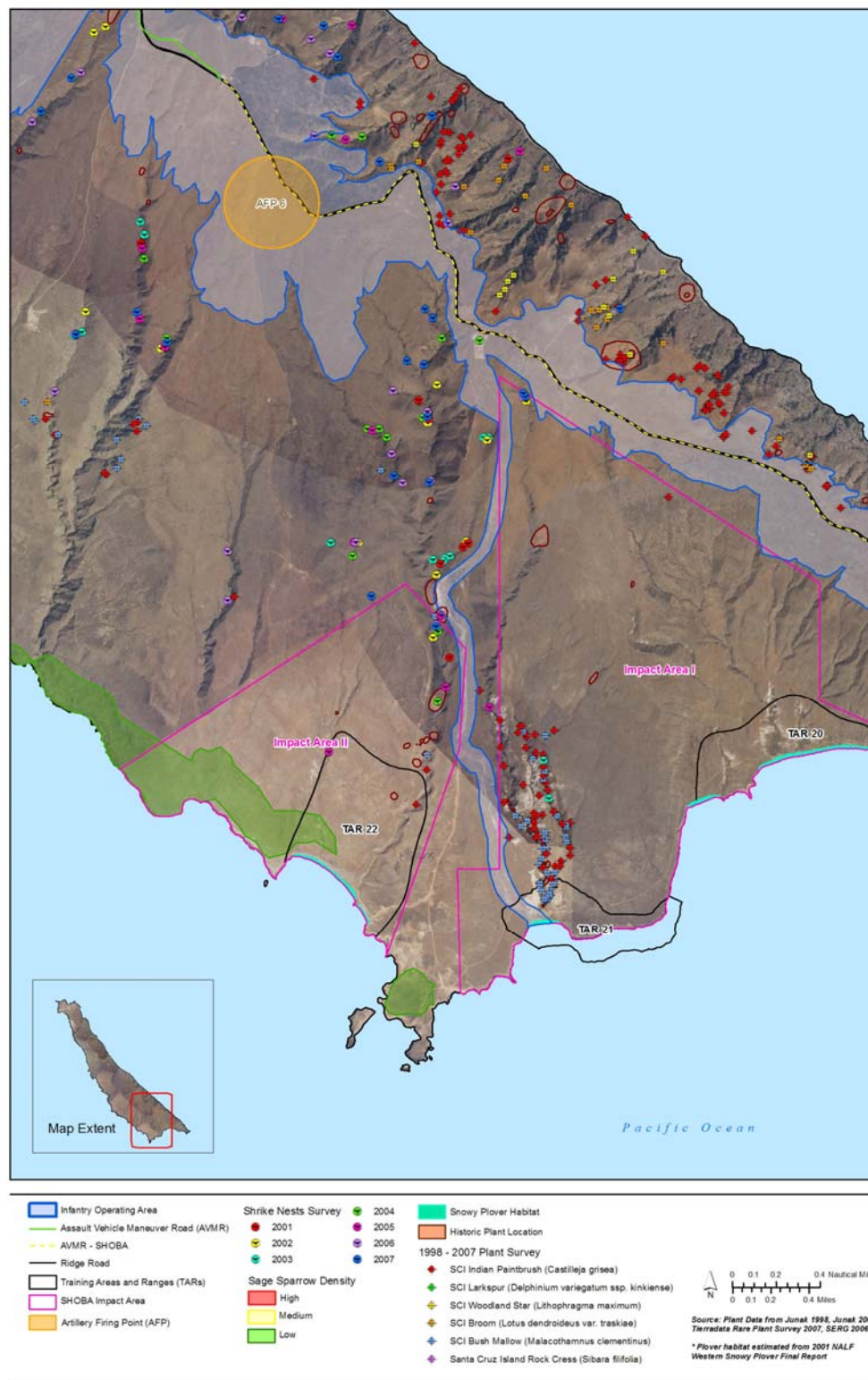
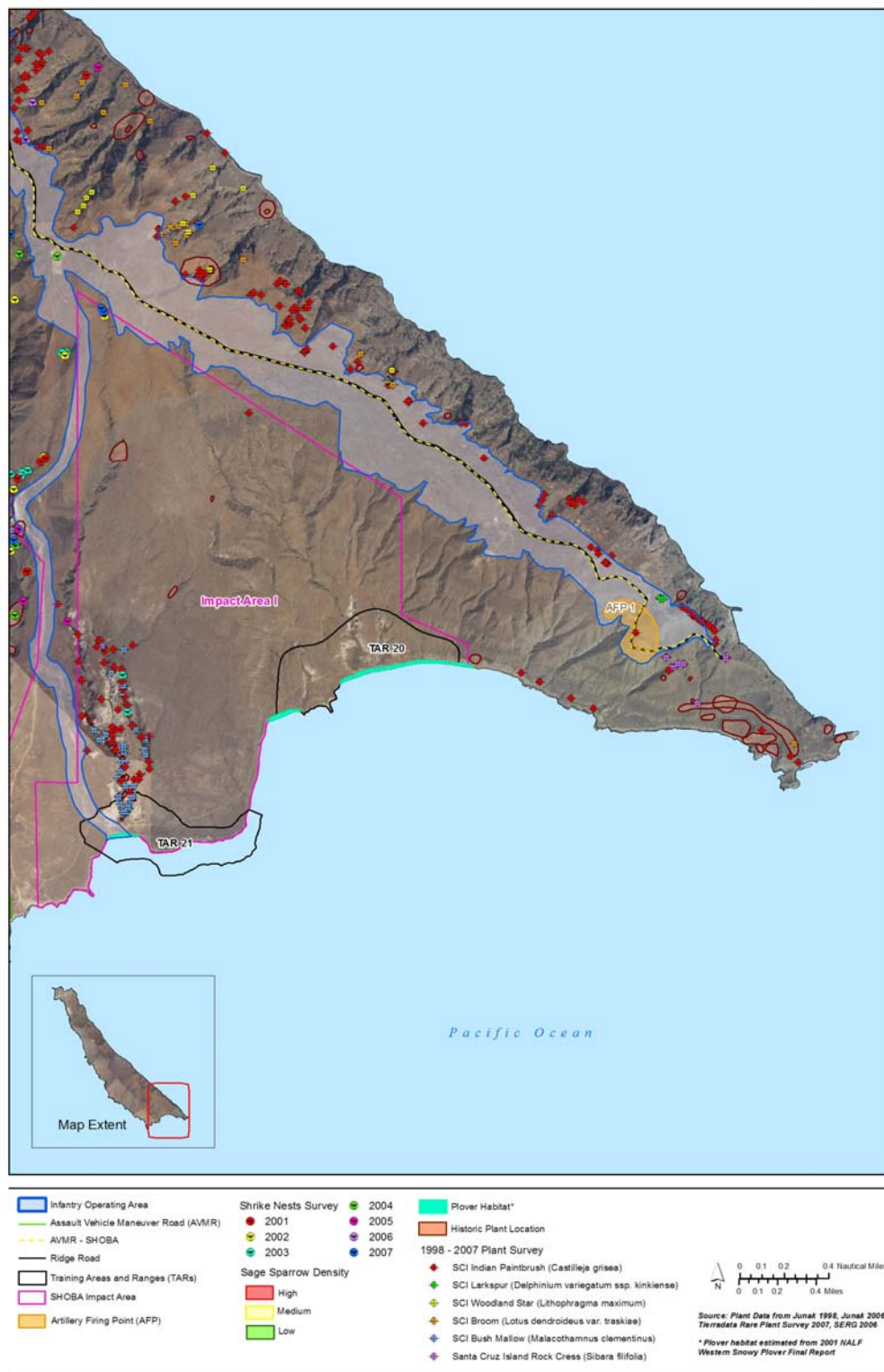


Figure 1e. San Clemente Island Listed Species and Training Areas



- 2) Introduction of new training exercises and expansion of training exercises into additional areas of San Clemente Island. New training exercises primarily increase the:
a) scope of United States Marine Corps (USMC) use of San Clemente Island; b) use of amphibious and off road vehicles; and c) number of Navy SEAL ranges that include live-fire and demolition. New exercises include use of three Assault Vehicle Maneuver Area (AVMAs), two Artillery Firing Points (AFPs), and four Artillery Maneuver Points (AMPs);
- 3) Modification of the boundaries of ordnance Impact Areas I and II to include Horse Beach and part of Horse Beach Canyon, TARs 21 and 22, and to exclude China Point Road and parts of Horse Beach Canyon Road;
- 4) Restriction of access to Impact Areas I and II that will preclude monitoring and management within these areas;
- 5) Implementation of a FMP to shape fire-related policy, management, and decisions on San Clemente Island for 5 years (2009-2014); and
- 6) Implementation of ongoing natural resource programs and other conservation measures to monitor, avoid and/or minimize potential impacts to federally listed species.

1. **Increase frequency of existing uses in current training ranges**

San Clemente Island has supported military training activities since 1934. The island currently supports a significant level of training. The Navy proposes to increase the frequency of existing operations to support the Fleet Readiness Training Plan. Many of the existing operations that are proposed to continue and increase in frequency occur at fixed ranges or objectives that currently sustain concentrated impacts from existing uses. Table 1 provides a synopsis of training exercises that currently occur on the island and the frequency at which activities are proposed for the future to provide a general idea of the increased intensity of baseline uses. Training exercises listed in Table 1 are often accumulated into and incorporated into larger scale exercises. Major range exercises could combine any of the listed exercises, which may be conducted at the same time to practice coordination of various commands. The number of exercises presented in Table 1 includes those that are conducted as part of major range exercises.

Table 1. Frequency of Current Operations and Proposed Increases in Frequency

Navy Warfare Area	Operation Type	Baseline # Annual Events	Proposed (# annual events)	% Increase Over Baseline Level of Use
Amphibious Warfare	Naval Surface Fire Support	47 (81 5-in shells/exercise)	52	11%
	Expeditionary Fires Exercise and Fire Support Coordination Exercise	6 (3-day exercise)	8	33%
Strike	Bombing Exercises (Land)	176	216	23%
	Combat Search and Rescue	7	8	14%
Explosive Ordnance Disposal	Explosive Ordnance Disposal	4	10	150%
Air Operations-	Naval Auxiliary Landing Field Airfield Activities	26,376	33,000	25%
Research, Development, Test and Evaluation	Missile Flight Tests	5	20	300%
Artillery Operations	Artillery Operations	5	8 (3-day events)	60%
Naval Special Warfare	Land Demolition	354	674	90%
	Underwater Demolition-Single Point Source Charge	72	85	18%
	Underwater Demolition Multiple Charge - Mat Weave and Obstacle Loading	14	18	29%
	Small Arms Training	171	205	20%
	Land Navigation	99	118	19%
	Unmanned Aerial Vehicle/Unmanned Aerial Systems Operations	72	1176	1533%
	SEAL Platoon Operations	340	668	96%
	Direct Action	156	190	22%

- The “Baseline” frequency of training exercises was determined by selecting the frequency during a “representative year” preceding 2008. Some activities that are not included in the baseline occurred at some time in the past on the island, but they have not occurred recently. The frequency of training exercises has fluctuated on the island based on training needs.

Amphibious Warfare

Naval Surface Fire Support

Naval Surface Fire Support (NSFS) includes ship to shore weapons use. A surface ship naval gun firing operation is called a Firing Exercise (FIREX). These exercises are annual requirements for Navy ships. During FIREXs in Shore Bombardment Area (SHOBA), guns (13 centimeters (cm) (5-inch (in.)) MK 45) are fired against surface targets in Impact Areas I and II

(Figure 1d) with range control and fire direction being provided by qualified Shore Fire Control Party spotters [usually from Observation Point-3 (OP-3)]. Each operation is organized in a logical sequence of events to simulate support for an opposed amphibious landing. Operations typically include a period of continuous illumination accomplished by illumination rounds. Approximately 81 13 cm (5-in.) shells are fired per exercise. Approximately 47 FIREX operations were conducted in 2007, and 52 per year are proposed. At current FIREX frequency, approximately 3,807 13 cm (5-in.) shells are expended in Impact Areas I and II each year. At proposed frequency, approximately 4,212 13 cm (5-in.) shells would be expended in Impact Areas I and II annually. Most FIREX exercises utilize Impact Area II.

Expeditionary Firing Exercise and Fire Support Coordination Exercise

The Expeditionary Firing Exercise (EFEX) is a complex operation that involves the coordination of NSFS from surface ships with land-based artillery and mortar and Close Air Support (CAS). A related exercise, the Fire Support Coordination Exercise (FSCEX), is focused on USMC artillery firing on San Clemente Island. Artillery for both the EFEX and FSCEX can be delivered only from AFPs in SHOBA. AFP 1 [(13.8 hectares (ha) (34.1 acres (ac)))] lies in SHOBA east of the Impact Areas and has experienced use for many years. AFP 6 (49.9 ha (123.3 ac)), north of the Impact Areas, was first used in 2004 and has been used two times. All AFPs need to remain unpaved to allow gun crews to dig the weapon's recoil spades into the ground to prevent the howitzer from moving when it fires. EFEX is a required Marine Expeditionary Unit (MEU)/Navy Amphibious Squadron pre-deployment exercise, using all supporting arms, naval gunfire, artillery, mortars, and aircraft CAS. EFEXs usually extend over a 3-day period, with 10-12 hours of live firing per day. Approximately 30 percent of the firing occurs at night. Approximately 1,206 naval artillery rounds would be expended annually during EFEX operations. Approximately 3,068 naval gun rounds are associated with EFEX. EFEX operation also include the use of other types of ordnance, including bombs, mobile land-based artillery rounds, cannons, mortars, grenades, flares, smoke, and small arms fire. Amphibious landing operations may be associated with an EFEX, and all amphibious landing for this exercise occurs outside of SHOBA. A typical EFEX operation is to land a USMC artillery battery [three to four 7.3-metric tonne (t) (16,000-pound (lb)) howitzers, four to five 9-t (20,000-lb) trucks, and four 2-t (4,500-lb) high mobility multipurpose wheeled vehicle (HMMWVs)] at West Cove, NW Harbor, or Wilson Cove with a Shore Fire Control Party spotter team. These units travel to SHOBA via Ridge Road since the artillery is wheeled. The artillery units set up at the firing position(s) with the spotter team at OP-3. The spotter teams coordinate the artillery firing with those of the ships and aircraft using both SHOBA impact areas. Eight operations are proposed per year, two more than are conducted in the baseline.

Strike

Bombing Exercises (Land)

Bombing exercises include air strikes and Close Air Support (CAS) operations. Air strikes are aircraft or missile attacks of ground targets that are located in SHOBA's Impact Areas I and II.

The operations can originate from an aircraft carrier or land base. The purpose is to identify, attack, disable, or destroy one of the many targets in the San Clemente Island integrated coastal defense system. The operations can be either no-drop or active drop of bombs or missiles. Principal weapons are the small, 11-kilogram (kg) (25-lb), inert MK-76 (a type of training ordnance); the MK-82, a 227-kg (500-lb) bomb; or the MK-83, 454-kg (1,000-lb) bomb and the MK-84 908-kg (2000-lb) bomb. The MK-82, MK-83, MK-84 and all other live ordnance over 113 kg (250 lb) must be dropped in Impact Area IIA. MK-76, other inert practice bombs, and any explosive ordnance up to 250 lb can be dropped elsewhere in Impact Areas I and II. Laser guidance systems may be used to guide weapons. The typical duration is less than 1 hour, and training takes place during the day and night.

CAS operations differ from air strikes in that CAS must be integrated with the fire and maneuver of ground forces. They are controlled by airborne or ground-based observers in a Tactical Air Control Party. CAS can be provided to ground forces by armed helicopters or fixed-wing aircraft. The aircraft can be USMC, Navy, and Air Force, and typical aircraft include AV-8, FA-18, A-10, F-16, AC-130, and AH-1. CAS can be flown with no-drop passes over virtually any part of the island as long as the aircraft does not carry live ordnance. Under all circumstances, aircraft must make an initial dry pass to identify the target visually and ensure that the area is clear of any non-participants. Sorties can be flown day or night. A total of 216 operations are proposed per year, 40 more than are conducted in the baseline.

Combat Search and Rescue

The Combat Search and Rescue (CSAR) operation occurs north of SHOBA and is usually in conjunction with a larger Composite Training Unit Exercise (COMPTUEX) or Joint Task Force Exercise (JTFEX). The purpose of the CSAR is to locate, protect, and evacuate a pilot or other crewmembers who have landed in hostile territory. The operation can include reconnaissance aircraft to find the downed aircrew, helicopters to conduct the rescue, and fighter aircraft to perform CAS to protect both the downed aircrews and the rescue helicopters. Eight operations are proposed per year, one more than are conducted in the baseline.

Explosive Ordnance Disposal

Explosive Ordnance Disposal (EOD) operations consist of specially trained personnel conducting sweeps, inspections, and cleanup. The teams search for Unexploded Ordnance (UXO) and, using extensive safety precautions and procedures, detonate any unexploded items in place or move them for disposal. They also demilitarize inert ordnance, supervise the periodic collection of metal debris from previously expended ordnance, and arrange for transportation of the debris out of the Impact Areas to clean up the range and reduce the amount of metal that may affect laser safety. EOD sweeps and inspections are proposed annually. EOD operations are conducted both inside and outside of SHOBA. Operations inside SHOBA are more frequent. Outside SHOBA, EOD activities are conducted after live warheads are used in the Missile Impact Range (MIR) and in conjunction with NSW operations. Ten operations are proposed per year, six more than are conducted in the baseline.

Air Operations

Naval Auxiliary Landing Field Airfield Operations

Operations at the Naval Auxiliary Landing Field (NALF) include aircraft landing practice, visual and instrument approaches and departures, aircraft equipment calibration, survey and photo missions, range support, exercise training, research and development test support, medical evacuation, and supply and personnel flights. The airfield is restricted to military aircraft and contract flights. The NALF has the primary mission of training Naval Air Force Pacific aircrews in Fleet Carrier Landing Practice (FCLP) to operate aircraft safely and to land on an aircraft carrier. The distance from the mainland and the surrounding marine environment make the island an ideal place to conduct night carrier landing practice. The NALF is also available for emergency landings year round.

FCLP is the most prevalent aviation use of the NALF, accounting for approximately 40 percent of aircraft operations. FCLPs are actual landings on a simulated aircraft carrier deck painted on the surface of the runway near its east end. Operations include low approaches, “touch and go” landings, usually in repeated sets, and full-stop landings. This type of training is conducted by naval aviators in a variety of aircraft: rotary and fixed wing, jet and propeller driven, in day and night landings. A total of 33,000 operations are proposed per year, 6,624 more than are conducted in the baseline.

Research, Development, Test and Evaluation

The Space and Naval Warfare Systems Command (SPAWAR) group conducts research, development, test and evaluation (RDT&E) engineering and Fleet support for command, control, and communications systems, as well as ocean surveillance. SPAWAR’s tests on San Clemente Island include a wide variety of ocean engineering, missile firings, torpedo testing, Electronic Combat (EC), and other Navy weapons systems. SPAWAR’s recent proposed test and evaluation programs on San Clemente Island are missile flight tests

Missile Flight Tests

SPAWAR conducts multiple missile tests. Two of the most typical tests are with the Joint Standoff Weapon (JSOW) and Tomahawk Land Attack Missiles (TLAM). Most of these tests are conducted using the MIR; however, Impact Area I has been identified as an emergency termination point. JSOW is an unpowered glide weapon capable of carrying different modular warhead payloads. The weapon is 4 meters (m) (13 feet (ft)) in length, 1.2 m (4 ft) in diameter and has an unfolded wingspan of 2.6 m (8.8 ft). One version of the JSOW employs a 227 kg (500-lb) BLU-111 (MK-82 general purpose bomb) warhead. This version is intended for use against medium or high-value fixed targets. The purpose of the testing program is to verify the design compliance with specifications and perform live-fire testing in a coastal marine

environment. Testing of the JSOW began in 1996 and is ongoing. Testing is for both live and inert warheads. All missile tests are in the daytime.

TLAM testing is the continuation of flight testing of the TLAM live warhead in support of the overall Tomahawk weapons systems improvement testing. National Environmental Policy Act (NEPA) documentation for Tomahawk testing includes an Environmental Assessment (EA), *Tomahawk Flight Test Operations on the West Coast of the United States* (November 1998), which is incorporated in this biological opinion by reference. The TLAM is a terrain-following missile that uses several navigation aids to position itself along a preprogrammed course. The primary methods of navigation are signals from Global Positioning System (GPS) satellites and Terrain Contour Mapping. The testing program will use both live and inert warheads. The live warheads contain either unitary conventional high explosives or dispensed submunitions. TLAMs in the San Clemente Island area are usually fired from surface ships or submarines with all targets being the MIR. Impact Area II is a contingency landing/recovery location for terminated test flights. There are also expected to be Tactical Tomahawk underwater launch tests. This program would verify the applicability of Tactical Tomahawk for submarine use. These will include boosted flight tests and instrumented test vehicles, which would impact the water, and full-up missiles, which would land in the MIR.

The Navy is considering adapting and employing the Army Tactical Missile System (ATACMS, MGM-140) from surface ships equipped with the Vertical Launch System (VLS). The ATACMS is an inertially guided ballistic missile with a range in excess of 278 kilometers (km) (150 nautical miles (nm)). Proposed changes for the Navy ATACMS variant include the use of a GPS guidance package. The current version of the missile carries a warhead equipped with submunitions. Test firings of the ATACMS missile have taken place from a Navy ship, the USS Mount Vernon, LSD 39. Test launches occurred in February 1995 on the Point Mugu Sea Range.

The Land Attack Standard Missile (LASM) is a Navy development program to test a land attack variant of the Navy's primary air defense weapon, the STANDARD Missile. The LASM is a solid rocket propellant missile that will use a combined GPS/Inertial Navigation System (INS). The LASM is approximately 4.7 m (185.6 in.) long, 0.3 m (13.5 in.) diameter, and weighs 710 kg (1,566 lb) at launch. The round will use the current MK-125 blast fragmentation warhead. Possible future variants may include a new submunitions or anti-armor warhead option, addition of a terminal guidance beyond the GPS/INS, and an uplink/downlink capability. The range capability of LASM will be greater than 161 km (100 mi.). An additional option to increase LASM range is also being evaluated. Testing of the baseline LASM will include Developmental Testing (DT) (2 rounds) and Operational Testing (OT) (2 rounds) at the Southern California Offshore Range (SCORE). After OT is complete, Follow-on Test and Evaluation (FOT&E) and Fleet training firings will be conducted on a periodic basis of approximately eight per year. Test firings will be from Aegis VLS ships located offshore from San Clemente Island. Proposed impact areas include the MIR or possibly Impact Areas I or II. Threat representative targets will be inserted and range instrumentation provided for LASM impact scoring measurements. Range safety planning includes provisions for helicopter availability and aircraft surveillance. The

LASM is planned to be configured with telemetry and a Range Safety approved Flight Termination System that will restrict/minimize the hazardous footprint. A C-band beacon transponder will be installed in the missile to assist range safety with missile track. Prior to LASM's first testing at San Clemente Island, both the missile and ship fire control system will have undergone extensive land based testing and firings. Tests are daytime only.

The Navy proposes to conduct up to 20 missile tests on San Clemente Island per year, which is up to 15 more than the baseline. Missile tests are 1 day per flight, but for scheduling purposes they take about 10 days for buildup and another 10 days for range cleanup of debris.

Artillery Operations

Artillery operations are the landing and movement of artillery pieces, trucks, and support vehicles for up to 50 Marines. These activities will occur primarily within the AVMA, AFPs, and AMPs. AFPs and AMPs provide the positions to positions artillery guns for attack. Exercises conducted within AMPs will not involve live ammunition; however, live-fire exercises will be conducted within the boundaries of AFPs. A typical operation entails Marines and vehicles landing in Wilson Cove and debarking from Navy Landing Barges. Vehicles used include four M198 155-millimeter (mm) (6-in.) Howitzers, six 7-t (15,680-lb) trucks, and three HMMWVs. In addition two helicopters provide escort as the artillery convoy travels from Wilson cove to Ridge Road on to SHOBA. The exercise lasts for 3 days. The howitzers are then airlifted by CH-53 helicopters and returned to amphibious ships offshore. Vehicles return to Wilson Cove on Ridge Road. Approximately 30 percent of the operations are at night. Eight operations are proposed per year, three more than are conducted in the baseline.

Naval Special Warfare Training

Naval Special Warfare Forces (SEALs) conduct two types of military operations on San Clemente Island: those conducted by the Naval Special Warfare Center, which includes the Basic Underwater Demolition/SEAL (BUD/S) indoctrination for new recruits, other basic military courses, and SEAL Qualification Training (SQT); and Maritime Operations (MAROPS) conducted by NSW Groups—basic, intermediate, and advanced tactical training for SEAL platoon readiness.

Land Demolition

Land demolition training to instruct in the construction, emplacement, and safe employment of explosives for breaching or demolition is currently conducted at TARs 1, 2, 3, 4, 16, 20, 21, and 22. This type of training is proposed in new locations, including TARs 9, 10, 13, 14, 15, 17, 18 and 19 and BTSs 1 through 8. In addition, land demolitions would occur in existing demolition range areas in Naval Special Warfare Training Area (SWAT-2) that lie outside of a TAR. In-place explosive ordnance disposal could occur throughout the island depending on where explosives are found. A significant increase (90 percent) in the number of land demolition training exercises is proposed over the number of such operations that were conducted in 2007.

Underwater Demolition-Single Point Source Charge

Underwater demolition, to teach the safe use of explosives for beach clearance is conducted in the nearshore areas of BUD/S beach or Graduation Beach, both in the Northwest Harbor area, as well as TAR 21, Southern California Anti-Submarine Warfare (ASW) Range (SOAR), and SWAT offshore waters. Charge size is small, 2.3 kg (5-20 lb) net explosive weight (NEW). The proposed action includes an increase in the frequency of this type of training, as well as new ranges to support this training. A total of 96 operations are proposed per year, 24 more than are conducted in the baseline.

Underwater Demolition Multiple Charge

Underwater demolition, to teach the safe use of explosives for beach clearance is conducted in the nearshore areas of BUD/S beach or Graduation Beach, both in the Northwest Harbor area. The largest of the underwater demolitions is a Mat Weave, which is comprised of 10 charges of 8-m (25-ft) demolition tubing and haversacks 218 to 226 kg (480 to 498-lb) NEW. A total of 24 operations are proposed per year, 10 more than are conducted in the baseline.

Small Arms Training

BUD/S small arms qualification training occurs on the rifle range at Northhead approximately 171 times per year, expending about 1.0-1.2 million rounds of small arms ammunition. A total of 205 operations are proposed per year, 34 more than are conducted in the baseline.

Land Navigation

Land Navigation takes place throughout San Clemente Island. A BUD/S class is divided into squads of six to eight men. Each squad is assigned a reconnaissance/tactical patrol mission to locate and retrieve an item of equipment. Typically, three squads are deployed per night, and each squad is considered a separate operation. Thus, there would be about 24 personnel moving across the terrain per night. SEAL Platoons also conducted land navigation. This activity is dispersed throughout SWAT ranges, and a 19 percent increase in land navigation exercises is proposed.

Unmanned Aerial Vehicle/Unmanned Aerial Systems Operations

NSW Unmanned Aerial Vehicle/Unmanned Aerial Systems (UAV/UAS) operations are conducted throughout San Clemente Island. UAVs have the unique ability to provide reconnaissance of opposition forces without risking the lives of military personnel. UAVs obtain information about the activities of an enemy or potential enemy or tactical area of operations by use of various onboard surveillance systems including: visual, aural, electronic, photographic, or other means. There are currently numerous types of UAVs employed. Operations typically entail launch, overflight over the ocean and island, and then recovery. The UAVs may be

controlled by a pilot at a remote location, just as if the pilot were onboard, or may fly a preplanned, preprogrammed route from start to finish. The combination of Navy-controlled airspace and proximity to Fleet assets makes San Clemente Island an ideal site for UAV operations. UAVs range from small 1-kg (3-lb) systems that are launched by hand to systems that are several hundred kg (lb) and take off from the NALF runway. UAVs are typically flown at a wide range of cruising altitudes ranging from 46 to 3,048 m (150 to 10,000 ft) mostly dependent upon their size. They are designed to fly quietly and at high enough altitudes so that they cannot be detected from the ground (*i.e.*, higher altitudes for larger, noisier UAVs). Smaller UAVs can be hand launched from any location on the island and are typically recovered in the same spot. Medium-sized UAVs may be launched off of a rail at VC-3 or a truck parked on the road. Large UAVs would take off and land at VC-3 or the NALF runway.

Ordnance used in UAV-supported target operations would be no larger than the Hellfire and would be dropped into either the Impact Areas or the MIR. UAV aircraft include the Swift, Pointer, Raven, Silverfox, Neptune, Aqua Puma, Scan Eagle, and Predator. Missions can last 1 to 20 hours and vary depending on the scheduled mission training. A significant increase in UAV use has occurred on San Clemente Island since 1997, and training involving UAVs is proposed to expand exponentially on the island (*i.e.*, 1,533 percent).

SEAL Platoon Operations

SEAL Platoon Operations are primarily ground operations involving amphibious landings, ground maneuver, and/or live-fire by SEAL platoon members. This category also includes boat-to-shore gunnery (*e.g.*, NSW MK V .50-caliber firing). A single SEAL Platoon Operation consists of a single component of an integrated Full Mission Profile, such as amphibious warfare exercises, breaching, escape and evasion, HMMWV training, immediate action drills, MAROPS, hydrographic reconnaissance, military operations in urban terrain (MOUT), physical conditioning, over-the-beach (OTB) operations, and special boat team operations. SEAL Platoon Operations also include SEAL participation in operation such as bombing exercises (BOMBEX), in which SEALs identify and/or mark the target for strike aircraft. Participants in a NSW Full Mission Profile include a SEAL platoon of 14-16 men, a Special Operations Craft (SOC), and a support element consisting of a Range Safety Officer (RSO) and five to eight other personnel. If the unit is to enter SHOBA from the sea, then a SOC with the SEAL platoon would transit over the open ocean to a point close to San Clemente Island. The SEAL platoon transitions to Combat Rubber Raiding Craft (CRRC), proceeds a short distance toward the beach, and then swims the remaining distance. They transition from the water to the land environment and proceed to the simulated inland target. Nearing the target, they are subjected to adversary weapons fire, simulated by small demolitions charges placed in the sand ahead of time by the support group. Using live-fire to defend themselves against personnel and vehicle targets, the platoon sets a number of demolitions charges on the target. Egress from the area is conducted with a "hot" extract off the beach by the support boat. This involves bringing the boat close to the shoreline, providing ship-to-shore cover fire with machine guns and mortars, while the SEALs swim back to the boat. SEAL Platoon Operations currently occur at all TARs except for 5, 6, 7, 8, 12, 18 and 19, and are proposed for all TARs. A significant increase in SEAL Platoon

Operations (96 percent) over the baseline number of operations is proposed. The intensity of use of TARs throughout the island is likely to increase if the proposed action is fully implemented.

Direct Action

Direct Action is conducted by NSW or Navy Expeditionary Combat Command (NECC) personnel who use covert or overt small unit tactics against an enemy force to seize, damage, or destroy a target and/or capture or recover personnel or material. A squad or platoon size force of NSW or NECC personnel are inserted into and later extracted from a hostile area by helicopter, CRRC, or other technique, and then use small-scale offensive actions to attack hostile forces or targets. These offensive actions can include: raids, ambushes, standoff attacks by firing from ground, air, or maritime platforms, designating or illuminating targets for precision-guided munitions, providing support for cover and deception operations, and sabotage. Opposing forces and targets within range areas are required for realism. Small arms such as 7.62 mm (0.3 in.), 5.56 mm (0.2 in.), 9 mm (0.4 in.), 12-gauge, 40 mm (1.6 in.) grenades, laser illuminators, and other squad or platoon weapons may be used against live fire targets, or with blanks. This exercise may be combined with other exercises such as insertion and extraction, close air support, and others. Direct Action involving live fire and demolition is currently conducted at TARs 2, 3, 4, 16, 20, 21, and 22 and BTS 1 (demolition only), 7 (live-fire only), and 8 and is proposed for additional TARs, including TARs 1 (demolition only), 9 (indoors), 10, 13 (indoors), 14, 15, 17, 18, and 19 (demolition only) and BTSs 2, 3, 4, 5, and 6 (demolition only). The number of Direct Action operations is proposed to increase approximately 22 percent over the number conducted in 2007, and the number of ranges available for this activity is proposed to double.

Naval Special Warfare Center conducts BUD/S training, SEAL Special Weapons System Training, Special Warfare combatant Crew Training and SQT

- Part of the third phase of BUD/S training is conducted on San Clemente Island, throughout the island particularly in the TARs and the BTS with the majority of training conducted in the Northwest Harbor area. BUD/S training is currently conducted in five classes per year for 5 weeks each (40-60 students per class) or 168 training days per year, and up to six classes are proposed with an increase in class size to 90 students per class. Increases in the anticipated number of some SEAL exercises reflect the additional class and students that would be receiving training on San Clemente Island. The first week involves basic training on pistol firing at the pistol range located in SWAT 1. The second week involves basic demolition training in the demolition donut and grenade range in SWAT 2 and the TAR 3. The third week involves basic rifle training in rifle range in SWAT 2. The fourth week involves tactics training which begins to integrate the previous three weeks of training in the field. The last week, BUD/S students are involved in field training exercises (FTXs) where the student locate and attack a mock target in a TAR or BTS. FTX training includes the usage of blank fire, land demolition with small charges, grenade simulators which are used away from the sites on roads to harass students, parachute/star cluster pyrotechnics, which are used in emergency situations to

illuminate the area, smoke grenades, and booby traps. Limited harassment activities, which include blank fire, may occur outside the training areas as the students patrol out of the target areas.

- The SEAL Weapons Systems (SWS) course provides training in a wide range of underwater and land demolitions. There are typically six 1-week classes per year with 16 students per class. The classes are conducted both in the classroom and in the field, resulting in about one operation per day of instruction for each class. SWS operations are estimated at 30 days per year.
- The Special Warfare Combatant Crew (SWCC) course is taught four times per year, for 1 week at a time (25 students per class). This course involves about 20 operations per year.
- SEAL Qualification Training is proposed to incorporate expanded use of San Clemente Island, particularly in SHOBA, for Direct Action, Immediate Action Drills (IAD), and live-fire insertion/extractions. SEAL Qualification Training is currently conducted in five classes per year. Six classes per year are proposed. Increases in the anticipated number of some SEAL exercises reflect the additional class that would be receiving training on the island.

Naval Special Warfare Training is Conducted in Training Areas called SWATs, TARs, and BTS Sites

Naval Special Warfare groups that conduct exercises on San Clemente Island include Naval Special Warfare Groups, and BUD/S. Naval Special Warfare organizes, trains, and deploys combat-ready SEAL platoons, and provides support with high performance surface craft. Training for these groups is conducted within training areas called SWATs and TARs (Figure 2a). SWATs are large areas that support movement of small groups to reach an objective, but they are not subject to demolition or more intensive uses, except in designated range areas. TARs are training sites that sustain more intensive operational use and provide an objective for demolition, live fire, or other types of activities. TARs are intended for tactical training, so virtually all the operations are conducted by combat-ready NSW personnel and those combat-ready forces of other military Services. Basic Underwater Demolition School (BUDS) conducts basic training for SEALs candidates at training sites called BTS sites as well as the TARs. BTS sites are similar to TARs because they provide an objective for BUDS trainees. Operations conducted at BTS sites differ from those typically conducted at TAR, because they are used by students who are not yet combat ready and have less experience with munitions used. See Table 2 for acreage figures.

Figure 2. Locations of SWATs and TARs on San Clemente Island



TAR 1—Demolition Range Northeast Point (0.7 ha (1.8 ac))

The Navy proposes to continue existing uses at TAR 1 and expand the number of operations and training days. Existing training includes 74 operations conducted over 23 days. Proposed use would increase to 169 operations over the course of 30 days. Training at TAR 1 includes over the beach operations, land demolitions, and target assault with UAVs. Explosives used in land demolitions would include non-shrapnel producing 100 lb net explosive weight charges. No construction is proposed at this TAR.

TAR 2—Graduation Beach Underwater Demolition Range [5.6 ha (13.8 ac) (2 ha (5 ac) disturbed)]

This area is currently in use as an underwater demolition range and has been for over 20 years. Existing training includes 80 operations over the course of 5 days. An increase in use is anticipated - 140 operations are proposed over the course of 30 days. The Navy proposes to continue to use this area for underwater demolition, hydrographic reconnaissance, CRRC Transit, Reinforced Inflatable Boat Operations, SEAL Delivery Vehicle (SDV) Operations, Nearshore/Fore-shore Obstacle Clearance, Standoff Weapons Employment, UAVs, Beach Feasibility Reconnaissance, Advanced SDV Operations, Swimmer Harbor Penetration, CRRC landings, Very Shallow Water Mine Counter-Measures (VSW MCM), and Land Demolition Training. To accommodate ongoing training, the Navy proposes to make site improvements for safety and environmental purposes, including: implementing erosion control measures on the access road and in the demolition area, adding a telephone communications line, developing a demolition staging area, and making a demolition preparation area. Lightweight, mobile remote cameras would digitize training events for feedback and reconstruction. These improvements will be accompanied by appropriate gates and signs.

Weapons used at this site include: blank fire, small arms, simunitions, short range training rounds, and crew-served weapons. Larger underwater demolitions up to 227-kg (500-lb) NEW and larger land demolitions up to 91-kg (200-lb) NEW would be conducted at the site.

TAR 3—BUD/S Beach Underwater Demolition Range (1.7 ha (4.1 ac))

BUD/S Beach Demolition Range is an existing training area that supports the BUD/S. The Navy proposes to increase the tempo of existing training activities at this range from 82 operations over 82 days/ year to 198 operations over 95 days/year. Land demolition including small charges up to 2 kg (5 lb) NEW are currently used at this site. Underwater demolitions up to 227 kg (500 lb) are currently conducted at this site. The Navy proposes to implement erosion control measures, maintain a demolition preparation area, a demolition staging area, and a communication line telephone at this site. Operations include Hydrographic Reconnaissance, Parachute Drop, Basic Underwater Demolition Training as a part of BUD/S Camp, operational demolition training for SEAL platoons as part of their proficiency and readiness training. CRRC Transit, Reinforced Inflatable Boat Operations, SDV Operations, Nearshore/Fore-shore Obstacle Clearance, Standoff Weapons Employment, Beach Feasibility Reconnaissance, Advanced SDV Operations, Swimmer Harbor Penetration, CRRC landings, VSW MCM. Weapons used include blank fire, flares, simunitions, and underwater demolitions.

TAR 4—Whale Point/Castle Rock (11 ha (27.1 ac))

This range was previously used as a demolition range and is under development as a MOUT/ village with expanded operational capabilities. The Navy consulted on the construction and use of this area in Biological Opinion FWS 1-6-00-F-19, which is incorporated herein by reference and is superseded by this opinion. New uses proposed include UAV use and convoy operations.

There were 176 operations conducted over 176 days at TAR 4 under the baseline; however, this level of use may be higher than actual use in the past few years because the MOUT proposed at TAR 4 has been under construction during this time. Proposed operations are estimated to be 604 operations over 237 days. Basic land demolition training, OTB, strategic reconnaissance, direct action tactical training, immediate action drills, small arms live-fire, land navigation, MOUT operations, helicopter landings, UAV operations, and Convoy/mounted operations would be conducted at TAR 4. Operations would include a SEAL platoon or Task Force/Task Group conducting street scene operational training. Of the operations proposed, only UAVs and convoy/mounted operations are not addressed in the Biological Opinion FWS 2808. A wide range of explosives are used in this area, including a proposal to increase the maximum size of demolition charges use to a maximum of 136 kg (300-lb) NEW; blanks, smoke and grenade simulators; flares and pyrotechnics; and small arms fire up to .50-caliber. Range facilities that have been previously approved, addressed under section 7 consultation, and are under development include: an urban warfare MOUT site, a rural village with 30 small structures, a paved street scene with 20 buildings, a range bunker, and a 18 m (60-ft) tower. An improved pistol and rifle range is located on the terrace above the MOUT site.

TAR 5—West Cove Amphibious Assault Training Area (0.8 ha (2.1 ac))

This area is adjacent to the SCORE Cable Termination Facility. The beach has historically been, and is currently being, used for insertion/extraction and routine amphibious landings and assaults. Hydrographic Reconnaissance, Land Navigation, SEAL Platoon Operations, and UAV training would be conducted at this TAR. This TAR currently supports some amphibious vehicle use, but this use would increase under the proposed action. No live-fire or demolition would be used at this TAR.

Gates and signs are proposed for use in this area. These are needed to provide notice and care to avoid damage to the Cable Termination Facility or the underwater cable that runs from the south side of West Cove to the SOAR underwater range sensors offshore.

TAR 9—Photo Lab Training Area (10.6 ha (26.3 ac))

TAR 9 is proposed to be used as an adversary-building complex. The area is heavily disturbed from past military activity. Existing buildings and facilities would be used as realistic simulated targets. Operations would include Tactical Environmental Movement, Direct Action, Close Quarter Combat, Urban Combat and Platoon Pre-Planned Attack, Helicopter Hover Personnel Insertion (Fast Rope), Tactical Ambush, Raid (Silent Assault), Land Navigation, Strategic Reconnaissance, and UAV training. Baseline use was 16 training days (NSW) and approximately 19 training days (NSW) and 14 USMC training days are proposed. No live-fire would be conducted outside existing buildings. Blanks and live-fire would be used in close quarter combat (CQC) facility with portable bullet traps. Small arms up to 5.56 mm (0.2 in.) and breaching charges are proposed for use in designated areas. Gates and signs would be constructed, and minor modification of the Photo Lab building would be required.

TAR 10—Demolition Range West [22.2 ha (54.9 ac) (2 ha (5.0 ac) developed for use)]

TAR 10 is proposed to encompass 22.2 ha (54.9 ac), but only 2 ha (5 ac) would be developed for use. Two ha (5 ac) of the site have concentrated impacts from historical use. TAR 10 would be used to provide a land-based location for safe, operationally realistic live-fire and high explosive demolition training. The site would support live-fire training for IAD with a minimum of 180 degrees of live-fire, optimum 360 degrees. TAR 10 has a secondary mission of supporting OTB operations. The operations conducted at TAR 10 would include a SEAL platoon conducting a live-fire assault on a target. At the objective, the SEALs would place explosive charges on the target and demolish it. Clean-up procedures would be incorporated after each operation. This TAR would not include the use of any vehicles off-road, and no new roads would be constructed. Access to the target area would be controlled. Range construction would last approximately 180 days. The site would usually be accessed by the road, and parking would occur in a lot adjacent to the proposed range building, or on existing roads. Existing uses include 27 operations conducted over 3 days; however, existing uses do not include use of live rounds or demolition charges. Proposed uses include 87 operations over 40 days, with equal night and day use. All types of explosives (136 kg (300-lb)) would be used, as well as blanks, smoke and grenade simulators tracers; small arms 5.56 mm (0.2 in.), 7.62 mm (0.3 in.), and .50-caliber surgical sniper would be used. All explosives would be non-shrapnel-producing.

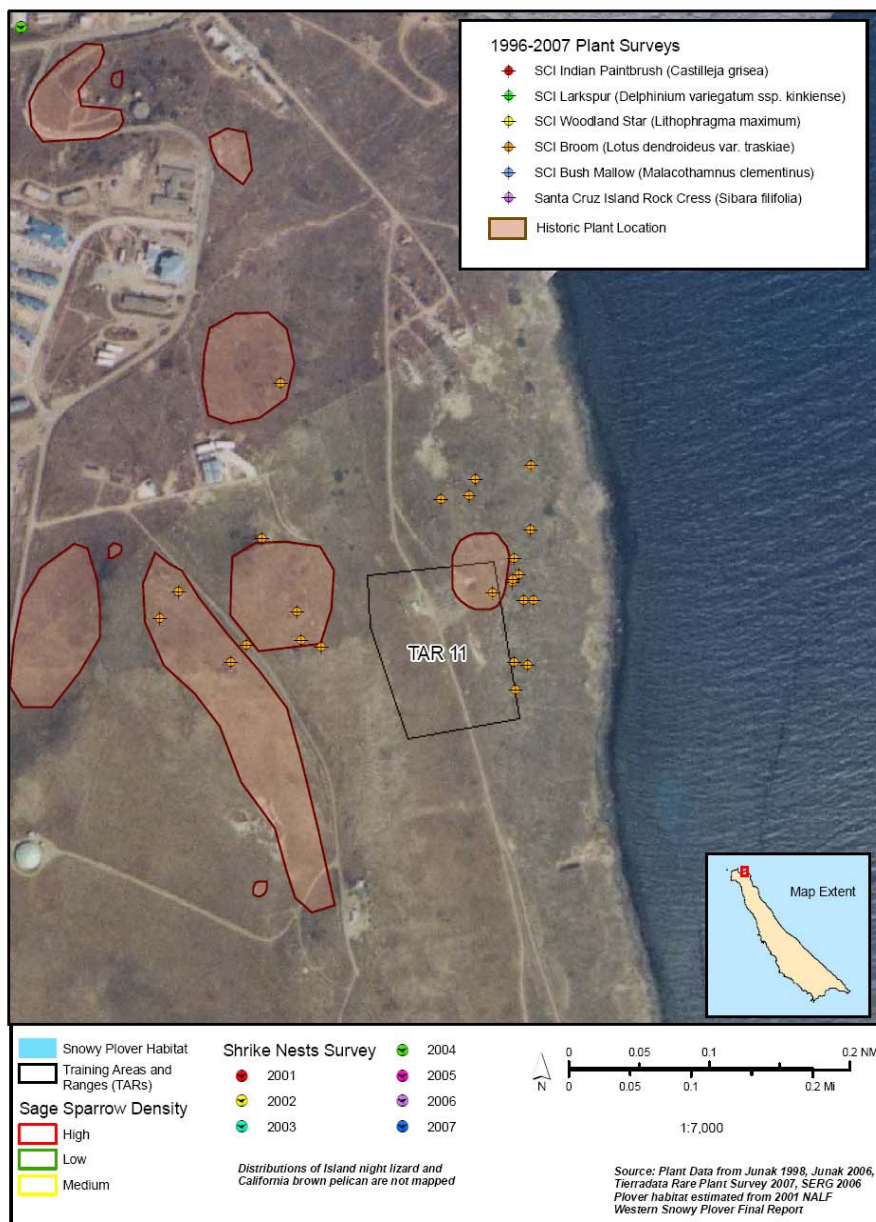
There are no existing facilities within the area. The proposed facility includes a parking area and a 20 x 30 ft² range building. The range building would be a concrete block structure. The building would be constructed on an existing previously disturbed site and would necessitate construction of a driveway to access the site. All construction would be conducted outside of the San Clemente sage sparrow breeding season, and all staging of construction vehicles would be accomplished within the existing disturbed footprint adjacent to the proposed range building. The building site would be flagged prior to construction activities to minimize the potential for disturbances to adjacent sage sparrow habitat. Erosion control measures that assure no offsite habitat degradation would be incorporated prior to construction activities. Such measures would entail review by the Natural Resource Office (NRO) botanist. Proposed use would include the use of small wooden structures as targets ranging in size from 50 to 500 ft². Structures would be constructed and demolished, so would require reconstruction. Erosion control measures may be necessary on the access roads and in the demolition area. The demolition area and target area would be located to the south and west of the existing oval berm onsite, as indicated in diagrams provided to the Service during consultation. The Motorola Base communication system would be incorporated for communication.

TAR 11—Surveillance Training Area [3.6 ha (8.8 ac) (0.4 ha (1 ac) concentrated impact)]

TAR 11 is an old missile site on a bluff facing east, about 1.6 km (1 mi.) south of Wilson Cove. It has been disturbed due to previous military activity. The proposal is for operational use only; no facilities would be developed. The site would be used as an objective, a target area for insertion, reconnaissance, and attack. Operations include Insertion and Extraction, Tactical Environmental Movement, Direct Action, Reconnaissance, Helicopter Hover Personnel Insertion

(Fast Rope), SEAL Team Raid, and UAV training. Existing annual operations include 10 operations conducted over 4 days. Approximately 33 NSW operations over 20 days and use during 2 USMC Battalion landings are proposed. No live-fire or demolitions would be used. Smoke, flares, pyrotechnics, and all types of blanks would be used. The original proposed location for this TAR supported several occurrences of listed plant species. NSW evaluated the site and was able to slightly modify the site boundaries to avoid most of the listed plants (Figure 3).

Figure 3. Modified boundary for TAR 11



TAR 12—Radar Site Training Area [2 ha (5.1 ac) (0.01 ha (.03 ac) concentrated impacts)]

This a small target area high on the bluff overlooking Naval Ordnance Test Station (NOTS) Pier, on the site of an abandoned RDT&E radar facility. It is used to provide an objective close to the shore in proximity to RDT&E facilities to simulate a realistic adversary target. The size of TAR 12 is 2 ha (5.1 ac). However, the area of concentrated impacts is only 0.01 ha (.03 ac). Operations include Land Navigation, Direct Action, Helicopter Insertion, Reconnaissance, and UAV training. Currently, operations span 11 days, and 17 days of use per year are proposed. No demolitions, flares, or pyrotechnics would be used. Smoke and blanks would be used. Gates and signs would be installed. Some erosion control on the access road and a communications telephone line may be necessary.

TAR 13—Randall Radar Site Training Area [6.9 ha (17.1 ac) (0.8 ha (2 ac) concentrated disturbance)]

This site is on the Eastern Escarpment. The area contains an abandoned bunker with attendant facilities. The bunker was previously used for weapons system development. This site would be used to provide a bunker area to conduct tactical land demolitions training and CQC. Operations would include Strategic Reconnaissance, Land Navigation, Direct Action, Tactical Weapons and Light Demolitions Training with Tactical Maneuvering and CQC. Baseline use of this TAR included 29 operations, and 50 operations per year are proposed. Small arms would be used at this TAR; however, all live firing of weapons would be conducted inside the existing bunker. Land demolitions under 2-kg (5-lb) NEW would be conducted. A demolition area would be cleared for target placement, and a firebreak would be installed because demolition activities would occur outdoors. This area is currently used for training operations; however, proposed uses are different than current use. Baseline use includes 29 training days, and 50 training days are proposed. In addition, this site would be used as a staging area during two USMC Battalion sized landing exercises per year.

TAR 14—VC-3 Onshore Parachute Drop Zone “Twinky” [137 ha (338.7 ac) (8.1 ha (20 ac) of concentrated impacts)]

The Drop Zone, named “Twinky,” is off the north end of the VC-3 northwest/southeast abandoned runway. Its use coincides with the use of VC-3, which includes parachute drops, patrolling, and related tactical operations. This TAR would be used as a Drop Zone for land-based parachute drops, static line and free-fall and would also support a variety of Special Warfare Operations, including; Strategic Reconnaissance, Live-fire, Combat Equipment Parachute Drop, Combat Personnel Parachute Insertion, Helicopter Rappelling, Land Navigation, UAV Training, Land Demolition Training, Direct Action, and Tactical Patrol. All types of special warfare aircraft could be used at the site, including, fixed wing and helicopter aircraft. From this area SEAL teams would patrol to Eel Point range, TAR 17, or other TARs on the island. The area is currently used for a subset of the proposed activities, but baseline use does not include the expenditure of live fire or demolition. The baseline use included 59 operations

conducted over 3 days and 12 SPAWAR RDT&E operations. Proposed uses include 147 NSW operations conducted over 19 days, 24 USMC operations, and 24 SPAWAR RDT&E operations. Proposed weapons use includes all types of weapons up to 7.62 mm fired in an easterly direction and demolitions up to 45-kg (100-lb) NEW, flares, illumination, and pyrotechnics. No range facilities are proposed.

TAR 15—VC-3 Airfield Training Area [311.9 ha (770.8 acre) (8.1 ha (20 ac) concentrated impacts)]

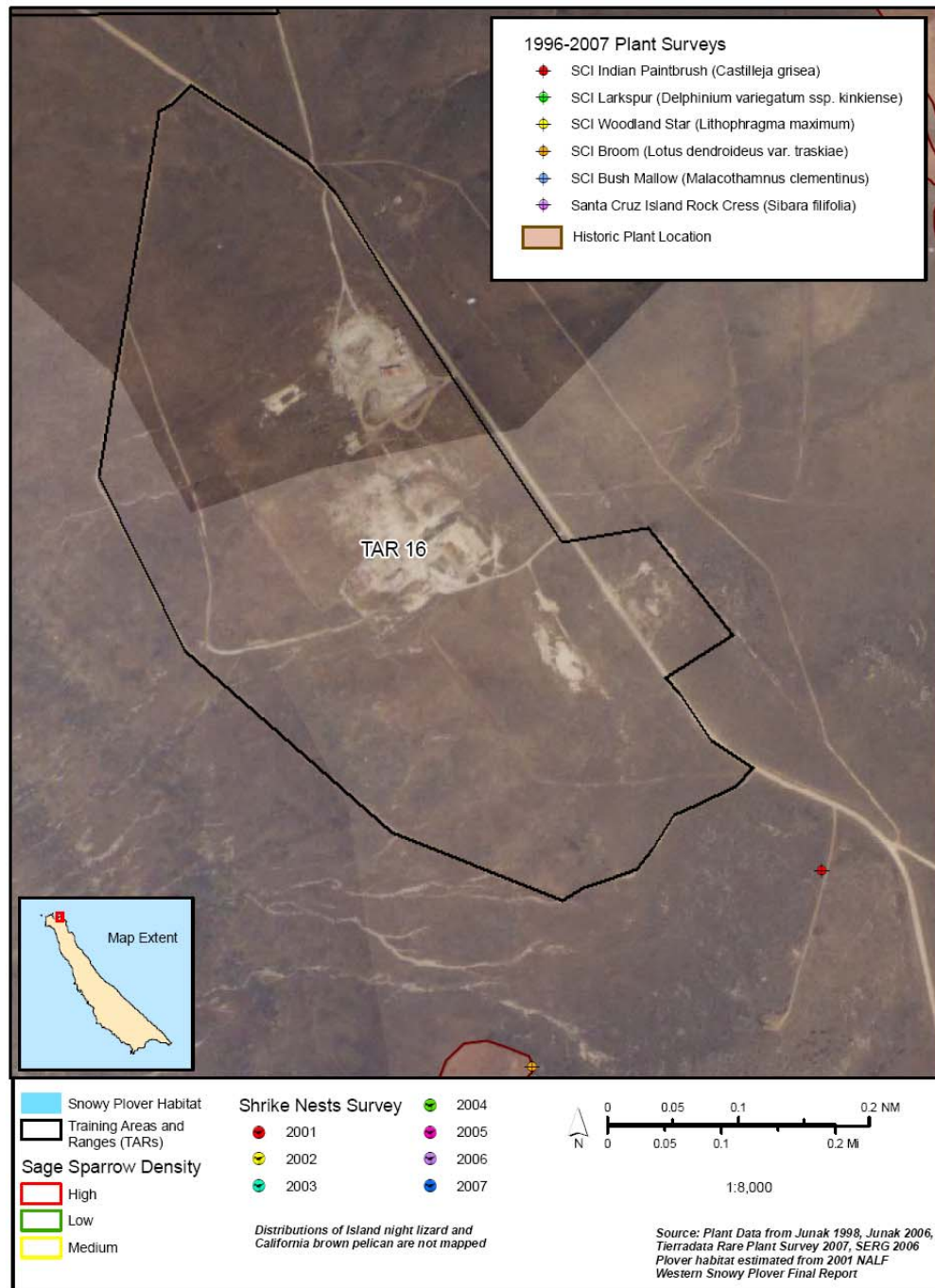
The purpose of TAR 15 is to provide a training venue for SEAL platoon land raids, airfield attack training. The area also supports an existing structure that houses the Special Warfare “Center of Excellence for UAV Training and Testing”. The area would provide the launching point for a variety of UAVs. The area has been heavily disturbed due to previous military activity and overlaps substantially with the proposed AVMA. Existing training operations conducted in TAR 15 include: Strategic Reconnaissance, SEAL Team Land Raid, Land Navigation, Land Demolition Training, Airfield Takedown, Direct Action, UAV training and testing. No live-fire exercises are currently conducted, and live-fire and demolition are proposed for this TAR. Baseline use of TAR 15 includes 120 NSW operations conducted over 20 days. Proposed use includes 265 NSW operations conducted over 30 days, 54 USMC operations, and 10 EOD operations per year. All types of weapons up to 5.56 mm (0.2 in.) and 7.62 mm (0.3 in.) are proposed for use and would be fired in an easterly direction. Land demolitions up to 45-kg (100-lb) NEW would be used, as well as flares, illumination and pyrotechnics. No range facilities are proposed.

TAR 16—South VC-3 [54.5 ha (134.7 ac) (21.9 ha (54.2 ac) highly disturbed)]

Use of the Missile Impact Range as TAR 16 is addressed in the EA Small Arms, Demolition Ranges and Training Areas for NSW Group ONE at San Clemente Island, California, and the accompanying Biological Opinion FWS-2808, which is incorporated herein by reference and is superseded by this biological opinion. The Navy proposes to increase the size of the area identified as TAR 16 and expand the boundaries of the TAR beyond the boundaries of the MIR (from 21.9 to 54.5 ha (54.2 to 134.7 ac)) (Figure 4). The MIR is not proposed for an increase in size and would be delineated separately from TAR 16. Live fire would be conducted throughout the expanded TAR 16 area and demolitions would occur in much of this expanded area. The MIR is currently used for testing JSOW and Tomahawk Missiles by NSW as a parachute drop zone and tactical air assault area. At the target, SEALs would place explosive charges, demolish the target, and extract from the area via beach, airlift, or existing roads. Operations in this area include Strategic Reconnaissance, Live-fire, Land Demolition Activities, Direct Action, Convoy/Mounted operations, Parachute Drops, and UAV Training. Current operations include 77 operations conducted over 25 days, and proposed activities include approximately 187 operations over 50 days and two USMC battalion landings. Live fire is currently conducted within this area. Munitions proposed for use include 5.56 mm (0.2 in.) and 7.62 mm (0.3 in.), machine guns, and .50-caliber sniper and crew-served weapons mounted on vehicles, flares,

pyrotechnics, tracers, and demolition charges up to 450-kg (1,000-lb) NEW. No construction would be necessary.

Figure 4. Revised boundary of Tar 16



TAR 17—Eel Point Tactical Training Range [4.8 ha (11.9 ac) (0.6 ha (1.5 ac) proposed development)]

Uses at TAR 17 are proposed to provide a shore-based location for safe, operationally realistic live-fire and high explosive demolition training for “actions at the objective” and support amphibious landings, OTB operations, and patrol to other land-based TARs. TAR 17 is currently used approximately 15 days per year. The site previously had demolition activities; however, demolition and live-fire activities are not currently conducted at this site. Proposed uses include more intensive assault and sniper training, live-fire exercises, as well as use by the USMC for insertion during Battalion Sized Landings and for CSAR operations.

Proposed operations include: Standoff weapons, Land Navigation, Direct Action, Demolition Training, and UAV Training. The operations would include a SEAL platoon conducting a pre-planned live-fire assault on a target. The platoon would covertly swim up to the beach, maneuver across the beach and assault a target, and return to the beach under live-fire conditions to escape. At the target the SEALs would place explosive charges on the target and demolish the target. Long-range sniper training would also be conducted. Baseline operations include 47 NSW operations conducted over 12 days and one CSAR operation; however, existing operations do not include live-fire training. Proposed operational use would be 115 NSW operations conducted over 25 days, two USMC Battalion landings, and 8 CSR operations with equal night and day use. All types of explosives (25 lb maximum net explosive weight), 5.56 mm (0.2 in.) and 7.62 mm (0.3 in.) rifles and machine guns, .50-caliber sniper/standoff, flares and pyrotechnics would be used. All explosives would be non-shrapnel-producing explosives.

The existing facilities within the area include a gate and a target building. No new facilities or site improvements are proposed at this TAR. The targets would be the same type of pop up targets used at other TARs. The targets for the sniper range are handset targets, meaning the targets are carried and setup by hand. The demolition area would be contained in the existing demolition area.

The beach exit is on the south side of Eel Point and is somewhat protected from the north. The exit consists of medium-sized rocks with a slope of 10 degrees up to the first marine terrace. The first marine terrace in the vicinity of the beach exit is a flat area traversed by an ephemeral drainage swale and an unpaved road. There would be no vehicle use off the existing roads and no expansion of the road system. Communication would be through the Motorola Base radio system. Clean-up procedures would be incorporated after each operation as per range instructions.

TAR 20—Pyramid Cove Training Area [67.6 ha (167.2 ac) (1.2 ha (3 ac) conc. use)]

This site is located in SHOBA and has been used extensively over the past decade for NSW training. Recently, it has become a preferred training location for Special Boat Team (SBT) 12, with its rigid-hulled inflatable boats (RIBs) and MK-V boats, Mobile Security Unit 31 and Naval

Coastal Warfare Group ONE. This TAR provides a tactical firing area close to the shoreline for water and land use. Since it is located within SHOBA, it has been used for live-fire training exercises. Proposed operations include Gunnery Exercises, Special Boat Unit Tactics, Firing from Boat to Boat, Boat to Shore, Small Arms Training, Land Navigation, OTB, Reconnaissance, Hot Extract from Beach, UAV, CAS, Land Demolition, Mounted Patrol, Direct Action, and IADs. Baseline training tempo included 64 operations conducted over 44 days. Proposed use includes 173 operations over 60 days per year. Live-fire and inert training munitions; small arms, .50-caliber rifle, .50-caliber machine gun on boats, 40 mm (1.5 in.), 25 mm (1 in.), 60 mm (2.4 in.), 81 mm (3 in.), 105 mm (4 in.), 127 mm (5 in.) (127 mm (5 in.) naval gunfire mounted on destroyer), 155 mm (6 in.), AT-4, and MK-19; land demolitions 45-kg (100-lb) NEW munitions, illumination rounds, tracers and pyrotechnics would be used onshore. Combat craft include RIBs and Boston Whalers.

No facilities would be constructed. No stationary targets would be in place for more than 1 day. This site is currently used 44 days per year and is proposed for 60 days of use.

TAR 21—Horse Beach Cove Training Area [35.7 ha (88.1 ac) (4 ha (10 ac) conc. impacts)]

This TAR provides an area close to the shoreline for day and night raids, insertion and extraction in proximity to a CQC target. The TAR is located within SHOBA and is used for live-fire exercises. Proposed training includes Gunnery Exercises, Land Demolition, Underwater Demolitions, Air assault, Platoon Pre-Planned Attack, Stand-off Weapons Employment, CAS, Special Boat Unit Tactics, Firing from Boat to Shore, OTB, Strategic Reconnaissance, Convoy/Mounted Drills, CQC, Hot Extract from Beach, VSW MCM, Direct Action, IADs, and UAV Training. Baseline use of TAR 21 includes 218 operations conducted over 79 days. The site is proposed for 455 NSW operations over 90 days, and 12 USMC operations using amphibious vehicles per year. Weapons use would include live-fire and inert training munitions; small arms, 9 mm (0.4 in.), 5.56 mm (0.2 in.), 7.62 mm (0.3 in.), .50-caliber, and training practice (not dud producing) 40 mm (1.5 in.); land demolitions up to 45-kg (100-lb) NEW and underwater demolitions up to 9-kg (20-lb) NEW. Flares, illumination rounds, tracers, and pyrotechnics would be used. Weapons firing would be conducted throughout 360 degrees. Some small building-like targets for CQC and small permanent facilities are proposed.

TAR 22—China Cove Training Area (289 acres, 2 acres concentrated impacts)

TAR 22 provides an area close to the shoreline for day and night raids and stand-off weapons employment in Impact Area II. Since the TAR is within Impact Area II, it is subject to live fire and demolition activities under baseline conditions. Proposed operations include Gunnery Exercises, Strategic Reconnaissance, Air assault, OTB, Insert/Extract, IADs, Land Navigation, Stand-off Weapons Employment, CAS, Land Demolition Training, and UAV Training. Baseline uses include 69 NSW operations conducted over 33 days and 63 non-NSW naval operations. Proposed use includes 143 NSW operations conducted over 40 days, 18 USMC operations, and 162 non-NSW naval operations per year. Proposed weapons use includes Live-fire and inert training munitions; small arms, .50-caliber, 30 mm (1 in.), 40 mm (1.5 in.), AT-4, 105 mm (4

in.), 127 mm (5 in.) naval gunfire, 155 mm (6 in.), Stinger Missile, and Light Anti-tank Weapon (LAW); land demolitions up to 227-kg (500-lb) NEW in an extension of Impact Area IIA (designated for heavy ordnance use) to the shoreline; flares; illumination rounds; tracers; and pyrotechnics. No range facilities are proposed

Table 2. TAR Ranges and BTS Sites on San Clemente Island

TAR /BTS Site	Land Area (acres)	Area of Concentrated Impacts *(acres)	Changes in Uses Proposed	Baseline Use Days (ops)	Proposed Use Days (ops)*	Percentage Increase in Use Days (% increase in ops)
TAR 1	1.8	All	YES (LIVE FIRE)	23 (74)	30 (169)	30%(128%)
TAR 2	13.8	5.0	NO	5 (80)	30 (140)	500%(75%)
TAR 3	4.1	All	NO	82 (82)	99 (202)	21%(146%)
TAR 4	27.1	All	NO	176(176)	237(604)	35%(243%)
TAR 5	2.1	0.0	NO	10	55	450%
TAR 6	3.3	Neg.*	YES	0	10	-
TAR 7	None	None	YES	0	10	-
TAR 8	None	None	YES	0	10	-
TAR 9	26.3	None	YES	16	33	106%
TAR 10	54.9	5.0	YES (LIVE FIRE)	3 (27)	40(87)	1233%(222%)
TAR 11	8.8	1.0	NO	4 (10)	24 (35)	500%(250%)
TAR 12	5.1	.03	NO	11	19	72%
TAR 13	17.1	2.0	NO	29	54	86%
TAR 14	338.7	20.0	YES (LIVE FIRE)	15(59)	67(195)	347%(230%)
TAR 15	770.8	20.0	YES (LIVE FIRE)	20(120)	100(329)	400%(174%)
TAR 16	200	54.2	NO	25(77)	58(189)	132%(146%)
TAR 17	11.9	1.5+	YES (LIVE FIRE)	12(47)	37(125)	208%(166%)
TAR 18	0.6	All	YES	0	30(88)	-
TAR 19	2.4	2.4	YES	0	10(47)	-
TAR 20	167.2	3.0	NO	44(64)	60(173)	36%(170%)
TAR 21	88.1	10.0	YES (EFV USE)	79(218)	104(467)	32%(114%)
TAR 22	289.0	2.0	NO	99(132)	222(323)	124%(145%)
BTS 1	1.4	1.4	NO	7 (7)	11(11)	57%(57%)
BTS 2	0.5	0.5	YES (DEMOLITION)	7 (7)	11 (11)	57%(57%)

BTS 3	0.9	0.9	YES (DEMOLITION)	7 (7)	11 (11)	57%(57%)
BTS 4	2.1	2.1	YES (DEMOLITION)	5 (5)	7 (7)	40%(40%)
BTS 5	0.9	0.9	YES (DEMOLITION)	3 (3)	5 (5)	67%(67%)
BTS 6	0.9	0.9	YES (DEMOLITION)	7 (7)	11 (11)	57%(57%)
BTS 7	13.8	13.8	YES (DEMOLITION)	10 (10)	12 (12)	20%(20%)
BTS 8	6.9	6.9	NO	15 (15)	18 (18)	20%(20%)
[Assumed: that battalion landing would entail 4 days use in VC-3 TARs and 3 days use in other TARs.]						

BTS 1 - Terrorist Training Camp (TTC)

Terrorist Training Camp (Figure 5a) provides an area near the BUD/S camp to practice day and night basic level NSW field exercises. Operations include Direct Action. Baseline use includes 7 NSW operations occurring over 7 days. Proposed use includes 11 operations over 11 days. Current weapons use includes small arms blank ammo, pyrotechnics (parachute/star clusters, grenade simulators, and smoke grenades) and explosives up to 2-kg (5-lb) NEW. The site consists of an existing bunker and a mobile mock missile launch platform. It also contains .50-caliber targets and is currently jointly used as the .50-caliber impact area. Two to three small target structures (10 x 10 ft²) would be added to the site.

BTS 2 - F-4 Aircraft

The F-4 (Figure 5b) provides training on rescuing personnel from a downed aircraft. Operations include Direct Action. Insertion to the site would typically be on foot, but it may occasionally be via helicopter. Baseline use includes 7 NSW operations occurring over 7 nights. Proposed use includes 11 operations over 11 nights. Current weapons use includes small arms blank ammo and pyrotechnics (grenade simulators). Proposed use would add explosives up to 2-kg (5-lb) NEW and pyrotechnics (parachute/star clusters, booby traps). The site consists of a downed aircraft. No improvements are proposed for the site.

BTS 3 - SAM Site

The SAM Site (Figure 5c) provides a basic NSW mock target missile site with multiple avenues of approach. Operations include Direct Action. Baseline use is 7 operations over 7 nights. Proposed use includes 11 operations over 11 nights. Current weapons use includes small arms blank ammo, pyrotechnics (parachute/star clusters), grenade simulators. Proposed use would add explosives up to 2-kg (5-lb) NEW. The site currently contains mock mobile missile launch platform and an existing plywood structure located on top of an existing concrete slab. Two to three additional small plywood target structures (10 x 10 ft²) are proposed for construction on the existing concrete slab.

BTS 4 - Project “X”

Project “X” (Figure 5c) provides a challenging NSW basic level field exercise site for target location and attack. Operations include Direct Action. Baseline use is 5 operations over 5 nights. Proposed use includes 7 operations over 7 nights. Current weapons use includes small arms blank ammo, pyrotechnics (grenade simulators). Proposed use adds explosives up to 2-kg (5-lb) NEW and pyrotechnics (parachute/star clusters, grenade simulators). The site currently contains an existing target structure. The target structure would be repaired and an additional plywood structure (10 x 10 ft²) and target vehicles would be added to the site. The target vehicles would be located on existing roads.

BTS 5 - Skeet

The Skeet site (Figure 5c) provides a NSW basic level field exercise target site with multiple avenues of approach. Operations include Direct Action. Baseline use is 3 operations over 3 nights. Proposed use is 5 operations over 5 nights. Current weapons use includes small arms blank ammo and pyrotechnics (grenade simulators). Proposed uses add explosives up to 2-kg (5-lb) NEW and pyrotechnics (parachute/star clusters, grenade simulators). The site currently contains two existing structures. Two to three additional plywood target structures (10 x 10 ft²) and vehicles would be added to the site.

BTS 6 - Lookout

Lookout (no Figure provided) provides NSW basic level field exercise night time target site overlooking a bluff. Operations include Direct Action. Current weapons use includes small arms blank ammo, pyrotechnics (grenade simulators). Proposed uses add explosives up to 2-kg (5-lb) NEW, pyrotechnics (parachute/star clusters), and grenade simulators. The site currently contains an existing structure. Three additional target structures (10 x 10 ft²) would be constructed on existing concrete pads.

BTS 7 - Contact Drills

Contact Drills (Figure 5a) provides NSW basic level tactics training. The site is an existing graded automatic weapons range. Operations include Direct Action. Baseline use is 10 operations over 10 days. Proposed use includes 12 operations over 12 days. Current weapons include live-fire up to 7.62 mm (0.3 in.) and pyrotechnics (parachute/star clusters, grenade simulators, smoke grenades, and tracers). Live fire is directed westward towards the ocean. No new structures or uses are proposed for this site.

BTS 8 - Raids

Raids (Figure 5a) provide a safe location for NSW basic level live-fire weapons training. Operations include Direct Action and weapons training. Baseline use is 15 operations over 15 days. Proposed use is 18 operations over 18 days. Current use includes live fire up to 7.62 mm

(0.3 in.) and pyrotechnics (parachute/star clusters, grenade simulators, smoke grenade) and land demolitions up to 2-kg (5-lb) NEW. Live fire is directed westward towards the ocean. The site is graded and contains existing targets. No new structures or uses are proposed for the site.

Figure 5a-c. Location of BTS Sites

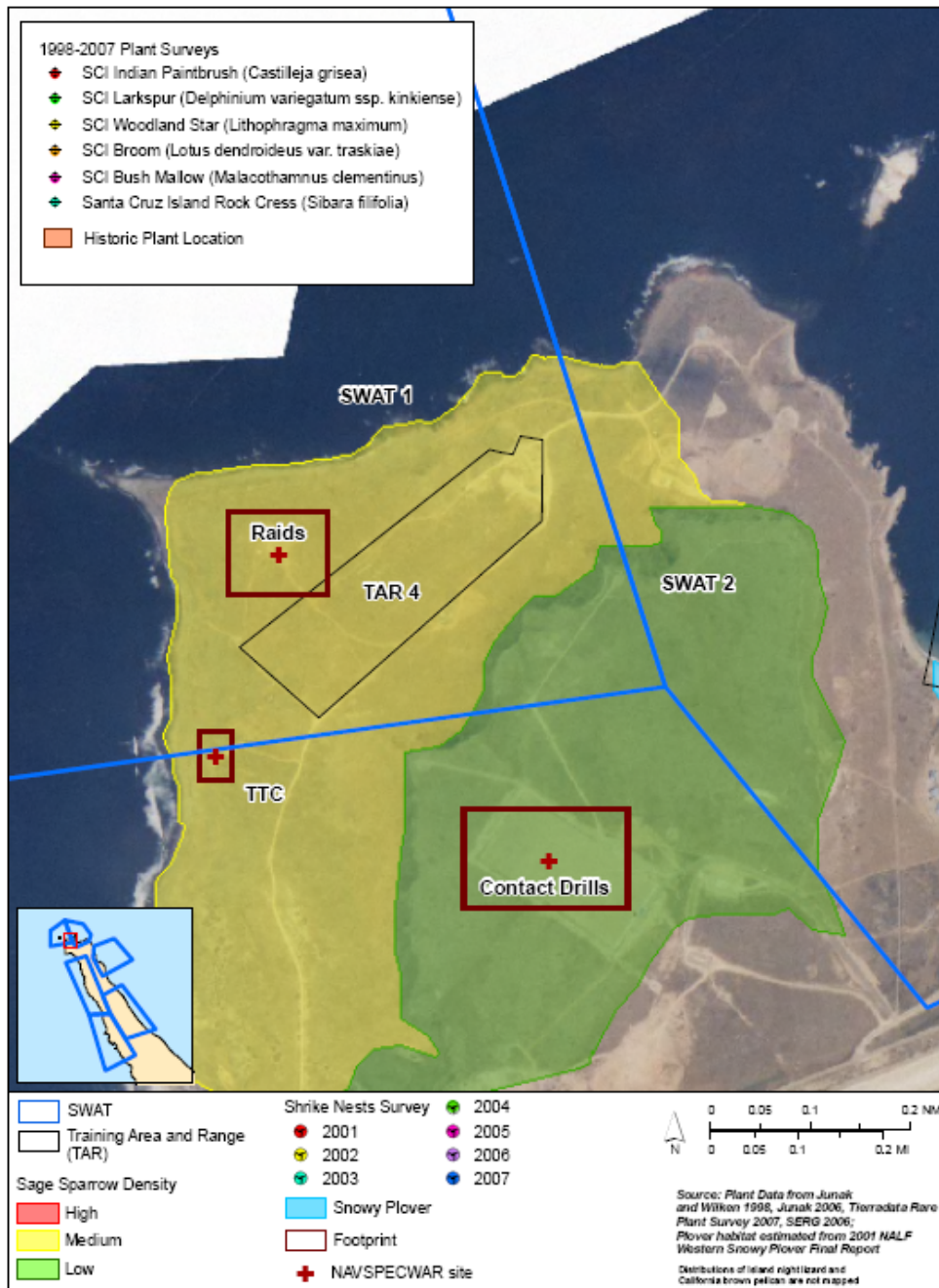


Figure 5b. Location of BTS Sites

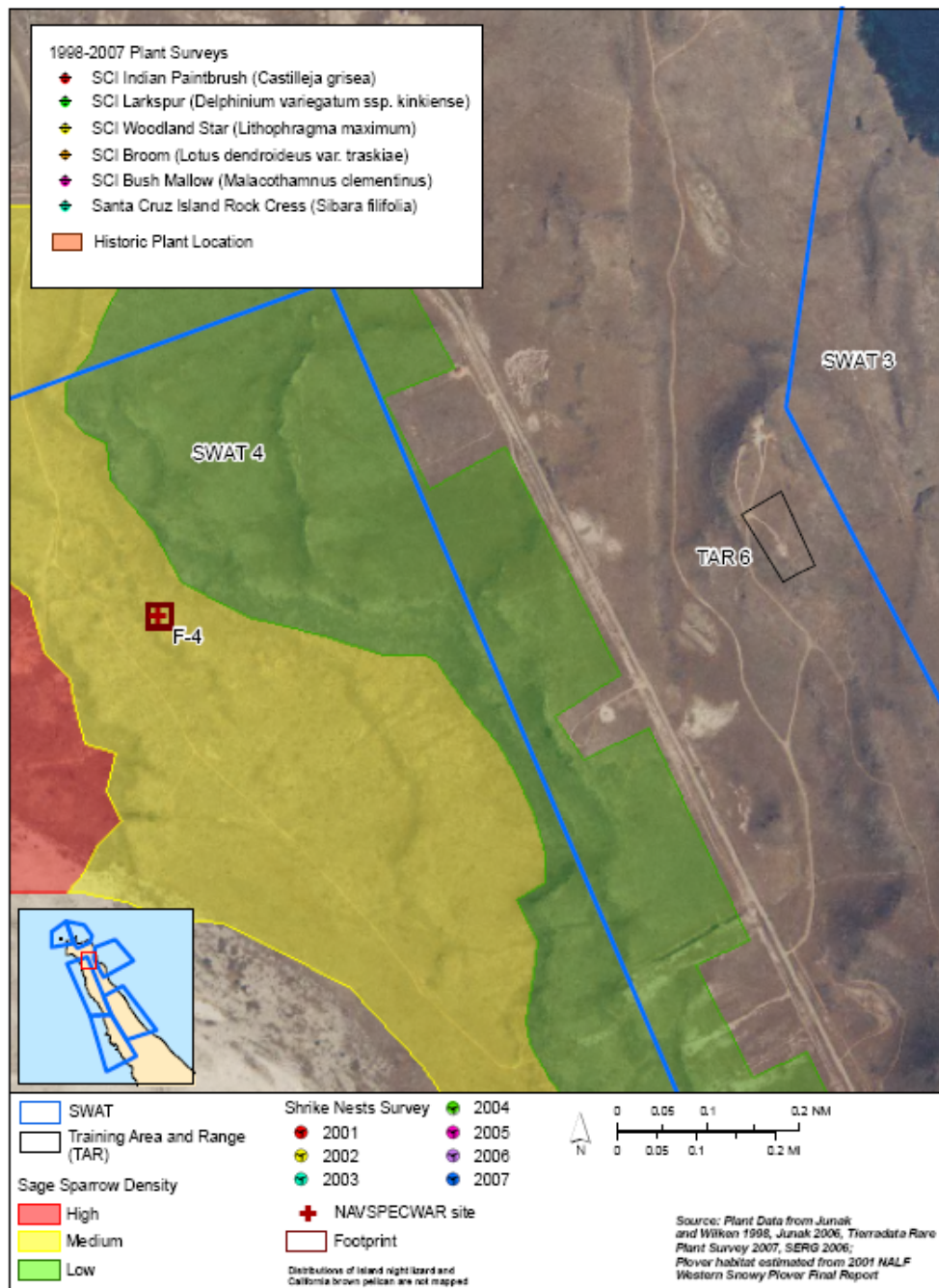
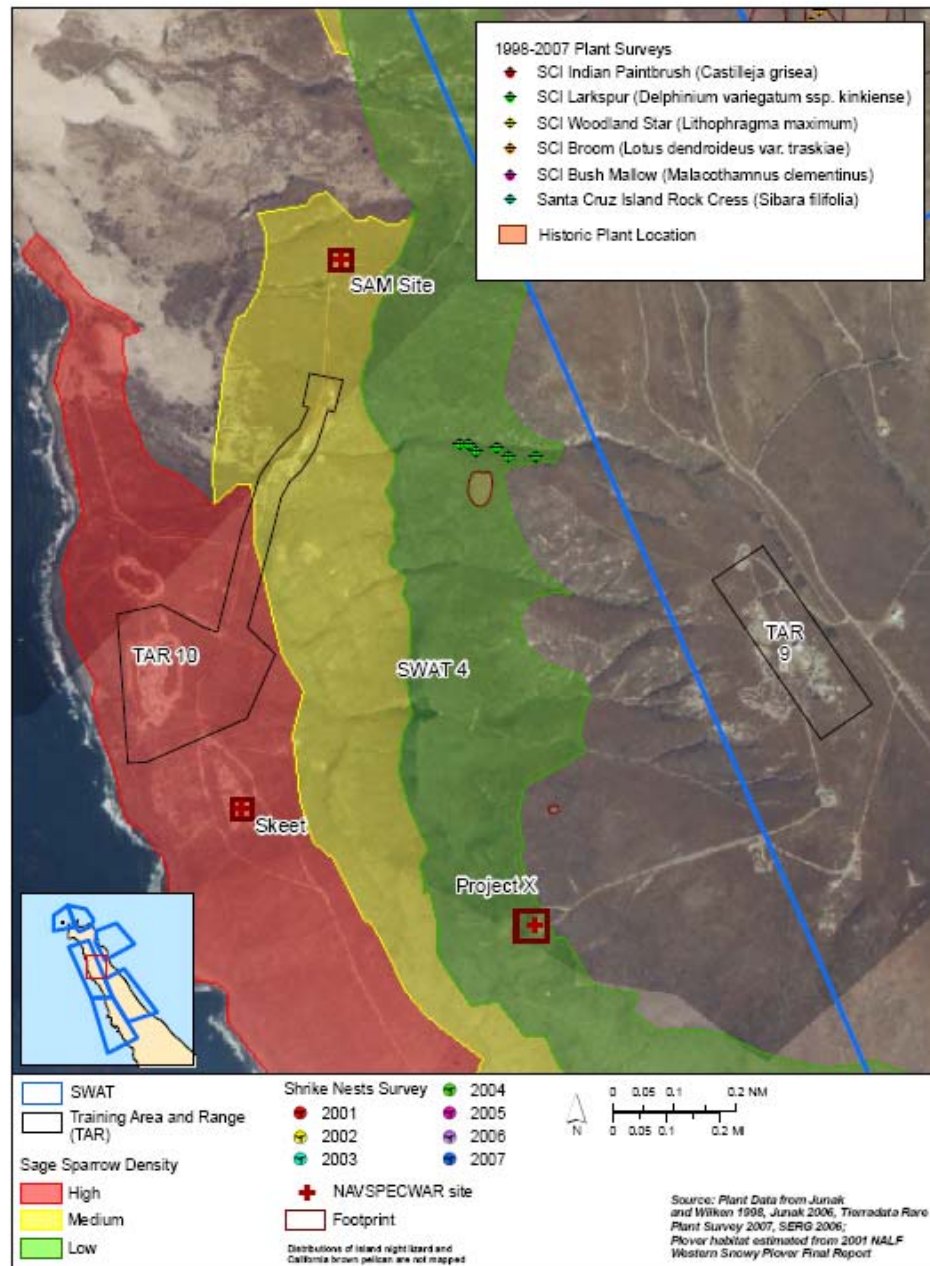


Figure 5c. Location of BTS Sites



2. Introduction of new training exercises to San Clemente Island

The Navy has administered San Clemente Island since 1934 as a location for training exercises and for research and development. While the entire island has been used throughout the years for various training activities, some activities and locations were discontinued during the ensuring years. Consequently, those discontinued activities and locations have not been included nor identified as part of the environmental baseline. The proposed action section of this biological opinion, however, now identifies activities previously discontinued, designates them as new training exercises, and places them in locations beyond those currently in use (Table 3).

Table 3. Proposed New Operations and New Uses in Existing Training Areas

Navy Warfare Area	Operation	Proposed Annual Use Days (Operations)	Locations
USMC Amphibious Landings And Raids	Reconnaissance	24 (12)	Entire Island
	Helicopter Assault	12 (12)	VC-3 (AMP D)
	Armored Operations	8 (4)	AVMC to SHOBA (AFP 1,6)
	Combat Engineers	2 (2)	Northwest Harbor
	Small Boat Raid	12 (12)	West Cove/ Eel Point
	Amphibious Assault Operations	3 (3)	West Cove/ Horse Beach Cove (AVMC, AMP A,B)
	Amphibious Assault Vehicles Operations	24 (8)	West Cove, AVMC to SHOBA (AMP C,D)
	EFV Company Assault	2 (2)	Transit from West or Horse Beach Cove to VC-3 and SHOBA (AVMC; AMP C,D)
	Assault Amphibious School Company Battalion Landing	75 (15)	Transit from West or Horse Beach Cove to VC-3 and SHOBA (AVMC; AMP D)
	Infantry Battalion-sized Amphibious Landing	8 (2)	Entire Island (AVMA; AFO 1,6; AMP A,B,C,D)
	Stinger Firings	4	China Point
Naval Special Warfare Changes in Training at TARs and BTS sites	TAR 6- White House Training Area	10 (10)	Above Wilson Cove
	TAR 7 – Saint Offshore Parachute Drop Zone	10 (10)	Offshore Wilson Cove
	TAR 8 – West Side Nearshore Parachute Drop Zone	10 (10)	Offshore western SCI
	Live Fire/Demolition Use TAR 10	40 (87)	West Shore
	Live Fire/Demolition Use TAR 14	74 (202)	VC-3 Area
	Live Fire Demolition Use TAR 15	100 (329)	VC-3 Area
	Live Fire Demolition Use TAR 17	42 (130)	Eel Point
	TAR 18	30 (88)	North Quarry
	TAR 19	10 (47)	South of Runway, Old Quarry
	Demolition Use BTS 2	11(11)	Northwest of Dunes
	Demolition Use BTS 3	11(11)	Flasher Road
	Demolition Use BTS 4	7 (7)	Upper West Shore
	Demolition Use BTS 5	5(5)	West Shore
	Demolition Use BTS 6	11(11)	Eastern Escarpment
	Demolition Use BTS 7	12 (12)	North of Runway

Amphibious Landings and Raids

USMC operations and training at San Clemente Island would include ground forces, air elements, and service support operations. Amphibious assault landings within SHOBA would occur at Horse Beach, and landings outside of SHOBA would take place in West Cove and Northwest Harbor. Small units would also land on the western shore. Helicopter assaults and infantry operations would be conducted at the Old Airfield. Air operations, air-to-ground weapons delivery, and artillery firings would be conducted in SHOBA, as noted above.

Amphibious landings by the USMC on San Clemente Island would generally be made from Navy ships offshore. USMC units would come ashore in Landing Craft Air-Cushion vessels (LCACs), Amphibious Assault Vehicles (AAVs), and Expeditionary Fighting Vehicles (EFVs). LCACs are high-speed cargo carrying vessels, while the AAVs are lightly armored amphibious troop carriers. The LCAC's air cushion ability allows it to ride onto the beach to unload cargo, vehicles, and personnel. The AAVs are tracked vehicles which are carried aboard Navy ships and come ashore with Marines aboard. The EFV is under development to replace the AAV. Most of the landings at West Cove have been to get Marines ashore for training on other parts of the island (*e.g.*, VC-3 or SHOBA). The typical landing of a Marine company includes the use of one to two HMMWVs and one to two five-ton trucks. The large trucks are used to tow the M198 155 mm (6 in.) Howitzer. Light Armored Vehicles (LAVs) are also used in amphibious landings. The LAV is a high-speed, armored reconnaissance and personnel carrier. It has eight tires and can operate both on roads and rough terrain. However, on San Clemente Island, the LAVs are used only on prepared road surfaces. Any tracked vehicle, tank, AAV, or EFV would use the AVMC (which includes the AVMA, AVMR, AVMR-SHOBA, AMPs and AFPs). Amphibious landing operations proposed for San Clemente Island include the following:

Reconnaissance - Small Marine units (approximately 12 individuals) would be inserted onto the island by two UH-1 helicopters. The helicopters would come from amphibious ships offshore. The helicopters would land in flat areas at NALF, VC-3, or on a case-by-case basis, at any flat area that does not interfere with sensitive resources. The Marines then travel on foot to the objective area. They would conduct covert reconnaissance of the area for a follow-on assault. The reconnaissance units are extracted from the island by helicopters and return to the offshore ship. No live ordnance is used during these operations, and the total time of the exercise is approximately 48 hours. Most reconnaissance landings would occur at night, and minimal movement is planned for daytime.

Helicopter Assault - This operation would consist of the airlift of approximately 150 Marines from amphibious ships offshore into a landing zone near the Old Airfield, VC-3. The aircraft would include CH-46s and CH-53s for inserting Marines and equipment. The force is also supported by AH-1 attack helicopters and AV-8B Harriers. The Marines would proceed to the north along the AVMR to the NALF airfield for to practice airfield seizure techniques. The forces would then leave the island by helicopters from

NALF back to the amphibious ships off shore. The exercise would last about 8 hours. Exercises take place during the day and night.

Armored Operations - These operations would use up to four M-1 tanks and four HMMWVs, which would arrive on the island at West Cove from Landing Craft Utilities (LCUs) and LCACs. Approximately 25 Marines would come ashore with the armor force. The tanks and HMMWVs would proceed to AFP 1 in SHOBA, escorted by two UH-1N/Y or AH-1W/Z and two AV-8B or F-35B helicopters, via the AVMR, AVMR-SHOBA, and nearby Ridge Road. Helicopters would typically fly at altitudes as low as 100 ft and up to 3000 ft depending on which mission they are flying, and what they are doing in the mission. In SHOBA, tanks would conduct live-fire operations from AFP 1, addressing targets in Impact Area I. The tanks would fire only target practice or HE ammunition, not illumination rounds. The exercise would last for 2 days. At the end of the exercise, the armor force would return to West Cove and re-board the amphibious vehicles. Operations would be mostly in the daytime.

Combat Engineer Operations - Combat Engineer Operations consist of approximately 30 Marines coming ashore from and LCU. On San Clemente Island, the proposed operation would consist of Marines coming ashore from an LCU in the Northwest Harbor area. They could bring three HMMWVs and one 5-t (11,023-lb) truck ashore and would conduct demolition training with live ordnance in the Northwest Harbor demolition training areas. The exercise would last for 1 day. The Marines would leave the island by LCU from Northwest Harbor. Most operations would be in the daytime.

Small Boat Raid - Small boat raids consist of six CRRCs coming ashore. On San Clemente Island, the proposed operation would occur on the southwest coast of San Clemente Island. Troops would avoid the marine mammal haul out areas. No movement would be authorized into the canyons along the shore. Each CRRC holds four Marines. The CRRCs would come ashore from a Navy amphibious ship afloat about 3.7 km (2 nm) from shore. The Marines would proceed inland on foot to a designated objective such as the Old Airfield, VC-3. After a simulated combat engagement at the objective, the Marines would return to the boats for transport back to the ship. No live ordnance would be used, and the total time of the exercise is approximately 6 hours. Small boat raids would occur mostly at night.

Amphibious Assault Operations - Typical Amphibious Assault Operations include landings by up to 10 AAVs (to be replaced by EFVs in the future). On San Clemente Island, the proposed operation would entail landings in West Cove and simultaneous offload of HMMWVs and LAVs from LCACs and LCUs at Wilson Cove. The two groups would link up on the AVMR and move to the south to SHOBA to conduct live operations. The proposed locations for live-fire operations include segments of Ridge Road, China Road, and Horse Beach Canyon Road that are close to Impact Areas; however, the boundaries for this activity have not been defined. The movement of Marine force could be accompanied by 4 to 5 helicopters, AH-1s, and an UH-1

Helicopters would typically fly at altitudes as low as 30.5 m (100 ft) and up to 914.5 m (3,000 ft) depending on which mission they are flying and what they are doing in the mission. In SHOBA, AV-8Bs could provide CAS during the exercise. These operations would usually take 2 days to complete. The groups would leave the island by moving north along Tank Trail and then into West Cove and Wilson Cove for re-boarding onto Navy amphibious ships. Most amphibious landings would occur in the daytime.

Amphibious Assault Vehicle and EFV Operations - These operations would involve up to 12 AAV and EFVs coming ashore in West Cove or Horse Beach Cove from amphibious Navy ships offshore. About 100 Marines would embark. The AAVs/EFVs would operate on the AVMC. The AAV/EFVs would proceed to the Old Airfield and conduct an assault on the objective in that area. When employed, EFVs would proceed to SHOBA and the nearshore waters to conduct live firing exercises. The length of the event would be approximately 8 hours, almost totally in the daytime.

EFV Company Assault - A company of 46 EFVs would depart naval shipping with 225-300 Marines embarked approximately 46.3 km (25 nm) from San Clemente Island to arrive at West Cove or Horse Beach Cove. The company would practice land maneuvers through the AVMR to the vicinity to VC-3, where the infantry would conduct an assault on the targets there. There would be no live-fire, but blanks and smoke charges would be expended. The EFVs would proceed to SHOBA and conduct live-fire on land with their 30 mm (1 in.) gun, 7.62 mm (0.3 in.) machine gun, and small arms. Live fire would occur on Ridge Road and/or China Point Road with EFV's firing into Impact Areas I and II. Live-fire would occur outside of the Impact Areas, but the targets are located within the Impact Areas. Existing targets or debris in the impact areas would be used as targets. Live-fire from sea to land would be accomplished in the SHOBA nearshore waters into the Impact Areas I and II. Sea to sea live-fire is planned to be conducted in the offshore waters of Laser Training Ranges 1 and 2 (5.6 km (3 nm) west of San Clemente Island) and Fleet Training Area Hot (FLETA HOT) 27.8 km (15 nm) south of San Clemente Island. The exercise would last 2 days. Following completion, the EFVs would traverse back to embarkation beaches via the AVMR and AVMR Extension.

Assault Amphibian School Battalion Operations - The Assault Amphibian (AA) School Battalion, located at Marine Corps Base Camp Pendleton (MCBCP), is the entry-level school for all USMC AAV crewmen and as such will also train EFV crewmen when that system comes on line in approximately 2009. Marines attending the entry-level training are under the full-time supervision of AA School Battalion instructors, and all of their activities are carried out in accordance with the Program of Instruction and associated lesson plans. The EFV would be equipped with a stabilized turret containing a 30 mm (1 in.) cannon and a 7.62 mm (0.3 in.) machine gun, both of which could be fired while the vehicle is on the move, either on land or at sea. In the proposed San Clemente Island operation two LCACs would carry five to six EFVs with approximately 50 Marine students and instructors embarked to arrive offshore near West Cove or Horse Beach Cove. The EFVs would be dropped off about 2.7 km (2 nm) from shore for student open

water driving training. The group would proceed via the AMVR to the vicinity of VC-3 for parking and bivouac. Since this is a school training event and not tactical, it would be possible for the Marines to park the vehicles in an administrative pattern, which would lessen surface disturbance. From VC-3 they would proceed to SHOBA for live-fire operations. Live-fire operations were not defined in the BA, but they may include firing from Ridge Road in the direction of Impact Area I. The need for targets has not been defined. The vehicles would also enter the nearshore waters and practice firing from ship to shore. The exercise is expected to last for 5 days and nights with only 3 days of live-fire, which would also be day and night.

Infantry Battalion-sized Amphibious Landing - Infantry battalion-sized amphibious landing, with opposing forces, is proposed for 1,500 personnel. This exercise would last up to 4 days, employ the full combined arms team used by the USMC and occur up to 2 times per year. The amphibious forces would land by helicopter (primarily CH-46s) and across the beach. Amphibious landings would use rubber boats, LCACs, AAVs (after 2009 the EFV), and LCUs. Approximately 200 naval gun rounds would be expended during each 4-day operation, approximately 400 per year associated with this exercise.

Proposed operations include the following sequence of events:

Day 1: An opposition force of one company would land by helicopter at VC-3 and take up positions to defend the airfield. This is estimated to involve 6 CH-46E or MV-22, 2 CH-53E, 3 UH-1N/Y or AH-1W/Z, and 2 AV-8B or F-35B helicopters. The company of about 140 would bivouac in the field, remaining within the Infantry Operations Area. That evening, a small reconnaissance unit (12 Marines) would land by rubber boat at Eel Cove and proceed overnight on foot to the outskirts of VC-3. This movement would occur in tactical formation, across open country, not using established roadways. The recon unit would conceal themselves in positions to overlook VC-3 and report intelligence and operations information back to following units. They would remain in place until it was safe to join the advancing infantry companies, which would land on Day 2.

Day 2: One company of infantry personnel in rubber boats would land at Northwest Harbor, one company by LCAC and LCU at West Cove, one company (plus artillery) in LCUs at Wilson Cove, and one company at Horse Beach in SHOBA. The northern companies (3) would assemble at the AVMA just south of the NALF Airfield and coordinate an attack on VC-3, using the Infantry Operations Area as the boundary of their operation. The company landing at Horse Beach Cove would maneuver northward, using delineated egress lanes from the beach into the IOA and proceed within the IOA and along the AVMR-SHOBA and AVMR to VC-3. During the attack the infantry companies would be in tactical formation, each company encompassing an area about 500 m (1,641 ft) on front, with about 5 m (16 ft) between individual marines. Tanks, EFVs and other amphibious assault vehicles would remain in the AVMC. The size (width) of the AVMC is a critical factor in providing a realistic training venue for armored vehicles. A tank platoon of four M-1 tanks usually deploys in "Line," Echelon, "Vee" or Wedge formation for engagement with an enemy. Spacing is usually 50-100 m (164-328 ft) apart, with 150-300 m

(492-984 ft) needed just to advance the platoon. Maneuvering using the factors of Mission Enemy Terrain, Troops available and Time adds additional space. In areas of the AVMR and AVMR Extension where the track is narrowed to virtually a little more than road width will require the tank platoon to use only a Column formation, which limits the unit to an administrative move. All units would bivouac in the field, using port-o-potties. Bivouac would occur around staged vehicles. The attack could continue into Day 3.

Day 3: Operations would center on VC-3 with the attacking companies using the Infantry Operations Area and AMPs. Travel on foot would not be restricted to existing roads or trails. There would be no live-fire in this portion of the exercise, but blanks and some pyrotechnics could be used, depending on Fire Season restrictions. Speeds of tactical vehicles would depend on whether they are participating in a mounted or dismounted attack. Mounted attack will probably move at about 12.9-19.3 kilometers-per-hour (km/h) (8-12 miles-per-hour (mph) (speed of the slowest vehicle, in this case an AAV-7). Dismounted attack (on foot) is at the speed of foot infantry, less than 3.2 km/h (2 mph). An administrative move by tanks or LAVs alone will move at approximately 32.2-40.2 km/h (20-25 mph) on the AVMC (wheeled vehicles on Ridge Road). AAVs alone don't move as fast, about 24.1-32.2 km/h (15-20 mph) on the AVMC. The commander will analyze the factors of Mission Enemy Terrain, Troops available and Time (METT-T) prior to moving and set the speed accordingly. For training purposes, USMC vehicle drivers are typically on blackout. But they can go on headlights if necessary to meet training needs. What is lost is that people in or around the vehicles cannot use their night vision goggles as they would in combat because the headlights wash out the goggles (too much light).

Days 3 and 4: Some companies would conduct an administrative movement to SHOBA while others remained in the VC-3 area for field training. All companies would eventually move to SHOBA in the areas around OP-1 and AFP 1. They would conduct an EFEX with live-fire.

Day 4: Forces would redeploy off the island. All units would exit off the island as they entered, with the exception of the Recon Force and Boat Company, which would redeploy by AAV from Wilson Cove. Aircraft would support all phases of the operation. Ground training operations would take place in day and night, with firing operations occurring in the daytime. Tracked and amphibious vehicles, once off the beach, would use the AVMC. Wheeled vehicles, artillery, and all personnel within SHOBA would use the AVMR roads and AFP/AMPs for maneuver and set-up of simulated and live-fire positions. Foot traffic would be limited to the shore landing areas and the IOA, which would encompass 3114.2 ha (7,695 ac) on the upland portion of the island. The companies would be administratively repositioned near their objectives after coming ashore to control ground-disturbing activities. The only use of live ordnance would be in SHOBA at AFP 1 for small arms, artillery fire, CAS, and naval gunfire. While most movement of personnel would occur at night, most of the live-fire operations (70-80 percent) would be in the daytime. Bivouacing of all personnel would occur in the field, primarily using areas at VC-3 and OP-1. A maximum of two operations are proposed per year.

Table 4. Battalion Landing Vehicles and Locations

		Offshore	VC-3	AVMC	Eel Point	Horse Beach	NW Harbor	West Cove	Wilson Cove	Airfield	Total
LHD		1									
LHA		1									
LPD		1									
LCAC Landing	1 st Wave					2					2
	2 nd Wave					1					1
	3 rd Wave								2		2
LCU Landing	1 st Wave							2	2		4
	2 nd Wave								2		2
CRRCs					3		30				33
AAVs (EFVs after 2009)						12		12	12		12-14
LAVs				20		8		4	8		20
FAVs			6	12						6	12
HMMWVs				2		2					2
7-ton Trucks									8		8
M-1 Tanks				4				4			4
155 mm Howitzer									6		6

Sources: Majors Tom Nemeth, G-3 I MEF; Keith Moore, 3d Assault Amphibian Bn; Michael Kennedy, XO, Assault Amphibious School Bn, 07 November 2001. Major Mike Lawrence, I MEF, 12 November 1999; LT Trovato, February 1998; and LT Griffin, January 1999. Major Wes Sanders, I MEF G-3, 2005

USMC Stinger Firings

The USMC Stinger firings would be conducted from two positions on-shore in SHOBA. The proposed positions include one at China Point and one near the shoreline adjacent to Impact Area II. The stingers would be fired toward the ocean and impact an aerial target over the ocean at ranges of from 1 to 8 km (0.6 to 5 mi.) offshore. Firing positions are temporary, and no construction would be involved. Missiles would be launched from an individual's shoulder, or from an Avenger (a HMMWV armed with eight Stinger missiles and one .50-caliber machine gun). The targets would be either Ballistic Aerial Targets (BATs) or Remotely Piloted Vehicles (RPVs) and would be launched from a catapult type launcher that would be temporarily set up at an existing cleared area on China Point. The BAT is a solid-rocket powered target and is not reusable. The RPV is a small, gasoline powered aircraft and is remote controlled. The RPV could be used repeatedly, if not damaged by the missile. The RPVs would land in SHOBA after the firing exercise. Training would be conducted predominantly in the daytime. This exercise is proposed to occur 4 times per year

Training Activities in Areas Identified as Infantry Operations Area, 4 Assault Vehicle Maneuver Areas, 1 Artillery Firing Point, 4 Artillery Maneuver Points

San Clemente Island currently supports limited tracked vehicle use and a limited number of amphibious vehicle landings per year. The proposed action includes significant increases in the

amount of vehicular training conducted on San Clemente Island. Individual operations are identified within the description of USMC exercises (page 42). To facilitate and provide a venue for this training, the proposed action includes use of three AVMAs, 4 AMPs, and 2 AFPs (Figure 3). One artillery firing point has been used extensively in the past (AFP 1), and one is a newly established site (2004) that has been used twice. These sites would be used for operating assault vehicles, staging grounds for supporting vehicles and equipment, and bivouac areas for troops supporting the operations of the assault vehicles and other equipment. Assault vehicles would move between these areas on the AVMR, a stabilized dirt road that extends from West Cove Beach to the SHOBA gate, on Ridge Road in SHOBA, and on Horse Beach Road from Horse Beach to Ridge Road (Figure 6). The insertion points for assault vehicles would include Northwest Harbor, where vehicles would be offloaded from transport vessels, West Cove Beach, and Horse Beach.

Figure 6. Location of IOA, AVMAs, AFPs, and AMPs on San Clemente Island



Naval Special Warfare Changes in Training at TARs and BTS Sites

Several TARs that have no use under baseline conditions are proposed. In addition, the Navy proposes to expand the uses at several TARs in a manner that constitutes a new use. Many activities currently conducted at TARs leave little footprint, as platoons are small and activities often involve covert entry and exit on foot from objectives. The addition of small arms and demolitions to existing sites recognized as TARs changes the nature of use at these sites. The use of small arms and demolition charges are currently conducted at a subset of the TARs recognized on San Clemente Island, but these uses are proposed for several new locations on the island. The use of demolitions charges is also proposed for BTS sites where demolition activity does not currently occur. Introduction of live fire or demolition training into a TAR or BTS site is identified as a new training activity/location within the context of this biological opinion, even though some areas identified for this use experience baseline use of a different nature. Small arms training is currently conducted at TAR 2, TAR 4, TAR 20, TAR 21, and TAR 22. Demolition training is currently conducted at TAR 1, TAR 2, TAR 3, TAR 4, TAR 16, TAR 20, TAR 21, TAR 22. The Navy proposes to expand these training activities and conduct live-fire training and demolition training at TAR 9, TAR 10, TAR 14, TAR 15, TAR 16, TAR 17, TAR 18, and TAR 19. The Navy also proposes to conduct basic demolition training at BTS sites 2, 3, 4, 5, 6 and 7, which do not currently support this type of training. More detailed descriptions of these training areas are provided below.

TAR 7— Saint Offshore Parachute Drop Zone

This Drop Zone (DZ) would be in the offshore waters opposite Wilson Cove on the lee side of San Clemente Island. The purpose is to provide a DZ in offshore area for the parachute insertion of SEAL platoons and equipment. Operations include Ingress and Egress by Aircraft, CRRC Paradrop Insertion, Helicopter (Limp Duck) Insertion, Inflatable Boat Air Drop (Combat Duck), CRRC transit, Combat Personnel Parachute Drop Insertion, and UAVs. This area is proposed for approximately 10 operations per year over the course of 10 days. No live weapons or demolitions would be used.

TAR 8—Westside Nearshore Parachute Drop Zone

This Drop Zone is proposed in the San Clemente Island nearshore area to provide a windward-side water Drop zone for day and night parachute drops, personnel insertion, and underwater demolition. The TAR would be used for ingress and egress by aircraft, UAVs, CRRC Paradrop Insertion, Helicopter (Limp Duck) Insertion, Inflatable Boat Air Drop (Combat Duck), CRRC transit, Combat Personnel Parachute Drop Insertion. The area is proposed for approximately 10 operations per year.

TAR 9—Adversary Building Complex

TAR 9 is proposed to be used as an adversary-building complex. The area is heavily disturbed from past military activity. Existing buildings and facilities would be used as realistic simulated

targets. Operations would include Tactical Environmental Movement, Direct Action, Close Quarter Combat, Urban Combat and Platoon Pre-Planned Attack, Helicopter Hover Personnel Insertion (Fast Rope), Tactical Ambush, Raid (Silent Assault), Land Navigation, Strategic Reconnaissance, and UAV training. Baseline use was 23 training days (NSW) and approximately 30 training days (NSW) and 14 USMC training days are proposed. No live-fire would be conducted outside existing buildings. Blanks and live-fire would be used in CQC facility with portable bullet traps. Small arms up to 5.56 mm (0.2 in.) and breaching charges are proposed for use in designated areas. Gates and signs would be constructed, and minor modification of the Photo Lab building would be required.

TAR 10—Demolition Range West [22.2 ha (54.9 ac) (2 ha (5 ac) developed for use)]

This site is currently used on a limited basis; however, proposed uses significantly increase the frequency of training activities and include range building construction and introduction of live-fire of training to this site. TAR 10 is proposed to encompass 22.2 ha (54.9 ac), but only 2 ha (5 ac) would be developed for use. Two ha (5 ac) of the site have concentrated impacts from historical use. TAR 10 would be used to provide a land-based location for safe, operationally realistic live-fire and high explosive demolition training. The site would support live-fire training for IADs with 180-360 degrees of live-fire. TAR 10 has a secondary mission of supporting OTB operations. The operations conducted at TAR 10 would include a SEAL platoon conducting a live-fire assault on a target. At the objective, the SEALs would place explosive charges on the target and demolish it. Clean-up procedures would be incorporated after each operation. This TAR would not include the use of any vehicles off road, and no new roads would be constructed. Access to the target area would be controlled. Range construction would last approximately 180 days. The site would usually be accessed by the road, and parking would occur in a lot adjacent to the proposed range building, or on existing roads. Existing uses include 27 operations conducted over 3 days; however, existing uses do not include use of live rounds or demolition charges. Proposed uses include 87 operations over 40 days, with equal night and day use. No USMC use of this area is proposed. All types of explosives (300 lb maximum) would be used, as well as blanks, smoke and grenade simulators, tracers, and small arms 5.56 mm (0.2 in.), 7.62 mm (0.3 in.), and .50 cal surgical sniper would be used. All explosives would be non-shrapnel-producing.

There are no existing facilities within the area. The proposed facility includes a parking area and a 20 x 30 ft² range building. The range building would be a concrete block structure. The building would be constructed on an existing previously disturbed site and would necessitate construction of a driveway to access the site. All construction would be conducted outside of the San Clemente sage sparrow breeding season, and all staging of construction vehicles would be accomplished within the existing disturbed footprint adjacent to the proposed range building. The building site would be flagged prior to construction activities to minimize the potential for disturbances to adjacent sage sparrow habitat. Erosion control measures that assure no offsite habitat degradation would be incorporated prior to construction activities. Such measures would entail review by the NRO botanist. Proposed use would include the use of small wooden structures as targets ranging in size from 50 to 500 ft². Structures would be temporary structures

that could be demolished and rebuilt to support demolition training. Debris associated with target demolition would be removed from the site to reduce impacts to island night lizards. Erosion control measures would be implemented, if necessary, on the access roads and in the demolition area. The demolition area and target area would be located to the south and west of the existing oval berm onsite, as indicated in diagrams provided to the Service during consultation. The Motorola Base communication system would be incorporated for communication.

TAR 14—Onshore Parachute Drop Zone “Twinky”

This site is currently used extensively; however, proposed uses include live fire and demolition exercises. In addition, the proposed TAR boundaries overlap proposed boundaries of the VC-3 AVMA, which would support assault vehicle off road use.

TAR 15—VC-3 Airfield Training Area

This site is currently used; however, proposed uses include changes in the type of training conducted to include live fire and demolition exercises. In addition, the proposed TAR boundaries overlap proposed boundaries of the VC-3 AVMA, which would support assault vehicle off road use.

TAR 17—Eel Point Tactical Training Range [11.9 acres (1.5 proposed development)]

This site is currently used; however, proposed uses include direct action exercises involving live fire, which is not currently used at this site. Proposed uses include more intensive assault and sniper training, live fire exercises, as well as use by the USMC for insertion during Battalion Sized Landings and for CSAR operations.

Proposed operations include: Standoff weapons, Land Navigation, Direct Action, Demolition Training, and UAV Training. The operations would include a SEAL platoon conducting a pre-planned live-fire assault on a target. The platoon would covertly swim up to the beach, maneuver across the beach and assault a target, and return to the beach under live-fire conditions to escape. At the target, the SEALs would place explosive charges on the target and demolish the target. Long-range sniper training would also be conducted. Baseline operations include 49 NSW operations conducted over 14 days and one Combat Search and Rescue operation; however, existing operations do not include live fire training. Proposed operational use would be 120 NSW operations conducted over 30 days, 2 USMC Battalion landings, and 8 CSR operations with equal night and day use. All types of explosives (11.3 kg (25 lb) maximum NEW), 5.56 mm (0.2 in.) and 7.62 mm (0.3 in.) rifles and machine guns, .50-caliber sniper/standoff, flares and pyrotechnics would be used. All explosives would be non-shrapnel-producing explosives.

The existing facilities within the area include a gate and a target building. No new facilities or site improvements are proposed at this TAR. The targets would be the same type of pop up targets used at other TARs. The targets for the sniper range are handset targets, meaning the

targets are carried and setup by hand. The demolition area would be contained in the existing demolition area.

The beach exit is on the south side of Eel Point and is somewhat protected from the north. The exit consists of medium-sized rocks with a slope of 10 degrees up to the first marine terrace. The first marine terrace in the vicinity of the beach exit is a flat area traversed by an ephemeral drainage swale and an unpaved road. There would be no vehicle use off the existing roads and no expansion of the road system. Communication would be through the Motorola Base radio system. Clean-up procedures would be incorporated after each operation as per range instructions.

TAR 18—Close Quarter Battle Training Complex (0.2 ha (0.6 ac))

TAR 18 is currently proposed for construction within the disturbed boundaries of the quarry northwest of the airfield. The purpose of the TAR would be to provide a set of moveable target buildings that realistically simulate a terrorist camp (hostage location) for SEAL training. The proposed design would support four different types of CQC scenarios at one time. The size of TAR 18 is 0.2 ha (0.6 ac), and the entire site could become disturbed. Operations that would be conducted at this location include: CQB Training, small arms fire, Helicopter Hover Personnel Insertion (Fast Rope) Tactical Ambush, Raid (Silent Assault), and Demolition Training. Once constructed, the facility is proposed for 88 annual operations conducted over 30 days each year. Small arms munitions including 5.56 mm (0.2 in.), 9 mm (0.4 in.), and small demolition charges under 2 kg (5 lb) would be used. All weapons firing would be inside non-ballistic walls with berms surrounding the complex.

No facilities exist at this site, but the following structures are proposed for construction: five bermed enclosures (four for shooting and one for command), four shooting mazes/houses/temporary buildings with non-ballistic walls. The TAR's command building would be small with phones, a public address system, and a video system. The structures would include wood/metal construction. Communication off site would be via hard line phones with a phone to the gate for access control. Clean-up procedures would be incorporated after each operation.

TAR 19—Simulated POW Camp and SAM Site

This site would provide a site that realistically simulates a Prisoner of War (POW) holding camp (hostage location) in the immediate vicinity of a Surface-to-Air Missile site for SEAL training. The size of TAR 19 is 1 ha (2.4 ac), and the entire site is previously disturbed from the runway construction. Additionally, the area has been used most recently as a dirt quarry for road repair and barracks construction. Operations include Raid Training, small arms simunitions and blanks, Helicopter Hover Personnel Insertion (Fast Rope) Tactical Ambush, Raid (Silent Assault), Demolition (Breaching) Training. This site is not currently used for operations and is proposed for approximately 47 operations over the course of 10 days per year. No live-fire would be conducted, and 5.56 mm (0.2 in.), 9 mm (0.4 in.), simunitions and small demolition charges approximately 0.5 kg (1 lb) NEW would be used. Five small temporary structures are

proposed. Communication off site would be via hard line phones with a phone to the gate for access control. Clean-up procedures would be incorporated after each operation.

BTS 2 - F-4 Aircraft

This site is currently used for small arms blanks and grenade simulators, but the proposed action includes additional training using 2-kg (5-lb) NEW demolition charges and parachute/star cluster pyrotechnics and booby trap pyrotechnics.

BTS 3 - SAM Site

This site is currently used for training that includes the use of small arms blank ammo, parachute/star clusters pyrotechnics and grenade simulators. Proposed use would add explosives up to 2 kg (5 lb) NEW and entail construction of 2 to 3 small plywood structures (10x10 ft²) on an existing concrete slab.

BTS 4 - Project "X"

Project "X" site supports training that uses small arms blank ammo, pyrotechnics, and grenade simulators. Proposed use adds explosives up to 2 kg (5 lb) NEW and parachute/star cluster pyrotechnics. An existing target structure would be repaired and an additional plywood structure (10x10 ft²) and target vehicles would be added to the site to support expanded training. The target vehicles would be located on existing roads.

BTS 5 – Skeet

The Skeet site provides a NSW basic level field exercise target site with multiple avenues of approach. Operations include Direct Action. Baseline use is 3 operations over 3 nights. Proposed use is 5 operations over 5 nights. Current weapons use includes small arms blank ammo and pyrotechnics (grenade simulators). Proposed uses add explosives up to 2 kg (5 lb) NEW and pyrotechnics (parachute/star clusters, grenade simulators). The site currently contains two existing structures. Two to three additional plywood target structures (10x10 ft²) and vehicles would be added to the site.

BTS 6 – Lookout

Lookout provides NSW a basic level field exercise night time target site overlooking a bluff. Operations include Direct Action. Current weapons use includes small arms blank ammo and pyrotechnics (grenade simulators). Proposed uses add explosives up to 2 kg (5 lb), and pyrotechnics (parachute/star clusters), and grenade simulators. The site currently contains an existing structure. Three additional target structures (10x10 ft²) would be constructed on existing concrete pads.

BTS 7 - Contact Drills

Contact Drills provides NSW basic level tactics training. The site is an existing graded automatic weapons range. Operations include Direct Action. Baseline use is 10 operations over 10 days. Proposed use includes 12 operations over 12 days. Current weapons include live-fire up to 7.62 mm (0.3 in.) and pyrotechnics (parachute/star clusters, grenade simulators, smoke grenades, and tracers). Live-fire is directed westward towards the ocean. No new structures or uses are proposed for this site.

3. Modification of the boundaries of Impact Areas I within SHOBA

Impact Area I has been used for ship to shore gunnery practice for over 20 years (Figure 1e). The mouth of Horse Beach Canyon was previously outside the boundary of Impact Area I and supports a SEAL Team training area, TAR 21. TAR 21 is used for a variety of small arms training and land demolition activities. The Navy has now expanded the boundary of Impact Area I to include the mouth of Horse Beach Canyon and TARs 20 and 21.

4. Revise Access Policy for Impact Areas I and II

The Navy has recently revised its access policy to high explosive impact areas for both military and non-military personnel throughout the Navy Region Southwest. To reduce the risk to non-military personnel, for High Explosive Impact Areas (including Impact Areas I and II), the policy explicitly states: “Any activity associated with archeological or biological monitoring and surveys or recreational use (to include hunting) is strictly prohibited.”

5. Implement San Clemente Island Fire Management Plan

The Navy proposes to implement a FMP for San Clemente Island to increase training flexibility and to offset the anticipated increase in ignition sources as a result of expanded training activities described in this biological opinion.

The FMP is planned to shape fire-related policy, management, and decisions on San Clemente Island for 5 years (2009-2014). Its primary purpose is to increase military training flexibility while complying with environmental laws and achieving sustainable ecosystem management. The FMP is intended to protect personnel, facilities, training areas, and natural and cultural resources of the island from fire damage and to prioritize assets to be protected in the event of a fire. Prior to the end of time period covered by the FMP, the FMP Working Group will convene to determine whether an update is needed. Beyond 2014, the Navy will continue fire management on San Clemente Island in accordance with the FMP or its update. The Navy will consult with the Service, as necessary, on continued adherence to the original FMP or implementation of its update.

San Clemente Island, the southernmost of the California Channel Islands, has been administered by the Department of Defense as a military installation since 1934. Military training activities, facilities maintenance, and other human activities have contributed to a high fire frequency on

the 14,164.5 ha (35,000-ac) island. San Clemente Island has experienced a shortened fire return interval due to frequent human-caused ignitions. Measures to reduce the frequency of wildfire have been implemented since 1997 and have included prevention measures (scheduling operations with high ignition potential outside a “fire season” and electrical system improvement), containment measures (vegetation management and use of prophylactic fire retardants), and suppression measures (staging and use of suppression resources). The 2005 draft FMP includes similar measures directed at prevention, fuels management, and suppression. The proposed FMP calls for increased funding, improved oversight, improved coordination, and improved reporting in areas pertaining to fire management. Significant changes to the fire fighting infrastructure are proposed to allow improved oversight, coordination, and reporting.

Whereas recent fire management on San Clemente Island has focused on two areas, (1) prevention primarily by temporal modifications to incendiary use and other high risk training during a lengthy “fire season” and (2) containment using fire and fuel breaks, a need for increased training flexibility is driving the proposed revised approach. Real-time assessment of fire risk (and associated ignition source reductions/ suppression asset availability), as proposed in the draft FMP, is expected to allow an increase in training capability throughout the calendar year while protecting personnel, facilities, and natural and cultural resources from fire damage. Due to the uncertainty associated with the size, location, and frequency of future fires that may occur on San Clemente Island, the FMP also identifies thresholds for re-evaluation of fire management in several plant communities on the island.

Prevention

Managers and users of San Clemente Island currently use a Fire Danger Rating System (FDRS) based on two ratings; Fire Season and Non-Fire Season. The ratings are based on information from the U.S. Forest Service (Forest Service) and local conditions (FMP, Encl 8, p.2). The dates of the fire season on San Clemente Island are currently determined and disseminated annually to all island tenants and users. During the fire season, the use of pyrotechnics is limited, the size of target areas is administratively reduced, and aerial suppression units remain on standby during operations that could cause fires. The current approach does not allow for day to day assessment of variation in the conditions on the island, but rather a broader, more conservative estimate of the general fire risk on the island. The current approach to prevent ignitions appears to be successful based on recent fire history on the island (FMP, Appendix D), but results in a lengthy period each year during which some training activities may not occur or may only occur during the early morning hours.

The proposed FMP proposes to refine the process for assessment of ignition risk on the island and modify the level of fire suppression resources required to be present during training activities. Implementation of the plan would entail adoption of the Forest Service FDRS and require a sophisticated network of weather inputs that would be disseminated daily on a web site. The Navy would continue to recognize the current designations of Fire Season and a Non-Fire Season, but they would also use daily/hourly weather conditions to determine the risks of ignition daily or throughout the day during the fire season. In addition, the Navy would use

weather information to assess fire risk during all periods that could increase the potential for ignition. Training activities would then be aligned with appropriate suppression resources to reduce the potential for wildfire. Collection and dissemination of data to accurately assess the real time weather conditions on San Clemente Island is contingent upon installation and maintenance of Remote Automated Weather (RAW) stations and on staffing and training a Fire Coordinator. To date, six RAW systems are functional on San Clemente Island: at the Target Shop (airfield), Wilson Cove, Mt Peak, REWS, OP-1, and OP-3. RAW stations will be properly functioning and accessible for fire weather information prior to modifying existing training restrictions to assure that ignition risk is known. Collection and dissemination of vegetation data pertinent to fire risk assessment is dependent upon botany contractors on San Clemente Island and clear communication between those collecting this data and the Fire Coordinator. Vegetation conditions are variable between the plant communities on the island (*i.e.*, some shrub communities become drier and more flammable earlier than others), so precautions necessary to reduce the potential for wildfire may vary accordingly.

The Forest Service FDRS, as proposed for use on San Clemente Island, uses five Fire Danger Ratings, which are color coded Blue (lowest risk), Green, Yellow, Orange, and Red (highest risk). Based on the Fire Danger Rating, a generalized statement pertaining to “Caution to be Exercised” and “Necessary Precautions” would be recognized and adhered to by island users (Tables 5 and 6). SHOBA, including TARs that are within SHOBA (TARs 20, 21, and 22), would have a set of necessary precautions (Table 5) that differ from those used at TARs that lie outside of SHOBA (Table 6). The use of the FDRS would increase the potential types of training conducted during the Fire Season, over those that are currently conducted, if weather/moisture conditions indicate that fire risk is low or moderate, as defined in the FDRS.

The necessary precautions and allowed activities outlined in Table 4 are based on certain assumptions regarding suppression, including: 1) 3-minute notification of the first fire observation; 2) 5-minute fire engine getaway; and 3) 30-minute response to fire escaping fuelbreaks around Impact Areas, MIR, or other approved fuelbreaks. The necessary precautions and allowed activities outlined in Table 6 (TAR precautions) are based on the assumption of a 10-minute response time to the scene with a quick-attack fire suppression apparatus. This assumes that equipment and parties trained to appropriately use this equipment will be onsite during training operations that have ignition potential. Assumptions regarding response time require that fuelbreaks, drivable roads, and full water storage tanks (VC-3, Mt. thirst, TAR 10) be in place at the start of fire season.

Table 5. Fire Danger Rating and Precautions for SHOBA

Fire Danger Rating	Caution to Be Exercised	Necessary Precautions
LOW <4 mph 20-ft wind speed> 11-12% 1-hr FFM	<u>Use normal caution during military training exercises.</u> Fires may start easily, but will have low rate of spread and fire intensity, <i>i.e.</i> less than 30 acres of spread per hour.	Care should be taken; however, any type of ammunition can be used during this condition. Consistent with NALFSCINST 5560.4D, smoking is not permitted in vehicles or in remote areas of San Clemente Island.* Any designated training area with required fuel treatment using retardant fuelbreaks and strip burning must be completed by start of fire season annually.
MODERATE 4-5 mph 20-ft wind speed 11-12% 1-hr FFM	<u>Use extra caution.</u> Fires may start very easily. Fires are expected to have moderate rate of spread and fire intensity. <i>i.e.</i> less than 100 acres of spread per hour.	<u>All Low Fire Danger Precautions, and all required fuelbreaks are in place.</u> This condition is the beginning of a fire ignition concern. Any type of small arms rounds or other non-incendiary ordnance may be used within designated ranges. The use of pyrotechnics, demolitions, white phosphorous and illumination ammunition and other heat/flame producing devices within designated training areas (outside of SHOBA Impact Area I & II or other area with fuel treatment meeting standards of the Fire Management Plan or its amendment) will be limited as much as possible to night time activity, a cleared area, or areas previously burned over. Training exercises using heat/flame producing devices will be conducted in the night time, early morning (before 1000 hours) or late evening (after 1900 hours) when relative humidities can be expected to be at their maximum.
HIGH 5-8-mph 20-ft. wind speed 9-10% 1-hr FFM	<u>Use extra caution.</u> Fires are expected to have high rate-of spread and fire intensity. More than 100 acres of spread per hour.	<u>All Moderate Fire Danger Precautions, and all required fuelbreaks are in place.</u> A helicopter will be placed on fire alert on San Clemente Island between 0900 and one-half hour after sunset whenever training activities are scheduled within SHOBA such that the aircraft can be airborne in 5 minutes. Other San Clemente Island military helicopter missions can take place during this fire alert; however, a fire dispatch should be given a high priority. North of SHOBA, and apart from NSWG TAR use, a quick-attack fire engine and crew will meet the 3-minute notification, 5-minute getaway, and 30-minute on-site criteria in the event of a fire. This fire suppression apparatus scheduling and location to be coordinated with SCORE. Use of TARs north of SHOBA is guided by a separate FDRS.
VERY HIGH 8-10 mph 20-ft wind speed 5-8% 1-hr FFM	<u>Extra protection caution.</u> Fires will start easily and spread rapidly. Fires are expected to exceed 100 acres in 1 hour and burn very hot. Fires will be hard to contain at designated roads and fuel treatment areas without aerial suppression assets and 2 wildland fire engine companies.	<u>All High Fire Danger Precautions are in place.</u> Firing of all types of ammunition will be permitted at all times, unless restricted by the Range Manager. Restrictions on the use of pyrotechnics, demolitions, illumination ammunition and heat/flame producing devices (including blanks and tracers), and white phosphorous will be in place for all other designated training areas during the period of 0800 to one-half hour after sunset. However, these restrictions will not apply to night time (1900 to 0800 hours) training activities, in cleared areas or previously burned areas. A helicopter with crew and water bucket is to be placed on fire alert during daylight hours whenever training activities are scheduled within SHOBA. This helicopter will be allowed to conduct other missions, providing the water bucket and water re-fill capabilities are appropriately placed such as at VC-3 or the helopad at OP-3, and ready for pick up by the helicopter crew, and meets the criteria of a 30-minute elapsed time for responding to the site of any fire occurring on the southern end of San Clemente Island. Firefighting will then be designated as the "highest priority" mission, except for those routine ignitions within SHOBA Impact Area I & II. Fires inside SHOBA Impact Area I & II that have the potential to go beyond Impact Area I & II boundaries will be considered the same as any other wildland fire during this fire danger period. All other fires within Impact Area I & II will not be considered "highest priority" missions. Outside of SHOBA, a quick-attack wildland fire engine, with a 3-person crew, is to be located in the vicinity where the highest fire hazard military training is taking place. This means a safe distance away with line-of-sight visibility, as approved by the Range Safety Officer/Safety Observer. The decision about where to put standby firefighting resources will be approved by the Wildland Fire Coordinator, who will coordinate with the Range Safety Officer/Safety Observer and with SCORE.

Fire Danger Rating	Caution to Be Exercised	Necessary Precautions
EXTREME >10 mph 20-ft wind speed <5% 1-hr FFM	Use <u>extreme caution</u> and allow only essential and high cost military training operations to continue under these conditions. Fires will spread at extreme rates of speed and by long distance spotting. Fires will burn at unacceptable intensities.	<u>All Very High Fire Danger Precautions are in place.</u> A helicopter, pilot and crew will be on ready fire alert at the San Clemente Island Auxiliary Landing Field, and will not be assigned any other mission, except upon specific agreement between the Wildland Fire Coordinator and the Range Manager.
* NALFSCIINST 5560.4D defines remote areas as anywhere except Wilson Cove, Airfield, West Cove Beach and paved roadways, which includes the unpaved portion of SAN CLEMENTE ISLAND Ridge Road south of VC-3 to Stone Gate. No smoking between the plane and the terminal at the Airfield.		

Note: “Fire Danger Rating” and “Caution to be Exercised” section is synonymous to that found in to Table 1. “Necessary Precautions” differ from Table 1.

Table 6. Fire Danger Rating and Precautions System for TARs outside of SHOBA.

Fire Danger Rating	Caution to Be Exercised	Necessary Precautions
<i>In all cases, the initial response will be to take immediate action to suppress the fire (if deemed safe) and call the Fire Department. Federal Fire and the Range Safety Officer/Safety Observer will jointly decide if it is safe for the exercise to continue or be postponed until after an incident. The road from just south of the dunes to approximately Marine Terrace Canyon or about 3,100 yards (range of tracers used) from TAR 10 must remain passable for access for firefighting and function as a firebreak. For TAR 17, the unpaved road to Seal Cove along the LMU boundary should remain passable by two-wheel-drive emergency vehicles to the canyon directly east of Eel Point. A gate should be installed at that location. Beyond this point, the road should remain passable by 4-wheel-drive emergency vehicles. Emergency personnel should have access through the ordnance magazine area as necessary for fire suppression. Standby quick-attack fire apparatus location will be approved by the Wildland Fire Coordinator, who will coordinate with the Range Safety Officer/Safety Observer and with SCORE. Scheduling of quick-attack to be coordinated with SCORE.</i>		
LOW 4 mph 20-ft wind speed ¹ 11-12% 1-hr FFM	Use <u>normal caution during military training exercises.</u> Fires may start easily, but will have low rate of spread and fire intensity, <i>i.e.</i> less than 30 acres of spread per hour.	Care should be taken; however, any type of ammunition can be used within a designated TAR during this condition. Consistent with NALFSCIINST 5560.4D, smoking is not permitted in vehicles or in any designated TAR.
MODERATE 4-5 mph 20-ft wind speed ¹ 11-12% 1-hr FFM	Use <u>extra caution.</u> Fires may start very easily. Fires are expected to have moderate rate of spread and fire intensity, <i>i.e.</i> less than 100 acres of spread per hour.	<u>All Low Fire Danger Precautions are in effect.</u> This condition is the beginning of a fire ignition concern. Standby fire truck and quick action by wildland fire trained and qualified cadre members is essential to minimize any fire spread during this or higher condition. Whenever any type of incendiary ordnance is in use within a designated TAR, a fully equipped fire truck, with a minimum of 500 gallons of water, and staffed with 3 wildland fire certified personnel shall be placed in the vicinity where the training is taking place and available to take initial action. The decision about where to place the standby fire engine will be that of the Range Safety Officer/Safety Observer, but there must be line-of-sight visibility and the ability to be pumping water within 10 minutes of an ignition report. The use of pyrotechnics, demolitions and other heat/flame producing devices within that TAR will be limited as much as possible to night-time activity, a cleared area or areas previously burned over. Training exercises using white phosphorous, illumination and tracer heat/flame producing ordnance devices may be conducted in the early morning (before 0800 hours) or late evening (after 1900 hours) when relative humidity is at its highest. One cadre member shall be equipped for and trained in the proper technique in taking on-site wildland fire weather. Weather recordings will be taken every two hours during any training exercise using heat producing

		ordnance or devices, and restrictions added if the Fire Danger Rating increases. The only exception is when the on-site night-time weather recordings indicate that Fire Weather conditions have reduced to LOW.
HIGH 5-8-mph 20-ft. wind speed ¹ 9-10% 1-hr FFM	<u>Use extra caution.</u> Fires are expected to have high rate-of-spread and fire intensity. More than 100 acres of spread per hour in grassland.	<u>All Moderate Fire Danger Precautions are in effect.</u> Restrictions on the use of pyrotechnics, demolitions, illumination, heat/flame producing devices (including blanks and tracers), and white phosphorous will be in place for all TARS during the period of 0800 to 1900 hours. However, these restrictions do not apply to night-time (1900 to 0800 hours) training activities, in cleared areas or previously burned areas. The only exception is when the on-site night-time weather recordings indicate a reduction in Fire Weather condition to MODERATE.
VERY HIGH 8-10 mph 20-ft wind speed ¹ 5-8% 1-hr FFM	<u>Extra protection caution.</u> Fires will start easily and spread rapidly. Fires are expected to exceed 100 acres in 1 hour and burn very hot. Fires will be hard to contain at designated roads and fuel treatment areas without aerial suppression assets or 2 wildland fire engine companies.	<u>All High Fire Danger Precautions are in place.</u> Firing of all types of non-heat producing ammunition will be permitted at all times within a designated TAR. If an ignition occurs, training will cease and firefighting will be designated as the "highest priority" mission.
EXTREME >10 mph 20-ft wind speed ¹ <5% 1-hr FFM	<u>Use extreme caution</u> and allow only essential and high cost military training operations to continue under these conditions. Fires will spread at extreme rates of speed and by long distance spotting. Fires will burn at unacceptable intensities.	<u>All Very High Fire Danger Precautions are in place.</u> If already on standby for other training missions, the helicopter, pilot and crew on ready fire alert at the San Clemente Island Auxiliary Landing Field will be summoned for suppression support.
<ul style="list-style-type: none"> NALFSCIINST 5560.4D defines remote areas as anywhere except Wilson Cove, Airfield, West Cove Beach and paved roadways, which includes the unpaved portion of SCI Ridge Road south of VC-3 to Stone Gate. ¹ The 20-ft windspeed is the windspeed measured at 20 feet above the ground surface. The wind gauges on San Clemente Island will be placed as close to 20 feet as possible when mounted on available existing structures to assure accurate information pertaining to the 20-ft windspeed. 		

Use of the FDRS, as proposed in the FMP is contingent upon filling a significant position on San Clemente Island, that of Wildland Fire Coordinator. The individual that fills the position needs to have experience that would allow for the following duties, as identified in the FMP:

- 1) Chart live-fuel moisture in key fuel species, including California sagebrush (*Artemisia californica*), California boxthorn (*Lycium californicum*), coyote bush (*Baccharis pilularis*), to declare the start and end of fire season. The start and end of fire season would be declared when the live fuel moisture reaches or drops below 200 percent. Live fuel moisture at four appropriate sites on San Clemente Island once per month would occur and analysis of the live fuel moisture would proceed based on the techniques described on 4-16 and 4-17 of the FMP;
- 2) Measure fine fuel moisture daily;
- 3) Map perimeters of all fires;
- 4) Notify the OIC regarding the condition of vegetation and the start of fire season;

- 5) Organize a training program for FFD San Diego personnel assigned to San Clemente Island (BA 2-39);
- 6) Appoint military and civilian personnel to assist in support of suppression efforts during a wildland fire incident on San Clemente Island (BA 2-39);
- 7) Act as the Fire Departments principal liaison with Military Operators, Aviation Units, and Natural Resources staff;
- 8) Coordinate all wildland fire training, collection and dissemination of fire weather and Fire Danger Rating information to island users, make necessary notifications and interpret restrictions based on the fire weather information and pre-planned operational guidelines; and
- 9) In coordination with NRO staff, manage implementation of proposed San Clemente Island prescribed fire and fuelbreak projects, including application of fire retardant and prepare annual budget requests.

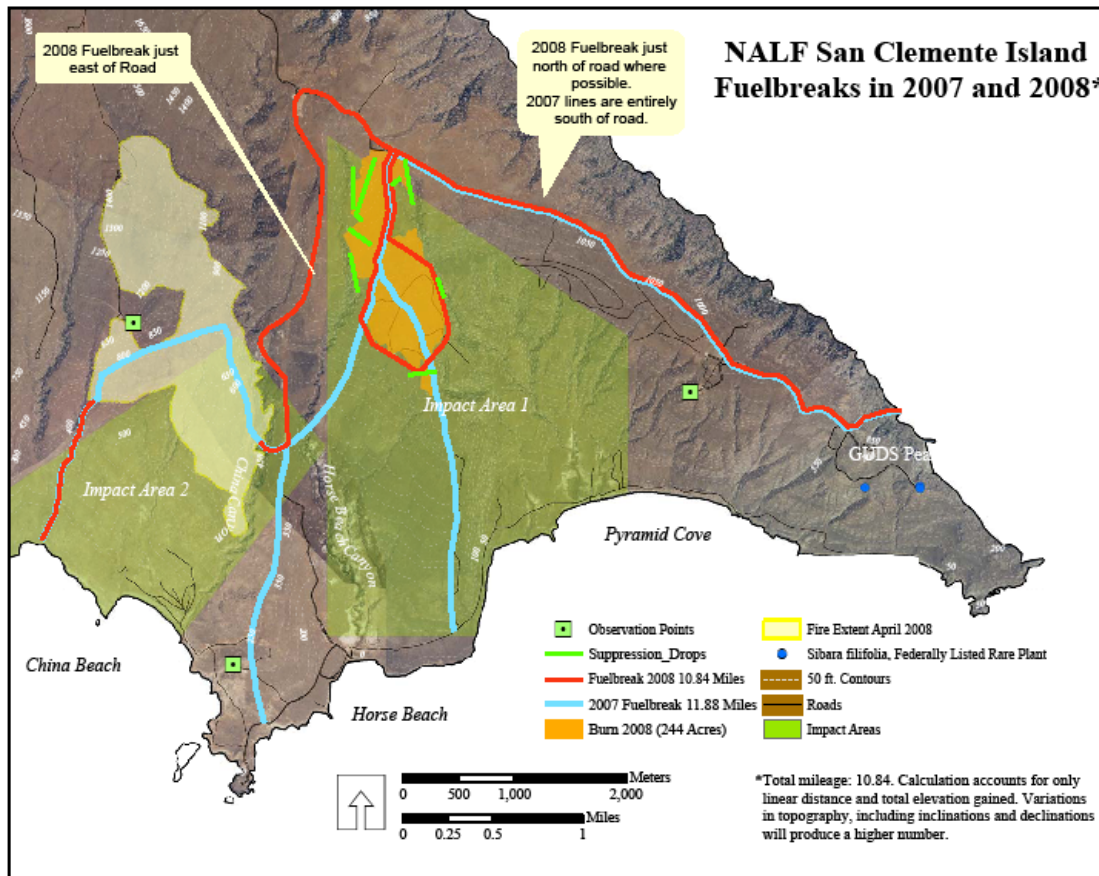
The Wildland Fire Coordinator would be hired (or designated) and trained prior to modifying existing training restrictions or increasing distribution of ignition sources on San Clemente Island to assure that the duties listed above are accomplished. The equipment and tools necessary for this staff person to accomplish the duties listed above will be in place prior to any increases in distribution of ignition sources.

Fuels Management

Managers of San Clemente Island currently conduct fuel management activities on a case-by-case basis to provide protection from escape of fire from Impact Areas 1 and 2. A series of existing fuel breaks have been installed in the general vicinity of most areas proposed for continued maintenance as part of the proposed FMP (Figure 7). In addition, existing roads have been considered and used as fuel breaks. Current fuel management activities entail coordination with the Shrike Working Group to reduce the potential for incidental take associated with installation of fuel breaks.

The FMP proposes continued maintenance of existing fuel breaks using fire retardant (Phos-Chek D75-F), development of new fuel breaks, maintenance of existing roads as firebreaks, use of controlled burns including strip burns (Figure 7) (FMP, 4-26). The proposed FMP also mentions three types of fuels management: 1) high intensity fuels management safety corridors or buffer zones; 2) defensible space around structures; and 3) low-intensity landscape modifications with prescribed fire that meets fuels management, resource protection, and habitat restoration goals. Conservation measures that minimize the potential for effects to listed species will be included in annual plans as they are developed in coordination with the Service for controlled burns, vegetation removal, or herbicide application.

Figure 7. San Clemente Island 2007-2008 Existing Fuelbreaks, and General Location for Proposed Fuelbreaks.



Suppression

The draft FMP proposes to revise the level of fire suppression resources required to be present during training activities based on revised assessment of ignition risk as defined by the FDRS (FMP Tables 4 and 5, page 59). Suppression resources include aerial assets.

Infrastructure Improvement

The draft FMP identifies road network improvement as necessary to improve access and response to fire emergencies and indicates that road design, construction, and maintenance should be to a standard that functions as a fuelbreak, is secure from erosion, and capable of supporting a Type 3 equivalent fire engine.

Habitat Thresholds and Proposed Review Process

The Navy proposes to review the fire management processes and ignition sources if fires exceed threshold levels defined in the fire management plan. In addition, the Navy proposes to review fire occurrence and fire management on an annual basis and incorporate changes to management practices identified as necessary during this process. Thresholds that would trigger immediate review of fire management are delineated by habitat type for several plant communities of special management concern:

- High density boxthorn/sage sparrow habitat - Patch size of 2 ha (5 ac) and a total burned area of 18.2 ha (45 ac) over 5 years
- Moderate density boxthorn/sage sparrow habitat - Patch size of 8.1 ha (20 ac)
- Low density boxthorn/sage sparrow habitat - Patch size of 16.1 ha (40 ac)
- Canyon shrubland/woodland - Patch size of 1.2 ha (3 ac) and total burned area of 12.1 ha (30 ac) over 5 years
- Maritime sage scrub - Patch size of 80.9 ha (200 ac)
- Grasslands – Patch size of 121.4 (300 ac)

These thresholds would only apply to fires of moderate severity or higher (Score 3 on NPS scale), and fires would be quantified in 0.2 ha (0.5-ac) mapping units. Thresholds would not apply to habitat north of the runway in the vicinity of TAR 4 and Whale Point, although the location and acreage of fires that occur in this area will be reviewed during annual reviews.

6. **Implementation of ongoing natural resource programs and other conservation measures to monitor, avoid and/or minimize potential impacts to federally listed species**

The Navy will implement the following measures to avoid and/or minimize potential adverse effects of the proposed action on federally listed species:

Proposed General Conservation Measures (G-M 1-9)

- **G-M-1.** The Navy will continue invasive exotic plant species control on an island-wide scale, with an emphasis on the AVMC, the IOA, TARs, and other operations insertion areas such as West Cove, Wilson Cove and the airfield. Due to access restrictions, however, invasive species control would not be possible within the Impact Areas except in Tar 21, as described in measures SCBM-M-1. A pretreatment survey to identify areas needing treatment, one treatment cycle, and a retreatment cycle (when necessary) will be planned each year to minimize the distribution of invasive species. The focus of the invasive exotic plant control program will continue to be the control of highly invasive exotic plants that have the potential to adversely impact habitat for federally listed species in known locations and the early detection and eradication of new occurrences of such species. Where feasible, the Navy will

include future construction sites in a treatment and retreatment cycle prior to construction.

- **G-M-2.** The Navy will continue feral cat and rat control and monitoring efforts as long as they are demonstrated to support listed species recovery and population maintenance. To reduce human-induced increases in the feral cat and rat populations, the Navy will ensure that personnel do not feed cats and that all trash, food waste, and training refuse are disposed of properly in animal proof containers.
- **G-M-3.** The Navy will continue implementation of its INRMP, including ongoing monitoring and management of listed plant species on San Clemente Island, with review and revision per Navy directives addressing management of natural resources.
- **G-M-4.** The Navy proposes to continue to review and coordinate the dissemination of environmental conservation measures to island users. Conservation measures will be distributed to island military and civilian staff in accordance with Commander's guidelines and with Fleet operations.
- **G-M-5.** The Navy will conduct any necessary EOD ordnance detonations in or near listed species habitat in a manner that minimizes the potential for wildfire without compromising personnel safety.
- **G-M-6.** The Navy will coordinate range access to achieve optimal flexibility between training operations and natural resource management activities, according to range use instructions and with priority given to military training.
- **G-M-7.** The Navy will locate heavy ordnance targets within Impact Areas I and II, away from sensitive resources, including San Clemente loggerhead shrike, San Clemente bush mallow (*i.e.*, away from Horse Beach Canyon), and coastal salt marsh, to the extent feasible while meeting operational needs.
- **G-M-8.** The Navy will conduct monitoring and control activities for non-native predators outside the impact area boundaries. Predator control activities would include China Point Road and Horse Beach Canyon Road between Impact Areas I and II. Predator control activities may be intensified as needed to prevent elevated predation on listed species outside the Impact Area boundaries attributable to predator populations within the Impact Area boundaries. Access to conduct control efforts would not be limited within SHOBA outside the Impact Area I and II boundaries. (See also related measure G-M-2).
- **G-M-9.** The Navy will conduct monitoring and control activities for invasive non-native plant species outside of the Impact Area boundaries. Monitoring and control activities would include the China Point Road and Horse Beach Canyon Road

between Impact Areas I and II. In addition, invasive monitoring and control will be conducted in TAR 21 in accordance with measure SCBM-M-1. Monitoring and control activities may be intensified as needed to prevent spread of invasive species and effects on listed species outside the Impact Area boundaries attributable to invasive species populations within the Impact Area boundaries. Access to conduct control efforts would not be limited within SHOBA outside the Impact Area I and II boundaries. (See also related measure G-M-1).

Fire Management Plan (FMP-M-1 -)

- **FMP-M-1.** The Navy will evaluate firelines and bladed areas disturbed by fire suppression activity and rehabilitate these areas as practicable and appropriate.
- **FMP-M-2.** The Navy's Natural Resource Office will, determine whether seeding is appropriate for post fire erosion control. Seeding would be overseen by the San Clemente Island Botany Program and would use native seed collected from San Clemente Island.
- **FMP-M-3.** The Navy will evaluate the potential impacts of fire on Santa Cruz Island rock-cress, San Clemente Island bush mallow, and San Clemente Island larkspur.
- **FMP-M-4.** When designing and implementing fuel breaks, the Navy will factor in the need to protect canyon shrubland/woodland occupied by shrikes. Coordination between Navy Natural Resource personnel and applicators will occur prior to fuel break installation in the proximity of occupied nesting areas.
- **FMP-M-5.** The Navy will minimize impacts to listed species and occupied habitat associated with Phos-Chek application by considering the locations of federally-listed species in advance of fuel break installation. This will allow the Navy to avoid impacts to the extent practicable. The Navy will avoid application of Phos-Chek within 91.5 m (300 ft) of mapped Santa Cruz Island rock-cress locations and avoid application of Phos-Chek within 91.5 m (300 ft) of other mapped listed species to the extent consistent with fuelbreak installation.
- **FMP-M-6.** The Navy will monitor soil and vegetation responses to retardants and herbicides and use this information to maximize the effectiveness of fuelbreak installation and minimize impacts to native vegetation.
- **FMP-M-7.** The Navy will coordinate the development of burn plans with natural resources staff to identify potential biological issues.
- **FMP-M-8.** The Navy will consider the locations of federally-listed plants in advance of prescribed fire application so that impacts can be avoided by location or timing

where possible and plan prescribed fire to provide a resource benefit where appropriate.

- **FMP-M-9.** The Navy will conduct experimental burns to evaluate the response of the boxthorn plant community to fire.
- **FMP-M-10.** The Navy will conduct prescribed fire experiments to evaluate their effectiveness in controlling non-native annual plants.
- **FMP-M-11.** The Navy will establish post-fire recovery plots to monitor recovery and identify new infestations of non-native invasive plants associated with both wildfire and prescribed fire.
- **FMP-M-12.** The Navy will evaluate burn areas and prioritize them appropriate for inclusion in the weed eradication program, as appropriate.
- **FMP-M-13.** The Navy will conduct pre-season briefings on minimal impact suppression tactics (MIST) for the fire fighting personnel. This would include guidelines on fire suppression materials and tactics, including limitations associated with Phos-Chek and salt water drops.
- **FMP-M-14.** The Navy will conduct an annual review of fire management and fires that will allow adaptive management, if required, as outlined on page 4-56 of the draft Wildland Fire Management Plan (September 2005 draft). The Service will be included as an invited stakeholder to participate in this annual review.
- **FMP-M-15.** The Navy will staff and train a Wildland Fire Coordinator prior to modifying existing training restrictions or increasing distribution of ignition sources on San Clemente Island. The equipment and tools necessary for this staff person to accomplish the duties of this position will be in place prior to any increasing ignition sources on the island.
- **FMP-M-16.** The Navy will submit a final San Clemente Island Fire Management Plan to the Service prior to increasing ignition sources on the island.

Proposed measures to minimize impacts of AVMC, AVMR, AVMA, AFPs, AMPs, IOA, and Amphibious Landing Sites (AVMC-M 1-10)

- **AVMC-M-1.** The Navy will survey for federally listed and sensitive plant species within the AVMC (including AVMA, AFP 1, AFP 6, AMPs) and IOA.

- **AVMC-M-2.** The Navy will conduct periodic monitoring of the AVMC (AVMAs, AMPs, AFPs, AVMR) and IOA as part of vegetation/habitat and sensitive species survey updates for the INRMP.
- **AVMC-M-3.** The Navy will develop a plan that will address soil erosion associated with planned military operations in the AMVP, AFPs, AMPs, and IOA. The Navy will finalize AVMA, AMP, and AFP areas based on field review with soil erosion experts and military personnel, such that operational areas minimize inclusion of steep slopes and drainage heads. The goals of the plan would be to: (1) minimize soil erosion within each of these operational areas and minimize offsite impacts; (2) prevent soil erosion from adversely affecting federally listed or proposed species or their habitats; (3) prevent soil erosion from significantly impacting other sensitive resources, including sensitive plant and wildlife species and their habitats, jurisdictional wetlands and non-wetland waters, the area of Special biological Significance (ASBS) surrounding the island, and cultural resources. The erosion control plan would lay out the Navy's approach in assessing and reducing soil erosion in the AVMAs, AMPs, AFPs, and the IOA, as well as routes used to access these areas. The plan would consider the variety of available erosion control measures and determine the most appropriate measure(s) to control erosion in the area. The plan would include an adaptive management approach and contain the following essential elements: maps defining boundaries of operational areas that provide appropriate setbacks; a Best Management Practice (BMP) maintenance schedule; a plan to monitor soil erosion and review the effectiveness of BMPs; site-specific BMPs to minimize soil erosion on site and minimize offsite impacts, which could include: (a) setbacks or buffers from steep slopes, drainages, and sensitive resources; (b) site specific engineered or bio-engineered structures that would reduce soil erosion and transport of sediment off site; and (c) revegetation. The Navy will coordinate with the Service during development of the erosion control plan and will submit the draft erosion control plan to the Service for review. If the Service does not provide comments within 30 days, the Navy will move forward with implementation of its plan.
- **AVMC-M-4.** The Navy will brief military units on maneuver area boundaries prior to conducting operations in the AVMC.
- **AVMC-M-5.** The Navy will conduct assault vehicle travel or maneuvering only within the boundaries of the AVMC (including AFPs, AMPs, AVMAs, AVMR).
- **AVMC-M-6.** The Navy will develop and implement a project to monitor for erosion, dust generation, and deposition of dust in adjacent habitats.

- **AVMC-M-7.** The Navy will require the following measures to reduce the potential for transport of invasive plants to the island. Prior to coming to San Clemente Island, military and non-military personnel will be asked to conduct a brief check for visible plant material, dirt, or mud on equipment and shoes. Any visible plant material, dirt or mud should be removed before leaving for San Clemente Island. Tactical ground vehicles will be washed of visible plant material, dirt and mud prior to embarkation for San Clemente Island. Additional washing is not required for amphibious vehicles after 15 minutes of self-propelled travel through salt water prior to coming ashore on San Clemente Island.
- **AVMC-M-8.** The Navy will enforce the existing 35 mph speed limit on Ridge Road. The Navy will post signs, continue public awareness programs; mow roadside vegetation; and monitor roadways for kills of protected or conservation agreement species including San Clemente loggerhead shrike, San Clemente sage sparrow, and island fox.
- **AVMC-M-9.** The Navy will direct tracked and wheeled vehicles to use the existing route for ingress and egress to/from the beach at West Cove.
- **AVMC-M-10.** The Navy will identify an ingress/egress and travel route that avoids impacts to wetlands and minimizes impacts to coastal dune scrub at the Horse Beach Cove Amphibious Landing and Embarkation Area at TAR 21. This will involve instructing drivers to: (1) drive amphibious vehicles: westward on the beach and egress from the beach west of the mouth of Horse Beach Canyon and (2) use only Horse Beach and Horse Beach Canyon Roads between ingress and egress. Prior to using the Horse Beach Canyon Road for landings, the Navy will do a site survey to determine whether the road can support the proposed landings and whether their proposed vehicles will create erosion downslope. If it is determined at that time that the roads need to be altered and consultation is required, the Navy will conduct separate consultation on that action. An alternate route may be along the coast, on the better maintained road to China Point Road.

Proposed Measures Specific to Training Areas and Ranges (TAR-M 1-2)

- **TAR-M-1.** The Navy will develop and implement a five-year monitoring plan with annual surveys for Threatened and Endangered plant species when they are known to occur within or adjacent to TARs outside of Impact Areas I and II.

Proposed Measures Specific to BTS Sites (BTS-M-1-2)

- **BTS-M-1.** Construction of structures will not involve grading and will be conducted outside the sage sparrow breeding season. The footprint of the construction areas will

be marked to avoid habitat areas in coordination with the San Clemente Island natural resources program. Anti-perch devices will be installed on the structures.

- **BTS-M-2.** FDRS precautionary measures at these sites will be the same measures implemented at TAR sites.

San Clemente sage sparrow (SCSS-M 1-4)

- **SCSS-M-1.** The Navy will continue surveys and population analysis for the San Clemente sage sparrow and develop additional surveys to assess sage sparrow juvenile survivorship and habitat use. Surveys will be developed and scheduled such that access to training areas is not restricted when training is needed/requested.
- **SCSS-M-2.** The Navy will manage the San Clemente sage sparrow population for long-term persistence in accordance with recommendations in the San Clemente Sage Sparrow Management Plan to the extent feasible and in a manner that is compatible with military training requirements.
- **SCSS-M-3:** The Navy will develop and implement a monitoring plan to assess the incidental take of San Clemente sage sparrow within and adjacent to TARs 10 and 17 and incorporate the findings into the San Clemente Sage Sparrow Management Plan as recommendations for minimizing or avoiding incidental take, to the extent practicable.
- **SCSS-M-4.** The Navy will address issues associated with habitat and sage sparrow survivorship as part of the INRMP update process, with focus on habitat areas near TARs 10 and 17.
- **SCSS-M-5.** The Navy will conduct construction activities supporting TAR improvements outside the sage sparrow breeding season at TARs and BTS sites that are located within sage sparrow habitat.

San Clemente Loggerhead Shrike (SCLS-M 1-4)

- **SCLS-M-1.** The Navy will continue the currently successful program of habitat restoration, predator management, monitoring, captive breeding, and re-introduction to benefit the San Clemente loggerhead shrike until such time that recovery objectives are identified and achieved.
- **SCLS-M-2.** The Navy will evaluate nest success data for San Clemente loggerhead shrike in sites nearest AFP 6, including those in Eagle and Cave Canyons, and compare it to other sites in and out of SHOBA with the objective of determining whether or not success rates are typical for the species.

- **SCLS-M-3.** The Navy's range schedulers will be provided the location of shrike nests within operational boundaries and also provided the location of shrike nests to personnel installing fuelbreaks prior to the installation of fuel/fire beak lines.
- **SCLS-M-4.** Within areas of the IOA that are wider than 1000 ft and not in any AVMA, AVMR, AFP, AMP, or TAR, the range complex schedulers will provide the GPS coordinates of up to four (4) shrike nests at any one time to operators and advise them that sensitive resources occur within a 10 meter radius of these points.

Island Night Lizard (INL-M-1)

- **INL-M-1.** The Navy will continue population monitoring and habitat evaluations at 3-year intervals while the delisting petition is being evaluated by the Service.

California brown pelican (CBP-M-1)

- **CBP-M-1.** The Navy will ensure that California brown pelicans are not in proximity to over-blast pressure prior to underwater demolition activities. Sequential underwater detonations would be conducted either less than 10 seconds apart or greater than 30 minutes apart to avoid impacts to birds attracted by fish kill.

Western Snowy Plover (WSP 1-2)

- **WSP-M-1.** The Navy will continue annual breeding and non-breeding season surveys for the western snowy plover at West Cove and Northwest Harbor.
- **WSP-M-2.** The Navy will explore the feasibility of using remote sensing technology to monitor western snowy plover use of Pyramid Beach and China Beach.

Santa Cruz Island Rock-Cress (RC-M-1-2)

- **RC-M-1.** The Navy will investigate feasibility of establishing additional colonies in suitable habitat farther away from the IOA and AFP--1 using the on-island nursery to propagate from local seed.
- **RC-M-2.** The Navy will prioritize areas surrounding Santa Cruz Island rock-cress occurrences as primary targets for weed eradication to the extent practicable and as appropriate based on potential impacts.

San Clemente Island Bush Mallow (SCBM-M- 1-3)

- **SCBM-M-1.** The Navy will control invasive exotic plant species in TAR 21 within the vicinity of Horse Beach Canyon and in the Infantry Operations Area along Horse Beach Canyon Road in Impact Area I to benefit the San Clemente Island bush mallow. Specifics of the control will be developed in coordination with the Service and initiated prior to the Navy conducting the new activities proposed in the BA. Control measures will be in accordance with safety requirements.
- **SCBM-M-2.** The Navy will implement management measures to improve the status of the San Clemente Island bush mallow. The Navy will coordinate with the Service to establish success criteria for the status of San Clemente Island bush mallow that, when met, will allow the Navy to discontinue invasive exotic plant control in the area defined in SCBM-1.
- **SCBM-M-3.** The Navy will use remote sensing to the extent feasible to monitor the portion of the bush mallow population within Horse Beach Canyon. The Navy will incorporate this monitoring strategy into the INRMP.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 *CFR* §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Action Area

The action area for the Navy's proposed new and increased operational training and associated fire management activities includes the area affected directly or indirectly by these actions. Thus, all of San Clemente Island and its offshore rocks and nearby waters are likely to be directly or indirectly affected as a result of the proposed action and are included in the action area.

San Clemente Island is owned by the Navy. The Commander, U.S. Pacific Fleet (CPF), through the Commander, Naval Region Southwest (CNRSW), is responsible for its administration. San Clemente Island is part of a group of installations and ranges collectively called the Southern California (SOCAL) Range Complex. San Clemente Island and the surrounding ranges support the largest concentration of U.S. naval forces in the world.

San Clemente Island is located approximately 68 nm (126 km) offshore from San Diego, California. Prior to U.S. Navy ownership, the island experienced introduction of goats and pigs, which were left to roam the island. The island was used for sheep and cattle ranching activities while under the administration of the Department of Commerce until the Navy assumed ownership and management of the island in 1934. Ranching activities were discontinued under Navy management, but feral goats, pigs, and deer were present on the island for many years. Overgrazing by previous ranching activities as well as goats, pigs, and deer resulted in dramatic changes in the flora and fauna of some areas on the island and a notable reduction in the distribution and abundance of several species native to the island.

Since 1934, the Navy has conducted a variety of training activities in many different areas of the island, although activities in many previously used areas have been discontinued as training needs have changed. San Clemente currently supports the following general categories of naval activities: (1) naval gunfire support, air-to-ground ordnance delivery, and amphibious warfare training in the SHOBA, (2) other USMC amphibious warfare training, (3) NSW training, (4) other island operations, (5) RDT&E of new systems, and (6) airfield operations. Training activities on San Clemente Island are currently conducted within existing ranges and training areas on the island under baseline conditions.

Description of San Clemente Island and Baseline Conditions

San Clemente Island is oriented northwest to southeast and is about 34 km (21 mi) long and about 11 km (4 mi) at its widest point. The island is approximately 56 sq mi (14,504 ha; 35,840 ac) in size. The island has a relatively broad plateau on top. Marine terraces extend along the western slope of the island and on the east of the plateau, and steep escarpments drop precipitously to the rocky coastline along the southern half. The southern part of the island is deeply dissected by a number of canyons up to 152 m (500 ft) deep. The highest point is Mt. Thirst, which is approximately 600 m (1,965 ft) above mean sea level.

San Clemente Island is mostly undeveloped with large expanses of grassland and shrub communities punctuated by small complexes of buildings. Wilson Cove on the northeast side is the main developed area on the island, providing most of the housing, dining, and infrastructure. On the north end, the Naval Auxiliary Landing Field and the area north of the landing field is another relatively developed portion of the island that supports the BUD/S Camp and MAROPS facilities as well as several TARs. The remainder of the island contains only small, scattered concentrations of development and/or facilities, mostly located on the edges of the central plateau. Such developed areas include buildings associated with the old VC-3 airfield and smaller facilities at isolated locations.

Although most of the island is undeveloped, both the flora and fauna of the island have been substantially altered by human activities, including the introduction of non-native herbivores and military training. Although the last of the remaining non-native herbivores were removed from the island in the early 1990s, the activities of introduced goats, sheep, pigs, and deer have significantly altered the native vegetation composition and the topsoil. These impacts also

affected the remaining wildlife and plants on the island. Since 1934, San Clemente Island has provided instrumented ranges, operating areas and associated facilities to conduct and evaluate a wide range of training exercises within the scope of naval warfare. The baseline condition of the plant and animal communities at individual training areas varies, as some areas sustain extensive use under baseline conditions, while others do not.

1. Shore Bombardment Area and Impact Areas I and II

The southern one-third of San Clemente Island 4,452 ha (approximately 11,000 ac) is known as the SHOBA. SHOBA is effectively a buffer area for Impact Areas I and II, the actual areas that contain targets for ship-shore, aerial bombing, and artillery use. SHOBA is the only remaining range in the United States that supports live ship-to-shore naval surface fire support (NSFS), artillery/mortar and air-to-ground training in unison. SHOBA is also a certified laser range. SHOBA supports notable native perennial grasslands on the upper plateau. While most areas within SHOBA are relatively unaffected by baseline training activities (with the exception of elevated fire frequencies in some areas) the Impact Areas have sustained heavy use for at least 20 years, as evidenced by disturbed vegetation characteristics within these areas.

Naval Special Warfare Training Areas

The northern half of the island is divided into six large (40 to 1,781-ha (100 to 4,400-ac)) SWATs. These areas assure NSW's access to required air, land, and sea interoperable areas and infrastructures (*i.e.* TARs). Designation as a SWAT indicates that the area is used for ingress and egress to/from TARs. Both basic and advanced NSW operations utilize these areas, as well as special operations training by MEUs and other special operations forces. Baseline foot traffic within a SWAT is low and dispersed and has little visual effect on the vegetation under baseline conditions.

2. Training Areas and Ranges and NSW Center Basic Underwater Demolition/School (BUD/S) Basic Training Sites

There are 22 TARs (0.4-312 ha (1-770 ac)) spread over the island, which have been subject to varying degrees of use for a variety of training activities for many years. TARs are operating areas that provide tactical ingress and egress training and objectives for NSW personnel. A TAR is a geographically bounded area used for planning and scheduling purposes for specific training operations and range activities. Each TAR was designed to support a typical training exercise based on tactical and safety requirements. These designs vary but may include live fire, demolitions, firing lines and positions, topographical features for ingress and egress, maneuver areas, test pads, and in some areas, restricted access and exclusionary areas. Each TAR that is intended for live-fire has been designed with appropriate Surface Danger Zones (area over which munitions may travel), but the TAR does not include the Surface Danger Zone.

NSW Center BUD/S Basic Training Sites (BTSSs) support FTXs for BUD/S students. Conducted at the compellation of the 25-week BUD/S program, FTXs integrate a range of skills including

land navigation, reconnaissance, and tactical movement and ambush. BTSs are similar to TARs because they provide a tactical objective for BUD/S trainees.

3. Old Airfield

The Old Airfield, called VC-3, located within TAR 15, is approximately 11 km (7 mi) from the northern end of the island, located in a grassland area dominated by non-native annual grasses. Several small buildings are present, and the area experiences regular use for equipment staging.

4. Missile Impact Range

The MIR, located within TAR 16, is in the north-central portion of the island, just south of VC-3. It is situated at the ridge crest of the island's central plateau. The MIR contains fixed targets and is equipped with sophisticated instruments for recording the flight, impacts, and detonations of weapons. The MIR is highly disturbed from repeated missile tests and is denuded in some areas.

5. Naval Auxiliary Landing Field

The NALF, located at the northern end of the island, has a single runway of 2,835 m (9,300 ft) equipped with aircraft arresting gear. The airfield was constructed on sand that was excavated from locations in the northern part of the island. The runway has separated the beach at West Cove from the sand sources that historically supported this beach. A small air terminal and associated parking area are located adjacent to the airfield. Soils in the area immediately south of the airfield are highly eroded and show evidence of quarry and borrow activities.

6. Artillery Firing Points

There are two AFPs in SHOBA. An AFP is a location from which artillery weapons such as the 155 mm (6 in.) howitzer are positioned and used in live-fire employment of munitions. Guns are towed by trucks along primary roads, often in convoy with munitions trucks and HMMWVs. There are currently two AFPs in use; AFP 1 and AFP 6. Two areas within proposed AFP 1 have been used historically, as evidenced by reduced vegetation at these sites. AFP 6 was requested as a firing point in 2004 and has been used on a limited basis since then. It was approved for one time use by the Navy's NRO, pending consultation. AFP 6 lies in an upland grassland area that has historically received little use.

7. Assault Vehicle Maneuver Road

The Assault Vehicle Maneuver Road (AVMR) consists of a stabilized route that parallels San Clemente Island Ridge Road between West Cove Beach (TAR 5) and the SHOBA Gate. The Service consulted on improvements to the segment of the route that extends from West Cove to VC-3 and development of the segment that extends from VC-3 to the SHOBA gate in Biological Opinion 1-6-04-F-3934.1.

8. San Clemente Island Ridge Road

San Clemente Island Ridge Road (Ridge Road) extends from the NALF all the way to the southern portion of the island at Pyramid Head. The road bisects the central plateau of the island, and several additional relatively well-traveled roads (REWs Road and China Point Road) as well as unimproved and rarely used roads (*e.g.*, Middle Ranch Canyon Road) extend from Ridge Road towards the east and west sides of the island. A road improvement project is currently underway that was addressed in Biological Opinion 1-6-04-F-3934.1. The project entails paving the length of Ridge Road, resurfacing REWs Road, installing culverts, and implementing erosion control measures. The Navy had committed to monitoring loggerhead shrikes and re-vegetating temporarily impacted soils with seed collected from native plants on San Clemente Island as part of this project; however, areas that have been temporarily impacted have not yet been re-vegetated. Under the terms and conditions in the biological opinion, the Navy was also required to install signs to slow traffic along portions of the road close to shrike nests, monitor roadways for shrike roadkills, and care for any eggs or nestlings that would otherwise be taken within the captive propagation facility. The Navy complied with these previous BO terms. Invasive plant species have been repeatedly identified and treated along this road under the Navy's weed management activities despite ongoing efforts to wash vehicles from the mainland prior to coming to San Clemente Island.

9. West Shore Road

West Shore Road is a poorly maintained road that extends from proposed TAR 10 to south of TAR 17. The road is located on the lowest marine terrace and bisects the narrow band of "high quality" or "high density" sage sparrow habitat. The road also extends through the Island Night Lizard Management Area and associated "medium quality" habitat for the island night lizard. Several spur roads have arisen that lead from West Shore Road towards the shore, approximately 656 ft (200 m) away. These routes were historically used for access to camera pads, but are currently used primarily by recreational fishermen. Some of the roads had previously been slated for restoration activities under Biological Opinions FWS 1-6-97-F-58 and FWS 1-6-00-F-19, although restoration activities have not yet occurred, and are now identified in the FMP as areas to remain open (unvegetated) for fire management.

10. Horse Beach Canyon Road

Horse Beach Canyon Road extends from China Point Road towards Horse Beach Canyon. The road is frequently in poor condition. This road parallels Horse Beach Canyon, which lies downslope from the road.

11. Biological Resources

Thirteen vegetation communities have been mapped on San Clemente Island using 1977 aerial imagery flown at 4,572 m (15,000 ft) (U.S. Navy 1996). The Santa Barbara Botanic Garden (under cooperative agreement with the Navy) is in the process of remapping vegetation

assemblages on San Clemente Island, which have changed since originally mapped. The Navy's INRMP identifies "Ecological Units" that are based on the mapped vegetation communities, landform, and soils. The acreage of the ecological units identified is depicted in Table 7.

Table 7. Ecological Units, Acreages, and Percentages of Island Area for San Clemente Island

Ecological Unit	Acreage	Percentage
Canyon Woodland	696.2	1.9
Maritime Desert Scrub (MDS)-Boxthorn	3,621.0	9.7
MDS-Boxthorn/Grassland	2,188.8	5.9
MDS/Grassland Complex (Terrace Faces and Flats)	8,921.4	23.9
MDS-Pyramid Cove and South Facing Slopes	1,611.5	4.3
Maritime Sage Scrub (MSS) - Northeastern Escarpment	369.9	1.0
MSS/Desert Scrub- Canyon Walls and Escarpments	5,858.3	15.7
Grasslands, Loamy Soils	5,275.9	14.2
Grasslands, Clay Soils	5,383.7	14.5
Active Sand Dunes	223.8	0.6
Stabilized Sand Dunes	412.9	1.1
Coastal Strand	166.8	0.4
Coastal Salt Marsh	19.3	0.1
Sea Bluff Succulent	36.0	0.1
Developed	359.1	1.0
Unmapped	916.1	2.5
Total	36,060.7	96.9

Source: U.S. Navy 2002

The native flora and fauna of San Clemente Island includes 455 plant taxa (including species, subspecies, and varieties), 245 bird species, 6 mammal species, and 2 reptile species. San Clemente Island is also inhabited by several non-native species including 159 exotic plants, 5 introduced birds, and 5 introduced mammals (Junak 2003; Ross, Boyd, and Junak 1997). Because of its long history of geographical isolation from the mainland, San Clemente Island supports a variety of plants and animals found nowhere else in the world or only found on one or more of the other Channel Islands. For example, 47 plant taxa on San Clemente Island are restricted to the California Channel Islands and of these, 15 are known only from San Clemente Island (Junak 2003), which is the highest percentage of endemism of the California Channel Islands. A total of 11 federally listed species occur on San Clemente Island, seven of which are endemic to the island (*i.e.*, San Clemente loggerhead shrike, San Clemente sage sparrow, San Clemente Island woodland star, San Clemente Island broom, San Clemente Island larkspur, San Clemente Island Indian paintbrush, San Clemente Island bushmallow) and two of which are endemic to the Channel Islands (island night lizard and Santa Cruz Island rockcress).

In 1992, the Navy completed over a decade of efforts to remove the non-native feral grazing animals from San Clemente Island. This significant accomplishment has created the conditions

that are expected to allow vegetation recovery on the island, although the future composition of “recovered” plant communities cannot be predicted. Because past and current uses of the island have significantly affected soils, hydrology, and the seed bank in some areas, and because plant species have responded differently to the removal of grazing animals, the changes in vegetation vary by species and across the island (Tierra Data, Inc. 2008). Some listed plant species have responded significantly to the removal of grazing pressure, including San Clemente Island Indian paintbrush, San Clemente Island larkspur, and the San Clemente Island broom. For other species, significant expansion of distribution and abundance is likely to be a slower process, due to changes in pollinator species, self-incompatibility mechanisms, new threats associated with land use, changes in soils or local conditions, or low genetic diversity.

Additional management actions taken by the Navy that have improved individual species’ status include the Navy’s intensive recovery program for the San Clemente Island loggerhead shrike, and the continued attention toward habitat protection along the West Shore, which supports high quality habitat for both the San Clemente sage sparrow and the island night lizard.

Integrated Natural Resources Management Plan

The Sikes Act Improvement Act of 1997 (Sikes Act) committed the Department of Defense, including the U.S. Navy, to develop INRMPs for lands under military control. The purpose of an INRMP is to guide installation managers in the sustainable management of natural resources on installations while ensuring no net loss to the military mission. As part of the San Clemente INRMP, the island has been divided into 18 Management Units (MUs) reflecting ecological, geographical, and mission-related factors. These units are shown in Figure 8. Key issues for the island identified in the development of the INRMP included: conservation of listed species and other endemic species; control of non-native and invasive species; erosion control, especially along roads, in operational areas, and in areas that were historically heavily grazed; fire management in the presence of training-related ignition sources; and protection of cultural resources. Despite the designation of listed plants as “management focus species” within the INRMP, no species-specific management directed at increasing the distribution and abundance of these species has yet been conducted. Management of listed plants has focused on activities that provide broad ecosystem benefits, such as invasive exotic plant species control and erosion control. Genetic research, however, has been conducted on several of the listed plant species and may guide future efforts to increase distribution and abundance of these species. In addition, research on the reproductive biology and ecology of three of the listed plants (San Clemente Island bush mallow, San Clemente Island Indian paintbrush, and Santa Cruz Island rockcress) is currently underway. The INRMP identifies numerous stewardship and conservation actions, many of which the Navy is implementing on an ongoing basis. The natural resources programs listed in Table 8 were funded by the Navy in 2008.

Figure 8. Land Management Units on San Clemente Island



Table 8. Natural Resources Management Activities and Studies for Listed Species Funded in 2008

Category	Studies/Programs
Vegetation and Habitat	Vegetation Plots; Seed Collection and Propagation; Site selection, Outplanting, Maintenance; Non-native Plant Control; Fuel break creation; Erosion Control; Fire Suppression Helicopter
Threatened and Endangered Plants	Genetic Diversity Study; Endangered Plant Survey; Research on Reproductive Biology/Ecology; Outplanting of San Clemente Island Broom
Island Night Lizard	Island Night Lizard Habitat Evaluation and Trap Maintenance
Category	Studies/Programs
San Clemente Loggerhead Shrike	Captive Breeding; Monitoring; Predator Management; Release
San Clemente Sage Sparrow	Sage Sparrow Monitoring
Western Snowy Plover	Western Snowy Plover Surveys

Previous Consultations-Biological Opinions Pertaining to Training and Fire Management

The Navy has coordinated extensively with the Service regarding training, facilities construction, and conservation activities on the island, and the Service has issued several biological opinions addressing such activities. The Navy has directed, to the extent possible, intensive uses into areas of the island that have experienced previous disturbance. The avoidance and minimization measures described as part of the Navy's proposed action(s) and terms and conditions of the biological opinions have defined the environmental baseline of management for listed plant and animal species on the island and have been included within the San Clemente Island INRMP.

The Navy previously consulted with the Service in 1997 on the potential effects of training-related fires on federally-listed species on San Clemente Island. The biological opinion (FWS 1-6-97-F-21) addressed the effects on listed and proposed species of military activities that may cause wildfire along with measures to reduce the potential for impacts to listed species. The consultation was limited to the effects of fires and did not address other impacts of training activities such as vehicle traffic, ordnance use, or foot traffic.

In 2001, the Navy requested re-initiation of this consultation because of changes proposed for military training and in the status of the San Clemente loggerhead shrike. The consultation and resulting biological opinion (FWS-LA-2808) reduced restrictions on ordnance use in Impact Areas I and II, expanded the fire season target boundary, and identified additional fire management and conservation measures to be implemented by the Navy. The Navy currently conducts fire management activities according to the conservation measures and terms and conditions of this biological opinion including: 1) annual or semi-annual coordination with the Service regarding the placement of fuelbreaks around Impact Areas I and II; 2) staffing of on-island fire suppression resources during operations conducted during the "fire season", which is determined by U.S. Navy botanical staff; and 3) compliance with weather restrictions and use illumination rounds, tracers, and white phosphorus only during periods of low-moderate ignition

potential and during periods when wind speeds do not exceed 13 knots. The timing restrictions under baseline conditions do not provide the flexibility that the Navy now needs to accomplish training; thus, the proposed fire management plan is intended by the Navy to minimize the effects of training-related fires in a manner that precludes the need for this term and condition.

After previously consulting on several individual projects that were likely to adversely affect the island night lizard, the Navy and Service completed a consultation to programmatically address the effects on night lizard of construction projects and activities likely to result in surface disturbance. Due to the broad distribution of the island night lizard on the island, the Navy intended to address impacts in a comprehensive fashion rather than on a project-by-project basis by identifying standard mitigation measures that would apply to all surface disturbing activities, recognizing the western portion of the island as the Island Night Lizard Management Area (INLMA), and developing an island night lizard management strategy. The biological opinion for this consultation (FWS 1-6-97-F-58) included terms and conditions that required: 1) habitat protection and some restoration outside of areas proposed for development by the Navy as an important measure to reduce the potential for impacts to the island night lizard; and 2) the Navy to designate the INLMA in perpetuity via signature of a Memorandum of Agreement with the Service. While unused roadway restoration and signature of a MOA have not been implemented, the Navy has complied with the majority of this biological opinion's terms and conditions, including but not limited to, designation of the INLMA, expansion of the INLMA (in lieu of some restoration), construction-specific minimization measures, weed control actions, annual surface disturbance monitoring and reporting, and feral cat control.

The Navy also consulted with the Service on training activities in TARs 1, 4, and 16. The biological opinion for this consultation (FWS 1-6-00-F-19) evaluated the effects of range improvements and operational use of TARs 1, 4, and 16 and required ongoing monitoring of the sage sparrow population, restoration of habitat to compensate for habitat modified during construction, and monitoring of habitat surrounding the TAR to identify any effects to habitat that extended beyond the TAR boundary. The commitment to restore habitat was replaced with an expansion of the INLMA.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Because San Clemente Island is owned and thus under the control of the Navy, we are unaware of any non-Federal actions affecting listed species that are reasonably certain to occur in the action area considered by these opinions.

SPECIES BY SPECIES EVALUATIONS AND CONCLUSIONS

Plants

San Clemente Island Bush mallow (*Malacothamnus clementinus*)

Status of the Species

Listing Status

The San Clemente Island bush mallow was listed as endangered on August 11, 1977 (42 FR 40682) and subsequently addressed in the California Channel Islands Species Recovery Plan (Channel Islands Recovery Plan) (Service 1984). Critical habitat has not been designated for the San Clemente Island bush mallow.

Species Description

San Clemente Island bush mallow is a rounded subshrub (with stems woody only at the base) in the Malvaceae (mallow family). It is up to 1-2 meters (3.3-6.6 ft) tall with numerous branched stems arising from its base (Bates 1993; S. Junak pers. comm. 2006). Its leaves are angularly 3-5 lobed or nearly circular or ovate, less than 5 cm (2 in.) in length and conspicuously bicolored, with green, sparsely pubescent (covered with short, fine hairs) upper surfaces and veiny, white hairy under surfaces that are densely matted with branching hairs (Munz and Johnston 1924). Flowers occur in densely compacted clusters and have pink or white and fading lavender petals with well developed calyx lobes that have branched, densely matted pubescence (Munz and Johnston 1924; Bates 1993). Plants bloom from March to August (California Native Plant Society 2001).

Habitat Affinities

San Clemente Island bush mallow is restricted to San Clemente Island, where it occurs in a range of conditions, including rock crevices along canyon walls, at the base of rocky walls, at the base of escarpments between coastal terraces, along canyon rims and ridgelines, and in vegetated flats (S. Junak pers. comm. 2006; Junak and Wilken 1998; U.S. Navy 2001). It is often associated with maritime cactus scrub vegetation on coastal flats at the southwestern end of the island (Junak and Wilken 1998). The collection of moisture in rock crevices and at the base of canyon walls and escarpments may provide favorable conditions for this species (S. Junak pers. comm. 2006).

Life History

This plant reproduces sexually and vegetatively. It is believed to be pollinated by solitary bees, but the plants appear to be self-sterile, as solitary clumps did not produce viable seed set (Tree of Life Nursery 1987).

Based on the occurrence of San Clemente Island bush mallow in clustered groupings of stems, it generally is believed that stem groupings represent individual plants that have propagated via underground runners or rhizomes (Service 1984; Helenurm 1999; S. Junak pers. comm. 2006). That it propagates via rhizomes is also suggested by the observation that the species is seldom observed to set seed (S. Junak pers. comm. 2006). Recent genetic analyses, however, indicate that clonal growth is not extensive in the species and that patches of closely adjacent individuals may not represent the same genetic individual (Helenurm 1999). Further study is needed to determine the relationship among adjoining individuals, the pattern of mating in the species (*e.g.*, the relative proportion of inbred to outcrossed seeds), and whether a self-incompatibility system exists that prevents or inhibits reproduction among closely related individuals.

The ease of resprouting from rhizomes and the adaptation of other species in the genus to fire (*e.g.*, *Malacothamnus fasciculatus*) suggest that *M. clementinus* may similarly be adapted to persist after fires through its ability to send up shoots from underground stems (Service 1984; S. Junak pers. comm. 2006). A fire did, however, reportedly kill one or more individuals in upper Horse Beach Canyon (M. Elvin pers. comm. in U.S. Navy 2005b). That the species can persist at shortened fire return interval is confirmed by the continued presence of the species within Impact Area II in areas that have burned an estimated three times, based on fire mapping. In addition, vegetation trend monitoring conducted on San Clemente Island between the years of 1992-2003 included monitoring at two plots in Horse Beach Canyon that burned in 1994. Data collected on the study plots appear to show the recovery following fire of a *M. clementinus* population that had been documented before the 1994 fire. In general, obligate sprouters such as *Malacothamnus sp.* are more resilient to short fire return intervals than many species; however, they may be impacted by sustained high frequency fire regimes. In other obligate sprouters, successful germination and recruitment of new individuals is correlated with cooler, moister, low-light conditions and increased litter depth associated with mature closed-canopy chaparral that develops over extended fire free periods. New individuals use gaps to recruit to the canopy and expand (U.S. Navy 2006c). This implies that *Malacothamnus* populations may persist and expand under fire return intervals that are long enough to allow recruitment of new individuals, yet short enough to create gaps for expansion.

Cultivated specimens of San Clemente Island bush mallow live 4 to 6 years. When the parent plant dies, all connected plantlets die (U.S. Navy 2006). Plants on San Clemente Island, however, appear to be long-lived (S. Junak pers. comm. 1996 in U.S. Navy 2006).

A recent genetics study used random amplification of polymorphic DNA (Randomly Amplified Polymorphic DNA (RAPD) analysis) to study genetic variability of 95 plants from 19 discrete locations (Helenurm 1999). Genetic variation was detected at RAPD loci within all occurrences sampled. Box Canyon and Horse Beach Canyon exhibited the greatest genetic variability (polymorphism), and Lemon Tank had the least genetic variation (Helenurm 1999). Overall, a substantial proportion of the genetic variation found in San Clemente Island bush mallow was found among different occurrences rather than within single occurrences, indicating that all occurrences may contain genetic variation not found elsewhere (Helenurm 1999). Based on

analyses, gene flow is highly limited in San Clemente Island bush mallow, even among patches within the same canyon (Helenurm 1999).

Rangewide Distribution and Threats

Since the San Clemente Island bush mallow's entire distribution is restricted to the action area of San Clemente Island, its island-wide distribution and current threats to the species are discussed in the Environmental Baseline section below.

Conservation Needs

A recent five- year review of the status of San Clemente Island bush mallow (Service 2007a) resulted in the following recommendations:

- (1) Develop and implement a species reintroduction program in coordination with San Clemente Island restoration actions to accelerate the recovery of this species. Such a plan should use genetic data to select source plants from populations with the highest levels of genetic variability (Helenurm 1999);
- (2) Based on the recommendations of Helenurm (1999), perform additional genetic studies to determine the relatedness of individuals in patches and to determine the pattern of mating (*i.e.*, proportion of inbred and outcrossed seeds). If results from this study indicate that patches of plants consist of highly related individuals and seed production is impaired by a self-incompatibility mechanism or inbreeding, develop and implement a transplantation program to improve seed production in the species;
- (3) To reduce the loss of any remaining genetic variation, incorporate as objectives in the INRMP to conserve as many populations of San Clemente Island bush mallow as possible and to manage those populations so that they support as many individuals as possible. In particular, work with the Navy to develop an environmental clean-up plan for the Lemon Tank dump site that provides for the conservation of San Clemente Island bush mallow in that location;
- (4) Study the range of fire conditions, especially fire frequency, that San Clemente Island bush mallow can withstand; and
- (5) Perform additional studies on the pollination of naturally occurring populations to determine if low seed production is due to poor pollinator visitation.

Environmental Baseline

Distribution

The distribution of San Clemente Island bush mallow is restricted to San Clemente Island and includes a historical occurrence mid-island within northeasterly facing Lemon Tank Canyon. The Lemon Tank occurrence was the only occurrence known at the time of the species' listing in 1977 and was confirmed as recently as 1996, but whether or not this occurrence is still extant has not been determined (K. O'Conner, pers. comm. 2008).

A scattering of about 30 occurrences of San Clemente Island bush mallow have been discovered since the bush mallow was listed. The occurrences span a distance of about 10 kilometers (km) (6.2 miles (mi.)) along the southwesterly-facing coastal terraces at the southern end of the island (Junak and Wilken 1998; Junak 2006). The Lemon Tank Canyon occurrence falls about 6.5 km (4 mi.) to the north of the nearest southern occurrence, with the distance between the northernmost and southernmost occurrences spanning a distance of about 15 km (9.3 mi.). Thus, the southern distribution of San Clemente Island bush mallow (30 occurrences) is disjunct from the historical, and only other known location for the species on San Clemente Island at Lemon Tank Canyon.

The appearance of the 30 new occurrences is likely associated with the removal of feral goats and pigs from the island in the early 1990s, which was the primary threat identified for the species at the time of its listing. Approximately 19 of the new occurrences were documented during sensitive plant surveys conducted during 1996 and 1997. An additional 11 occurrences were documented during 2003 and 2004 surveys. This species was also collected from San Clemente Island in the early 1990's and propagated at Tree of Life Nursery with the intent of future outplanting on San Clemente Island. Although the majority of the plant material propagated at Tree of Life Nursery was returned to San Clemente Island, the fate of the specimens, and whether or not they were outplanted, thereby contributing to the increased distribution of the species, is unknown.

Occurrences along the southwesterly facing coastal terraces are predominantly situated at the base of escarpments between coastal terraces (S. Junak pers. comm. 2006). Seventy percent of the San Clemente Island bush mallow distribution is within SHOBA, in Impact Areas I and II. Within Impact Area I, approximately 68 percent of the known occurrences are within Horse Beach Canyon, adjacent to Horse Beach Canyon Road. About 47 percent of the occurrences are directly within the canyon and 21 percent are at the mouth of the canyon within TAR 21 (Figure 1d). Within Impact Area II, approximately 2 percent of the known occurrences are located in China Canyon. Additional occurrences within SHOBA include those located north and south of Cave Canyon. Two occurrences of the San Clemente Island bush mallow were recorded within fuel breaks in 2002 (Service 2002). The remaining occurrences (30 percent) are not in SHOBA or are in areas not significantly impacted by training. These occurrences are less genetically diverse than the occurrences known from Horse Beach Canyon, and we are unaware of any specific management actions implemented by the Navy to conserve these occurrences.

Occurrences within Horse Beach Canyon have been studied for over 20 years and are significant not only in their magnitude, but in their genetic variability (Helenrum 1999). The significant percentage of the species distribution within Horse Beach Canyon is believed to be due to microhabitat conditions within this canyon, including the availability of water within the canyon (S. Junak, pers. comm. 2008). The San Clemente Island bush mallow population in Horse Beach Canyon has persisted under baseline levels of use, which includes one mapped fire (1979-2005) at the mouth of the canyon and two to three fires further up-canyon, although additional fires and additional unrecorded disturbance are likely to have occurred in this area. This existing fire history (one to three fires in different areas of the canyon over 25 years) also appears to have favored this species and may have contributed to the expansion of the populations in this canyon.

San Clemente Island bush mallow occurs in groupings of stems that are assumed to represent the same genetic individual. Because of this assumption, the size of occurrences has been recorded using several methods, including counting the number of stem groupings or “clumps;” counting the total number of stems within a clump; and/or measuring the approximate area covered by plant groupings. However, uneven application of these enumeration methods causes some ambiguity when comparing occurrence sizes, suggesting more refined methods are needed to document trend beyond the appearance of new occurrences. Occurrences documented in 1996-1997 ranged in size from 1 to 50 clumps, with about half of these made up of 10 or fewer clumps (average 15 clumps per occurrence) (Junak and Wilken 1998).

Threats

A number of threats exist for San Clemente Island bush mallow, including competition with invasive plant species, erosion, alteration of San Clemente Island habitats by military activities, unnaturally high fire frequencies, and constrained access to its habitat for conducting active management. Small sizes of occurrences, low genetic diversity (Helenurm 1997, 1999), and little gene flow among occurrences (Helenurm 1999) may threaten San Clemente Island bush mallow due to the vulnerability of small populations to a range of environmental, demographic, and genetic stochastic factors.

The northern Lemon Tank Canyon occurrence, if extant, falls within an area identified by the INRMP as potentially needing environmental clean-up pursuant to the Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Although there are no immediate plans for clean-up at this site (U.S. Navy 2001), this occurrence could be impacted by future environmental clean-up. The historical Lemon Tank Canyon occurrence also falls within the bounds of a Special Warfare Training Area (SWAT-5) and close to the Missile Impact Range (MIR). However, the topography at Lemon Tank likely provides protection from troop movements, and fire frequency would likely be within the range of frequencies under which the species has persisted in the Impact Areas.

Over 70 percent of the known occurrences of San Clemente Island bush mallow lie within SHOBA, with many occurrences near ignition sources. Training activities within SHOBA pose

a direct threat to individual plants and occurrences due to the ground disturbance associated with them, potential for invasive plant expansion, and the potential for recurrent fire.

Past and existing munitions use and NSW training within Impact Areas I and II and TAR 21 have impacted San Clemente Island occurrences in these areas. While surveys in the area have monitored species persistence, impacts of munitions and training activities have occurred but have not been quantified (J. Dunn, pers. comm.2006). Periodic fires caused by training activities have occurred in Horse Beach Canyon within Impact Area I and China Canyon within Impact Area II. Lower Horse Beach Canyon burned one time in the vicinity of San Clemente Island bush mallow locations and Upper Horse Beach Canyon burned three times between 1979 and 2004. China Canyon burned three times in the vicinity of the San Clemente Island bush mallow locations within the same time period. The extent to which these fires actually burned bush mallow occurrences and the intensity of the fires is not known. Occurrences within Horse Beach Canyon and China Canyon have persisted without apparent detriment at an apparent fire frequency of one to three fires over a 25-year period (1979-2004).

Fire suppression practices, including maintenance and creation of fuel breaks through vegetation removal or application of herbicide or Phos-Chek fire retardant, may also affect this species. While the effects of the herbicide or Phos-Chek application on San Clemente Island are unknown, the main ingredient of Phos-Chek is agricultural fertilizer that can affect plant communities and rare plants by facilitating the invasion of non-native species (Bell 2003; Larson and Newton 1996). For example, a study by Labat Environmental (2007) found that “similar to the effects of fertilizers, fire retardants may encourage growth of some plant species and giving them a competitive advantage over others, thus resulting in changes in community composition and species diversity (Tilman 1987; Wilson and Shay 1990). Bell *et al.* (2005) recorded enhanced weed invasion in an Australian heathland ecosystem, particularly in areas receiving high concentrations of Phos-Chek. Thus, in or near areas where endangered and threaten plants occur, the use of Phos-Chek fire retardant is of concern because its use may facilitate invasion of non-native weeds.

On San Clemente Island bush mallow is subject to the effects of applications of herbicide and/or Phos-Chek within the boundaries of fuelbreaks. The footprint of fuelbreaks surrounding Impact Areas I and II have evolved over time, and approximately two occurrences of San Clemente Island bush mallow are within the footprint of fuelbreaks (Service 2002). The status of these two occurrences is unknown.

Conservation Actions

Monitoring plot trend data and the appearance of around 30 new occurrences of San Clemente Island bush mallow since the early 1990s suggest this species is responding favorably to the removal of feral herbivores from San Clemente Island. Despite ongoing threats from fire, military training, and fire management and control activities, the species also appears to exhibit some tolerance to infrequent fire, as monitoring data has tracked the recovery of a population following fire, and new occurrences have been discovered in recently burned areas (Junak and

Wilken 1998; S. Junak pers. comm. 2006, and Tierra Data Inc. 2005). San Clemente Island bush mallow is also likely benefiting from weed management that occurs under baseline conditions, including treatment of fennel within Impact Area I and *Brassica* ssp. along China Point Road. Fennel was treated in Horse Beach Canyon and along China Point Road in 2005 (U.S. Navy, 2005a).

San Clemente Island bush mallow is among the sensitive plant species periodically monitored by the U.S. Navy on San Clemente Island (Junak and Wilken 1998; Junak 2006). Research pertaining to the genetics of this plant is also underway (Helenurm 1999).

The San Clemente Island INRMP proposes an array of management strategies to address identified goals and objectives for specified management units and their natural resources. Of relevance to the protection of the San Clemente Island bush mallow, the INRMP includes an objective to: “Protect, monitor, and restore plants and cryptogams in order to manage for their long-term sustainability on the island” (U.S. Navy 2001).

Associated with this objective are a number of proposed management strategies that include the following: consideration of San Clemente Island bush mallow as a “management focus plant” such that it is considered independently from its associated plant community for management; conducting status surveys for this species; ensuring that management-focus plants have a network of suitable sites; performing pollination studies on San Clemente Island bush mallow; and continuing to apply genetic research and management approaches to its management. Other INRMP strategies targeted towards the terrace complex of maritime desert scrub, in which San Clemente Island bush mallow occurs, include accelerating the recovery of shrubs on terrace faces and flats; reducing the percent cover of invasive plants from the 1992-93 baseline of 41 percent on terrace faces and 53 percent on terrace flats; controlling erosion, particularly in association with active and abandoned roads; and establishing a preliminary fire return interval of 5 years in grassy areas and 10 years or longer in shrublands.

Possibly in conflict with protection and/or recovery of San Clemente Island bush mallow is the competing objective included in the INRMP to protect military access to the SHOBA firing ranges due to SHOBA’s high military value for ship-to-shore bombardment training (U.S. Navy 2001). To date, a number of the INRMP management strategies, or aspects of them, have been implemented. The Navy has implemented rare plant surveys that have documented new occurrences of San Clemente Island bush mallow; however, the status of many previously detected occurrences has not been assessed. Genetic research and pollination studies have also been performed. Concerted efforts have been made to control escape of fire from the SHOBA Impact Areas. However, other objectives have not been achieved, such as ensuring a network of suitable sites; controlling erosion in some areas; and the community goal of reducing the percent cover of invasive plants from 1992-93 baseline conditions (K. O’Connor pers. comm. 2006.).

Effects of the Action

The proposed action includes increased frequency of ordnance use in Impact Areas I and II, increases in munitions that will be fired over Horse Beach Canyon, and increased foot and vehicle traffic along Horse Beach Canyon Road. These activities may result in direct and indirect adverse effects to San Clemente Island bush mallow, particularly to the significant occurrences located within and at the mouth of Horse Beach Canyon in Impact Area I, including occurrences within TAR 21, and other occurrences within China Canyon in Impact Area II. New range management directives will be implemented as part of the proposed action. These directives will limit the ability of Navy resource personnel to assess and manage the portion of the bush mallow population that inhabits Horse Beach Canyon, including occurrences in TAR 21, and the occurrences in China Canyon. The proposed action also includes fire management and suppression activities that are likely to result in application of Phos-Chek or herbicide to San Clemente Island bush mallow occurrences that lie on the periphery of these Impact Areas.

Threats to the bush mallow occurrences within Impact Areas I and II are likely to increase over time as a result of intensified ordnance use and increased foot and vehicle traffic, including AAVs, along Horse Beach Canyon Road.

The Navy will implement significant conservation measures to minimize the effects of their FMP and training activities on the San Clemente Island bush mallow.

Ordnance Use

Impact Areas I and II sustain significant heavy artillery use under baseline conditions, and the San Clemente Island bush mallow populations within these Impact Areas have persisted under recent levels of disturbance and fire. Ordnance-related impacts in the vicinity of San Clemente Island bush mallow occurrences are expected to increase as training exercises become more frequent. Increases in NSFS (11 percent), EFEX (33 percent), Bombing Exercises (23 percent), and NSW Use of TAR 21 (32 percent) will increase the risks of direct hits to bush mallow occurrences within Impact Areas I and II. New activities that entail munitions use adjacent to, or over Horse Beach Canyon (AA Operations, AAV Operations, EFV Company Assault, and Battalion-Sized Landings), will also increase the risk of ordnance directly hitting occurrences of San Clemente Island bush mallow. A direct hit from ordnance could damage or destroy individuals or clumps of bush mallow plants.

Horse Beach Canyon, which supports 68 percent of the San Clemente Island bush mallow occurrences, and China Canyon, which supports 2 percent of the bush mallow occurrences, are included within Impact Area I and II boundaries, respectively, due to potential for ordnance to skip into these canyons. Under baseline conditions, heavy artillery targets are not placed within these canyons. TAR 21, which supports 21 percent of the bush mallow occurrences, is also located within the boundaries of Impact Area I, at the mouth of Horse Beach Canyon. Tar 21 is used for live-fire and demolition training, which is expected to increase by about 63 percent under the proposed action. Since plants are located within the boundaries of this training area,

they could be directly hit and damaged or destroyed by explosions or live fire associated with training in this area.

As part of the Navy's overall conservation program on San Clemente Island, when consistent with training objectives, the Navy proposes to continue avoiding placement of heavy ordnance targets close to listed species, including San Clemente Island bush mallow occurrences. Close coordination between Navy botanical resource professionals and the military personnel placing targets will be necessary to assure that targets are not placed adjacent to San Clemente Island bush mallow plants. This measure will reduce the potential for direct impacts on San Clemente Island bush mallow and loss of known occurrences from ordnance use within Horse Beach Canyon, China Canyon, and adjacent to bush mallow plants in TAR 21. It is reasonable to conclude, however, that some San Clemente Island bush mallow plants will be impacted in TAR 21 and that the risk of ordnance entering Horse Beach and China canyons will increase as the number of operations increase. Thus, we anticipate that there may be some loss and damage to individuals or clumps of bush mallow plants. Based on the past history of training in this area, persistence of occurrences in spite of training activities, and life history information that indicates the San Clemente Island bush mallow exhibits some tolerance to fire, we believe the impacts to individuals and occurrences at Horse Beach Canyon, China Canyon, and TAR 21 from explosions or live fire will be low such that the overall distribution of the species at these sites is not reduced by more than 10 percent of the baseline condition at any one site (*i.e.*, Horse Beach Canyon: 47 percent of baseline occurrences; Tar 21: 21percent of baseline occurrences; and China Canyon: 2 percent of baseline occurrences).

Fire

Approximately one to three fires have occurred in Impact Areas I and II over a 25-year period under existing training and management conditions. San Clemente Island populations have persisted within Impact Areas I and II despite this fire frequency.

Increased use of large ordnance within Impact Area I and II, introduction of live-fire exercises from EFVs and increased frequency of NSW training could increase the frequency of fires in habitat occupied by San Clemente Island bush mallow within the SHOBA. Precautionary measures included as part of the FDRS are intended to reduce the ignition potential and allow for adequate suppression response to prevent repeated large-scale fires. The FDRS includes precautionary measures that discourage training with incendiary munitions during periods of high ignition potential; however, the increased intensity of munitions use (11 percent increase in FIREX, 33 percent increase in EFEX, 63 percent increase in TARs exercises, etc.) combined with the less restrictive ordnance use guidelines (over baseline conditions outlined in Biological Opinion FWS-2808), limit inference as to the potential future ignition frequency and fire pattern. Ignition frequency and fire patterns are also likely to change over time as a result of anticipated expansions of invasive plant species distributions and resulting increases in fuel.

San Clemente bush mallow displays adaptive characteristics that allow it to tolerate relatively high fire frequencies; however, fires that occur at frequencies greater than once every 5 to 10

years are believed to be detrimental to the species (U.S. Navy 2006). Increased fire frequency resulting from intensified uses could also lead to localized changes in vegetation (type conversion) that could indirectly affect San Clemente Island bush mallow. The Navy's fire management practices are anticipated to minimize ignitions as well as the spread of fires. The proposed action also includes a Navy commitment to conduct an annual review of fire management and fires that will allow adaptive management, if required. These measures should minimize the frequency and spread of fires that could result in type conversion of native habitat.

Fuelbreaks and suppression measures outlined within the FDRS should prevent fire frequency outside Impact Areas (*e.g.* San Clemente Island bush mallow occurrences south and north of Cave Canyon) from increasing to levels incompatible with the persistence of this species. Fire suppression is not proposed, however, within Impact Areas I and II, so bush mallow occurrences in these Impact Areas (70 percent of baseline occurrences) will likely be subject to a higher fire frequency than occurrences that occur outside Impact Area boundaries (30 percent of baseline occurrences). Fire could result in mortality to individual plants and reduce or eliminate (over-time) the species' seed bank.

Fire Management and Suppression

Fire management and suppression activities are likely to result in continued application of herbicide or Phos-Chek on the two known San Clemente Island bush mallow occurrences (if they are still extant) within fuel breaks along on the periphery of the Impact Areas. Phos-Chek may also favor the expansion of non-native species due to the fertilizing effect of this retardant that could also lead to the loss of these two occurrences. These two occurrences represent a small percentage of the overall San Clemente Island bush mallow population. The Navy will minimize the effects of Phos-Chek use on these and other bush mallow occurrences by conducting preseason briefings for fire fighting personnel addressing guidelines on fire suppression materials and tactics, including limitations associated with Phos-Chek and salt water drops.

The Navy proposes to minimize the potential for effects to listed species associated with future fuelbreak installation by considering the locations of documented occurrences as fuelbreak lines are developed, by studying the effects of Phos-Chek on San Clemente Island vegetation, and avoiding application of Phos-Chek within 91 m (300 ft) of mapped listed species to the extent consistent with fuelbreak installation. Since the boundaries of future fuelbreaks have not yet been identified, we anticipate that the Navy will consult with the Service regarding any future plans to establish fuel breaks with the potential to impact San Clemente Island bush mallow. Thus, the impacts of new fuelbreaks on San Clemente Island bush mallow are not considered in this analysis.

Vehicle and Foot Traffic

Proposed training activities would include significant increases in vehicle use entering and exiting TAR 21, both from the water and from elsewhere on San Clemente Island. NSW training activities are expected to increase approximately 63 percent under the proposed action.

Although many of these operations do not entail vehicle traffic (since insertion is from the water), it is expected that vehicle traffic to the TAR will increase proportionally to the amount of training. TAR 21 is located at the mouth of Horse Beach Canyon and is one of two proposed insertion points for AA School Battalion Operations (6 EFVs, 15 times/year), EFV Company Assault (46 EFVs 2 times/ year), and AA Vehicle and EFVO (12 AAVs, 8 times/year) and is an insertion point in the proposed Battalion Sized Landing (25 vehicles, 2 times/year).

Several proposed operations include more than one potential insertion point, so the exact number of operations and vehicles that would transit Horse Beach Canyon Road per year under the proposed action is not known. Based on vehicle numbers provided in the BA, approximately 656 assault vehicle trips up and down Horse Beach Road to and from TAR 21 could occur if all activities that identify TAR 21 as the insertion or exit point use this route.

Assault vehicles are large vehicles, many of which are tracked and weigh approximately 76,000 pounds. Increased travel along Horse Beach Road may result in erosion problems and/or transport of invasive plant material into Horse Beach Canyon, which lies downslope from the road. One of the most significant ecological effects that vehicular routes have on soils in desert regions involves changes in water runoff patterns. Vehicular routes that run straight up hillslopes can promote soil erosion and the development of rills and gullies. Vehicular routes that run parallel to elevation contours can also alter runoff patterns by redirecting water along roadside ditches to low points along the road, after which water continues on downslope in a more concentrated stream than otherwise would have occurred. This process concentrates channels at higher slope positions (Montgomery 1994), resulting in more elongated first-order drainage basins and accelerated rates of soil erosion (Forman and Alexander 1998).

Vehicular routes are also a primary pathway for plant invasions into arid and semi-arid ecosystems (Johnson *et al.* 1975; Amor and Stephens 1976; Brooks and Pyke 2001; Gelbard and Belnap 2003). Vehicles serve as dispersal vectors for alien plant propagules (Clifford 1959; Schmidt 1989; Lonsdale and Lane 1994), and disturbances within vehicular route corridors facilitate establishment of invading ruderal plants (Greenberg *et al.* 1997). Horse Beach Canyon Road and portions of TAR 21 that are used by vehicles as part of the proposed action are likely to support conditions that will allow establishment of invasive plant species adjacent to significant portions of the San Clemente Island bush mallow distribution on San Clemente Island (*i.e.*, 68 percent of the baseline occurrences of bush mallow are known from Horse Beach Canyon or TAR 21).

Vehicular routes with dirt surfaces can also be a significant source of dust, which can have significant effects on plant vigor downwind from vehicle activity. Dust is likely to be generated on Horse Beach Canyon Road during training activities that use heavy assault vehicles. Whether such dust could accumulate on plants that lie in Horse Beach Canyon is unknown; however, given the prevailing wind direction, downwind dust deposition appears likely to occur up to an undetermined distance from this road.

The intensity of foot traffic is also likely to increase within the proposed IOA and TAR 21 as a result of the proposed action. Foot traffic will come from off-island (predominantly Camp Pendleton), other areas of the island during Battalion-Sized Landings, and TAR 21 training activities, which are anticipated to increase approximately 63 percent. Plans for the TAR include construction of temporary plywood targets that would be used for demolition practice and re-constructed as necessary. Frequent foot traffic by small groups and placement of targets could directly affect the bush mallow occurrences located within the boundaries of the TAR. Foot traffic is also likely to disturb soils and can increase the potential for spread of invasive plant species.

To address erosion problems and transport of invasive plant material into Horse Beach Canyon, , the Navy will identify an ingress/egress and travel route that avoids impacts to wetlands and minimizes impacts to coastal dune scrub at the Horse Beach Cove Amphibious Landing and Embarkation Area at TAR 21. This will involve instructing drivers to: (1) drive amphibious vehicles: westward on the beach and egress from the beach west of the mouth of Horse Beach Canyon and (2) use only Horse Beach and Horse Beach Canyon Roads between ingress and egress. Prior to using Horse Beach Canyon Road for landings, the Navy will do a site survey to determine whether the road can support the proposed landings and whether their proposed vehicles will create erosion downslope. If it is determined at that time that the roads need to be altered and consultation is required, the Navy will conduct separate consultation on that action. An alternate route may be selected along the coast on the better maintained road to China Point Road.

The Navy also proposes to develop and implement an erosion control plan in coordination with the Service to minimize the potential for erosion problems beyond the Horse Beach Canyon Road boundaries and reduce the potential for impacts to listed species. The erosion plan will include using BMPs to reduce the potential for erosion beyond boundaries of operational areas, potentially including setbacks from steep slopes such as those along Horse Beach Canyon Road. The Navy will also develop and implement a project to monitor for erosion, dust generation, and deposition of dust in adjacent habitats. If the erosion control plan and monitoring project are implemented prior to broader uses of Horse Beach Canyon Road outlined in the proposed action, we do not expect adverse effects to the bush mallow in Horse Beach Canyon from erosion and/or dust.

To reduce the potential for transport of invasive plants to the island, military and non-military personnel will be asked to conduct a brief check and remove any visible plant material, dirt, or mud on equipment and shoes, prior to coming to San Clemente Island. Tactical ground vehicles will be washed of visible plant material, dirt and mud prior to embarkation for San Clemente Island (The washing procedure is not required for amphibious vehicles after 15 minutes of self-propelled travel through salt water prior to coming ashore on San Clemente Island.). The Navy also proposes to brief military units on maneuver area boundaries prior to conducting operations and to conduct assault vehicle travel or maneuvering only within these boundaries.

Invasive Plant Species

Invasive plant species are likely to be introduced to San Clemente Island by ongoing and increased training activity on the island and are also likely to be spread by increased movement of people, equipment, and vehicles. In addition, invasive species are frequently found within fuelbreaks (Merriam *et al.* 2006). Invasive species are widely recognized as a leading cause of species loss world-wide, second only to direct habitat loss and fragmentation (Pimm and Gilpin 1989). Island ecosystems and species are especially vulnerable to invasion (Mack *et al.* 2000). Invasive species may affect ecosystem processes. For example, invasion of grasses may alter fire frequency by rapid production of highly flammable fuel, thus leading to more frequent fires and eventual conversion of shrub lands to grasslands (D'Antonio and Vitousek 1992). Non-native invasive species may compete with San Clemente Island bush mallow for nutrients, water, or sunlight. In addition, non-native plants may provide additional flashy fuels that could change the frequency of fires in this area. Since no fire suppression is proposed in Impact Areas, fires could exceed the frequency under which San Clemente Island bush mallow could persist in these areas. Spread of invasive species from inadvertent introductions caused by vehicular or foot traffic could adversely affect San Clemente Island bush mallow, given its occurrence in Impact Areas I, including TAR 21, in Impact Area II.

Invasive species of particular concern for bush mallow include fennel (*Foeniculum vulgare*) because this species is likely to persist in microhabitat similar to bush mallow. Fennel is present on San Clemente Island and may be transported to the vicinity of Horse Beach Canyon by movement of people and vehicles from areas that are currently infested by fennel plants into areas adjacent of Horse Beach Canyon Road. Increased levels of foot traffic may also occur at the mouth of Horse Beach Canyon as a result of proposed increases in NSW Training in TAR 21. Mesic conditions at the mouth of the canyon would facilitate germination of invasive plant seeds that could then move up canyon.

Safety concerns are expected to limit the potential to manage any large scale establishment of invasive plant species that occurs within Horse Beach Canyon. Since a significant portion of the San Clemente Island bush mallow occurs within the canyon, this is of particular concern.

To reduce the potential for invasive plant species establishment and spread in San Clemente Island bush mallow habitat, the Navy will monitor for invasive non-native plant establishment in the following areas: TAR 21 within the vicinity of Horse Beach Canyon; the southern end of Horse Beach Canyon Road and IOA within Impact Area I; and along China Point Road and Horse Beach Canyon Road between Impact Areas I and II. If invasive plant species are identified, the Navy will control them to prevent their spread into Horse Beach Canyon. Specifics of the monitoring and control will be developed in coordination with the Service and initiated prior to the Navy conducting the new activities proposed in the BA. Monitoring and control measures will be in accordance with safety requirements. The Navy will also implement management measures to improve the status of the San Clemente Island bush mallow. The Navy will coordinate with the Service to establish success criteria for the status of San Clemente Island

bush mallow that, when met, will allow the Navy to discontinue any required invasive exotic plant control in the Horse Beach Canyon and Tar 21 areas described above.

The Navy has also committed to continue invasive exotic plant species control on an island-wide scale. The focus of the invasive exotic plant control program will continue to be the control of highly invasive exotic plants that have the potential to adversely impact habitat for federally listed species in known locations and the early detection and eradication of new occurrences of such species.

Access Restrictions and Impact Area Boundary Change

In 2006, the Navy began to review access policies to range complexes through out the Southwest Region. Due to an increased awareness of the potential safety hazards to personnel associated with the accumulation of Munitions Potentially Possessing Explosive Hazards (MPPEH) and UXO within high explosive impact areas the Navy issued an instruction (COMNAVREGSW Instruction 400.2 dated 18 July 2006 and updated 07 September 2007). The policy directives of this instruction prohibits access to the high explosive impact areas within SHOBA for “any activity associated with archeological or biological monitoring and surveys or recreational (to include hunting) use”. Until this time, Horse Beach Canyon, China Canyon, China Beach, Pyramid Beach, and other areas that lie within Impact Area boundaries had been periodically surveyed for natural resources for over 20 years.

The Navy proposes to continue the policy that excludes Impact Area access for biological monitoring as part of the proposed action. Access policies due to safety concerns will reduce the ability to monitor and manage approximately 46.3 percent of the San Clemente Island bush mallow occurrences on San Clemente Island. These plants lie within Horse Beach Canyon and support a relatively high level of genetic variability (polymorphism). Inability to access the Horse Beach Canyon occurrences will preclude collection of cuttings or seeds of the plant that could be used as a repository of this genetic variability. Inability to access occurrences will also preclude botanists from monitoring the population on foot. However, the Navy proposes to explore the feasibility of remote monitoring to assess the ongoing status of the species within Horse Beach Canyon.

The Navy proposes to include TAR 21 and an area to the west of TAR 21 as part of Impact Area I. Previously, TAR 21 has been recognized as lying between Impact Area I and Impact Area II. TAR 21 supports approximately 21 percent of the baseline San Clemente Island bush mallow occurrences. Tar 21 lies at the mouth of Horse Beach Canyon, which supports the largest number of bush mallow occurrences. This administrative change further affects the Navy’s capability to monitor and manage for this species since the access policy for Impact Areas precludes access for non-military personnel.

The inability to monitor or manage occurrences within the boundaries of TAR 21 would affect occurrences throughout Horse Beach Canyon because of the likelihood of invasive plant species establishment resulting from intensified activities within or adjacent to the TAR. In recognition

of the management needs of San Clemente Island bush mallow, however, the Navy proposes to control invasive exotic plant species in TAR 21 within the vicinity of Horse Beach Canyon and in the Infantry Operations Area along Horse Beach Canyon Road in Impact Area I until San Clemente Island bush mallow becomes more abundant and broadly distributed outside of Horse Beach Canyon.

Conclusion

After reviewing the current status of the San Clemente Island bush mallow, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of this species. We have reached this conclusion for the following reasons:

- (1) Approximately 30 percent of the San Clemente Island bush mallow occurrences are not within Impact Areas and are not in areas subject to significant training activities, which will help to ensure survival of this narrowly-restricted island species. More importantly, the Navy through their proposed conservation program will implement monitoring and management actions for bush mallow occurrences outside of the Impact Areas to support recovery of the species;
- (2) Increased ordnance use in Impact Area I has the potential to impact the significant San Clemente Island bush mallow population known from within and at the mouth of Horse Beach Canyon; however, the Navy's commitment to locate heavy ordnance targets within Impact Areas I and II away from sensitive resources, including San Clemente Island bush mallow, to the extent feasible while meeting operational needs, will minimize damage or destruction of individual occurrences of this plant. With implementation of these measures, we anticipate no significant change in the distribution of the San Clemente Island bush mallow population in Impact Area I as a result of increased ordnance use. Moreover, the Navy will manage and monitor the San Clemente Island bush mallow population in Impact Area I (*i.e.*, Horse Beach Canyon and TAR 21) in coordination with the Service, to the maximum extent possible given safety constraints in the area. This measure will ensure that the Navy and the Service have the ability to coordinate, assess, and address any effects not anticipated in this analysis. Finally, as part of the Navy's conservation program, some genetic material will be collected, if safety constraints allow, from bush mallow occurrences within TAR 21, again helping to ensure survival, and in support of recovery, of this species;
- (3) The Navy will minimize the potential impacts from increased invasive species establishment by controlling invasive exotic plant species in the following areas: TAR 21 within the vicinity of Horse Beach Canyon; the southern end of Horse Beach Canyon Road and IOA within Impact Area I; and along China Point Road and Horse Beach Canyon Road between Impact Areas I and II. With implementation of this measure, we anticipate no significant change in the distribution of the San Clemente

Island bush mallow population in Impact Area I as a result of establishment and spread of invasive species. The Navy will also continue their island-wide invasive exotic plant species control program, which focuses on habitat for federally listed species;

- (4) The Navy will minimize the potential impacts from increased fire frequency by implementing a FMP and develop an erosion control plan to address potential effects of erosion and/or dust on the bush mallow occurrences in Horse Beach Canyon as a result of use of Horse Beach Canyon Road by tracked vehicles as a result of use of Horse Beach Canyon Road by tracked vehicles; and
- (5) The San Clemente Island bush mallow has increased in numbers and distribution since the time of its listing primarily due to conservation actions supported by the Navy (e.g. removal of feral grazing animals, invasive plant management); with continuation of the Navy's conservation program for San Clemente Island, including actions to promote the recovery of listed plants such as the bush mallow, we anticipate effects of the proposed action will be offset and will not result in an appreciable reduction in the numbers, reproduction, or distribution of the San Clemente Island bush mallow.

San Clemente Island Indian Paintbrush (*Castilleja grisea*)

Listing Status

San Clemente Island Indian paintbrush was listed as endangered on August 11, 1977 (42 FR 40682) and subsequently addressed in the Channel Islands Recovery Plan (Service 1984). Critical habitat has not been designated for this species.

Species Description

San Clemente Island Indian paintbrush is a highly branched perennial subshrub in the figwort family (Scrophulariaceae). The species is endemic to San Clemente Island (Chuang and Heckard 1993) and is the only representative of the genus *Castilleja* found on the island (Helenurm *et al.* 2005). San Clemente Island Indian paintbrush is typically 29.2 to 80 cm (11.5 to 31.5 in.) in height and covered with a dense white-wooly felt. Most *Castilleja* species have bisexual flowers disposed in terminal spikes. The flowers of San Clemente Island Indian paintbrush are yellow. Its leaves alternate and are linear, approximately 1.3 to 5.1 cm (0.5 to 2 in) long with 0 to 3 lobes (Chuang and Heckard 1993). The fruit is an ovoid capsule, less than 1.3 cm (0.5 in.) long, containing approximately 150 seeds (Junak and Wilken 1998). San Clemente Island Indian paintbrush seeds are typically brown and less than 0.2 cm (0.06 in.) long. The seed coats are deeply netted, allowing the encapsulation of air, which may aid dispersal via water (Chuang and Heckard 1993; Muller 2005). Under natural conditions, plants typically produce 9 to 14 fruits.

Habitat Affinity

Most occurrences of San Clemente Island Indian paintbrush are in steep rocky canyons on both the eastern and western sides of the island. It is also found on coastal bluffs, slopes and flats around the island's perimeter. Some of the largest occurrences are located in bowl-shaped swales on the coastal terraces in the southern portion of the island (Junak and Wilken 1998). San Clemente Island Indian paintbrush is found in both coastal sage scrub and maritime cactus scrub plant communities between 30 and 1,200 ft in elevation. Based on vegetation mapping for the San Clemente Island INRMP, San Clemente Island Indian paintbrush is mainly associated with two habitats on the island: canyon woodland (696.2 ac) and maritime desert scrub/terrace complex (6,228.2 acres) (U.S. Navy 2002). A few scattered occurrences can also be found in maritime desert scrub/grassland habitat and in grassland habitat just east of Pyramid Cove. San Clemente Island Indian paintbrush habitat at Pyramid Cove is further subdivided into shallow, cobbly fine loam on slopes and terraces and maritime sage scrub northeast escarpment. San Clemente Island Indian paintbrush is often associated with the following native plant species California sunflower (*Encelia californica*), saltbush (*Atriplex californica*), golden cereus (*Bergerocactus emoryi*), foxtail brome (*Bromus madritensis rubens*), prickly-pear cactus (*Opuntia* spp.), and lemonade berry (*Rhus integrifolia*).

Life History

Both insect and hummingbird pollination of Indian paintbrush have been reported (Grant 1994; Junak and Wilken 1998). Junak and Wilken (1998) found that 67 to 71 percent of San Clemente Island Indian paintbrush flowers produced fruits and significantly more flowers than fruits were produced. These data suggests that San Clemente Island Indian paintbrush may either be self incompatible or strongly dependent on insect or hummingbird visitation for pollination and seed set. San Clemente Island Indian paintbrush seeds typically germinate the spring following seed set as temperatures begin to warm (Muller 2005). All members of the genus *Castilleja* are considered hemiparasitic because their roots tap into the root system of other species to ensure an adequate supply of water and possibly nutrients (Junak and Wilken 1998). Parasitism in *Castilleja* seems to be a generalist phenomenon with taxa parasitizing plants within a wide range of families, including Asteraceae, Fabaceae, Polygonaceae, Poaceae, and Rosaceae (Muller 2005).

Population Trend

San Clemente Island Indian paintbrush was considered relatively common in the 1930s but declined steadily over the next 30 years. By 1963 it was reported as rare or occasional, and by the time of listing in 1977, few individuals were observed (Kellogg and Kellogg 1994). Surveys in 1996 and 1997, however, documented a total of 77 occurrences of San Clemente Island Indian paintbrush, collectively comprising more than 3,500 individuals (Junak and Wilken 1998). Occurrences ranged from isolated plants to 600 individuals. San Clemente Island Indian paintbrush was found in steep canyons on both sides of San Clemente Island and on coastal bluffs, slopes, and flats around the island's perimeter. More recent surveys for San Clemente

Island Indian paintbrush were conducted in 2003 and 2004. Surveyors mapped an additional 42 locations and 1,120 individuals (Junak 2006). Occurrences ranged from isolated plants to 200 individuals. These new occurrences were mainly concentrated in steep canyons on the western side of the island, although a few were discovered near previously recorded individuals in the eastern canyons. Taken together, these two surveys documented about 119 locations and up to 4,700 individuals. Additional surveys conducted in support of the San Clemente Island BA have provided additional records of species locations and further increased the estimated distribution and abundance of this species. Based on the most recent estimates, San Clemente Island Indian paintbrush has increased substantially in distribution and abundance since the time of listing so that now about 14,064 San Clemente Island Indian paintbrush individuals may be found at about 335 locations on San Clemente Island (U.S. Navy 2008a).

Rangewide Distribution and Threats

Since the entire distribution of San Clemente Island Indian paintbrush is restricted to the action area of San Clemente Island, its island-wide distribution and current threats to the species are discussed in the Environmental Baseline section below.

Conservation Needs

A recent 5-year review (Service 2006a) identified the following conservation recommendations for the San Clemente Island Indian paintbrush.

1. Study the range (frequency and intensity) of fire conditions that San Clemente Island Indian paintbrush can withstand. Determine whether there is a fire interval at which this paintbrush best survives and reproduces.
2. Conduct field studies to determine which species are pollinating San Clemente Island Indian paintbrush. Protection of pollinator habitat, dispersal corridors, and other nectar sources may be necessary for the continued recovery of this species.
3. Identify which populations of San Clemente Island Indian paintbrush are subjected to erosion from storm water run-off. Implement erosion control measures and other Best Management Practices in these areas.
4. Conduct greenhouse studies to determine the importance of host species on San Clemente Island Indian paintbrush seedling recruitment and survival.
5. Establish a non-native annual grass removal program in San Clemente Island Indian paintbrush habitats such that percent cover of these species decreases by at least ten percent (a goal identified in the INRMP).

Environmental Baseline

Distribution

San Clemente Island Indian paintbrush is endemic to San Clemente Island and was originally described as relatively common (Helenurm *et al.* 2005). The original range and distribution of San Clemente Island Indian paintbrush on San Clemente Island is not known because its decline began before thorough botanical studies were completed. Currently, most occurrences of San Clemente Island Indian paintbrush are in steep rocky canyons on both the eastern and western sides of the island. It is also found on coastal bluffs, slopes and flats around the island's perimeter. Some of the largest occurrences are located in bowl-shaped swales on the coastal terraces in the southern portion of the island (Junak and Wilken 1998).

Based on the most recent estimates, San Clemente Island Indian paintbrush has increased substantially in distribution and abundance since the time of listing so that now about 14,064 San Clemente Island Indian paintbrush individuals may be found at about 335 locations on San Clemente Island (U.S. Navy 2008a). Much of the expansion has been within the steep canyon walls on the western side of the island. Occurrence data for this species spans the southern two-thirds of the island, a distance of approximately 17.5 mi.

Threats

With the removal of goats, pigs, and deer in 1992, the vegetation on San Clemente Island has rebounded, and the health of San Clemente Island Indian paintbrush populations has improved substantially (S. Junak pers. comm. 2006). Although the main threat to the recovery of San Clemente Island Indian paintbrush has been eliminated, persistent erosion resulting from historic overgrazing and competition with naturalized invasive non-native plant species still pose a threat to the recovery of this species. Other threats to the species include alteration of its habitat by military training activities and unnaturally high fire frequencies in the southern portion of its range.

The San Clemente Island Indian paintbrush distribution overlaps the boundary of the SHOBA at the southern end of the island, with 40 percent of occurrences inside the SHOBA (Junak and Wilken 1998; Junak 2006). Although the SHOBA contains 40 percent of San Clemente Island Indian paintbrush occurrences, existing impacts associated with use of ordnance and associated fires are concentrated in two Impact Areas (Impact Area I and II) within SHOBA. Impact Area I contains about 15.5 percent of the San Clemente Island Indian paintbrush occurrences and 14.5 percent of the individuals. Impact Area II contains about 0.9 percent of San Clemente Island Indian paintbrush occurrences and 0.3 percent of the individuals. Strip burning and fire retardant are used to maintain fuel breaks around these impact areas and to limit the spread of fires. It is likely that San Clemente Island Indian paintbrush in these areas are occasionally destroyed or damaged by explosives or small arms use.

Periodic fires have occurred in occupied habitat in Horse Beach Canyon in Impact Area I and China Canyon in Impact Area II. Portions of these canyons that are inhabited by San Clemente Island Indian paintbrush have burned one to three times in since 1979, and San Clemente Island Indian paintbrush has persisted and increased under this fire regime in Horse Beach Canyon. Occurrences in China Canyon have not been recently monitored, so effects of the fires on this population are not known.

Fire suppression practices, including maintenance and creation of fuel breaks through vegetation removal or application of herbicide or Phos-Chek fire retardant, may also have affected this species in the past. Creation and maintenance of fuelbreaks could kill or damage San Clemente Island Indian paintbrush. As described in the analysis for San Clemente Island bush mallow Phos-Chek may act as a fertilizer, facilitating the spread of non-native grasses.

San Clemente Island Indian paintbrush occurrences near areas exposed to foot and vehicle traffic include an occurrence near TAR 17 at Eel Point, which may be exposed to occasional foot traffic from small groups of soldiers, and an occurrence within AFP 1. Within AFP 1, the occurrence is approximately 200 feet and upslope from the most heavily impacted area

Conservation Actions

The San Clemente Island INRMP includes an objective to “protect, monitor, and restore plants and cryptogams in order to manage for their long-term sustainability on the island” (U.S. Navy 2002). Associated with this objective are a number of proposed management strategies that include the following: consideration of San Clemente Island Indian paintbrush as a “management focus plant” such that it is considered independently from its associated plant community for management; conducting status surveys for this species; ensuring that management focus plants have a network of suitable sites; performing pollination studies on San Clemente Island Indian paintbrush; and continuing to apply genetic research and management approaches to its management. Other INRMP strategies targeted towards the terrace complex of maritime desert scrub, in which San Clemente Island Indian paintbrush occurs, include: accelerating the recovery of shrubs on terrace faces and flats; reducing the percent cover of invasive plants from the 1992-93 baseline of 41 percent on terrace faces and 53 percent on terrace flats; controlling erosion, particularly in association with active and abandoned roads; and establishing a preliminary fire return interval of 5 years in grassy areas and 10 years or longer in shrublands (U.S. Navy 2002).

To date, concerted efforts have been made to control escape of fire from the Impact Areas and to reduce the cover of non-native species (K. O'Connor pers. comm. 2006). The Navy has also funded rare plant surveys that have documented new occurrences of San Clemente Island Indian paintbrush and field studies that have determined some aspects of its reproductive potential.

Effects of the Action

San Clemente Island Indian paintbrush is likely to be exposed to increased fires, fire management and suppression activities, ordnance, foot and vehicle traffic, and erosion as a result

of the proposed action. The ability to monitor and manage approximately 16 percent of the species occurrences will be precluded by the boundaries of Impact Areas and access policies. Despite the potential for these adverse effects, most of the San Clemente Island Indian paintbrush population occurs outside the areas that are most likely to be impacted by the proposed action. The Navy will implement significant conservation measures to minimize the effects of their FMP and training activities on the San Clemente Island Indian paintbrush.

Ordnance Use

The risk of destroying individual San Clemente Island Indian paintbrush plants within Impact Areas I and II is expected to increase as the use of ordnance in these areas increases. As described above, use of TAR 21, in Impact Area I, is anticipated to increase substantially, and other activities involving use of ordnance in the rest of Impact Areas I and II are anticipated to increase as well. TAR 21 contains only one occurrence of San Clemente Island Indian paintbrush, and Impact Areas I and II contain only 15.5 and 0.9 percent of San Clemente Island Indian paintbrush occurrences, respectively.

Impact Areas I and II sustain significant heavy artillery use under baseline conditions, and the San Clemente Island Indian paintbrush occurrences within these Impact Areas have persisted under recent levels of ordnance use. Persistence of San Clemente Island Indian paintbrush within Impact Areas I and II is likely due to the fact that San Clemente Island Indian paintbrush are concentrated in two canyons (Horse Beach Canyon and China Canyon) whereas impacts from ordnance are concentrated in existing highly disturbed portions of the Impact Area, and plants in the canyon are largely shielded due to topography. For example, San Clemente Island Indian paintbrush occurrences are located approximately 1,150 ft from Impact Area IIA (also known as the bomb box), which receives most of the heavy ordnance used on San Clemente Island. Targets are not currently placed within China Canyon, and topography of the area reduces the potential for a direct hit of these San Clemente Island Indian paintbrush occurrences. Existing patterns of disturbance are expected to continue in this area, which suggests that existing heavily impacted areas continue to be impacted.

The risk of occasional, accidental impacts to San Clemente Island Indian paintbrush from exploding ordnance will increase roughly in proportion to the increase in training activities. While direct hits from ordnance are unlikely, they could damage or destroy individual Indian paintbrush plants. Although the plants within Impact Area I remain at risk due to their proximity to intensive ordnance use, proposed increased use of large ordnance would likely have minimal additional effects on this species based on the observed increase in plants seen in SHOBA during ongoing operations, their adaptation to fire and distance from frequently used target areas, and topographic shielding. The potential for direct impacts to San Clemente Island Indian paintbrush from ordnance will also be minimized through the Navy's commitment to locate heavy ordnance targets within Impact Areas I and II as far away from sensitive resources as feasible while meeting operational needs.

Fire

Fire frequency is expected to increase as training exercises become more frequent. There may be some increase of fire in the SHOBA, which contains 40 percent of the San Clemente Island Indian paintbrush occurrences, including those occurrences in Impact Areas I and II and the surrounding area. Fuel breaks and suppression measures outlined within the FDRS should prevent a substantial increase in fire frequency outside of the Impact Areas. Thus, the greatest risk for increased fire will be within Impact Areas I and II, which contain 15.5 and 0.9 percent of San Clemente Island Indian paintbrush occurrences, respectively.

TAR 21 within Impact Area I will experience the 32 percent increase in use associated with training activities (Table 2), but TAR 21 contains only one occurrence of the San Clemente Island Indian paintbrush. Other activities that will increase in the Impact Areas include Naval Surface Fire Support (11 percent), EFEX (33 percent), and Bombing Exercises (23 percent), all of which will increase the potential for fire ignitions (Table 1). New activities that entail munitions use adjacent to, or over Horse Beach Canyon (AA Operations, AAV Operations, EFV Company Assault, and Battalion Sized Landings), will also increase the risk of fire.

Fire could result in mortality to individual San Clemente Island Indian paintbrush plants and to the species' seed bank. Because it may rely on connections to a host plant, repeated fires at short intervals could affect this species by negatively impacting the re-establishment of its host plants. Host plants have not yet been confirmed for the species, although California sunflower, *Opuntia littoralis*, and *Isocoma veneta* are believed to be host plants. However, anecdotal evidence suggests that occasional fire may help promote this species, which exhibits fire-stimulated seedling establishment. A monitored occurrence in Pyramid Cove peaked in 1984 after a 1983 fire and subsequently declined for several years (U.S. Navy 2008a). In addition, numerous individuals have now been documented in Horse Beach Canyon, in areas that have burned one to three times since 1979. Too frequent fires, however, may inhibit San Clemente Island paintbrush recovery and result in habitat type conversion. The Navy's fire management practices are anticipated to minimize ignitions as well as the spread of fires. The proposed action also includes a Navy commitment to conduct an annual review of fire management and fires that will allow adaptive management, if required. These measures should minimize the frequency and spread of fires that could result in type conversion of native habitat.

Fire Management and Suppression

Fuelbreak maintenance, using Phos-Chek or herbicides is proposed in the general vicinity of several occurrences of San Clemente Island Indian paintbrush. Any San Clemente Island Indian paintbrush plants within existing fuelbreaks may have been destroyed or damaged by past maintenance activities. However, any remaining individuals could be adversely affected by ongoing application of herbicide or by application of Phos-Chek. Phos-Chek can create a fertilizer effect that favors the establishment and proliferation of weedy plant species that can then out-compete native species. The Navy will minimize the effects of Phos-Chek use on Indian paintbrush plants by conducting preseason briefings for fire fighting personnel addressing

guidelines on fire suppression materials and tactics, including limitations associated with Phos-Chek and salt water drops.

The Navy proposes to minimize the potential for effects to listed species associated with future fuelbreak installation by considering the locations of documented occurrences as fuelbreak lines are developed, by studying the effects of Phos-Chek on San Clemente Island vegetation, and avoiding application of Phos-Chek within 300 ft of mapped listed species to the extent consistent with fuelbreak installation. However, since the boundaries of future fuelbreaks have not yet been identified, we anticipate that the Navy will consult with the Service regarding any future plans to establish fuelbreaks with the potential to impact San Clemente Island Indian paintbrush. Thus, the impacts of new fuelbreaks on San Clemente Island Indian paintbrush are not considered in this analysis.

Vehicle and Foot Traffic

Locations where increased vehicle and foot traffic may directly affect San Clemente Island Indian paintbrush include TAR 21 in Impact Area I, AFP 1 near the eastern-most point of the island, and the Infantry Operations Area (IOA), which runs through much of the central portion of the island. Increased vehicle and foot traffic could indirectly affect San Clemente Island Indian paintbrush, particularly in Horse Beach Canyon, through increased erosion, dust, and introduction of non-native plants.

Plans for the TAR include construction of temporary plywood targets that would be used for demolition practice and re-constructed as necessary. Frequent foot traffic by small groups and placement of targets could directly affect the lone occurrence that is located within the boundaries of the TAR. Foot traffic is also likely to disturb soils and can increase the potential for spread of invasive plant species.

One occurrence of San Clemente Island Indian paintbrush with 28 individuals lies within the central portion of the AFP near the Ridge Road. The occurrence is located in operationally accessible portions of the site that appear to have been previously unused. Proposed use of this area is likely to result in direct impacts to this occurrence of San Clemente Island Indian paintbrush. Maneuvering of heavy wheeled and tracked vehicles, including tanks, and digging in of recoil spades on howitzers are likely to damage individuals of this occurrence, and spread of invasive species may be facilitated by the activity. Avoidance measures suggested by the Service, and included as potential avoidance measures in the BA, including signage or inclusion of physical features that would discourage vehicle use in the immediate vicinity of the occurrence, were deemed incompatible with the training needs of the Marine Corps, the primary user of this operational area. However, protection of the localized area containing San Clemente Island Indian paintbrush could still potentially be addressed as part of development of the erosion control plan.

The 3,567-ha (8,815-ac) IOA contains approximately 53 of 335 occurrences (15.8 percent of the total occurrences) and 808 of 14,064 individuals (5.75 percent of total individuals) of San

Clemente Island paintbrush. San Clemente Island Indian paintbrush occurrences within the IOA would be exposed to increased foot traffic associated with Battalion Landings under the proposed action. However, San Clemente Island Indian paintbrush is a small shrub and is unlikely to be affected by occasional foot traffic. Any effects of foot traffic on a local occurrence of this species would be dispersed (because the Marines would be spread out), minor (trampled leaves or broken branches), infrequent (up to twice per year, generally less) and temporary. Marines will generally travel in a dispersed pattern during the proposed training activities, and the small and generally temporary direct effect that this dispersed foot travel would have on plants is not expected to have a significant impact on the species. The increased foot traffic could, however, result in increased spread of non-native plant species, discussed in more detail below.

Indirect effects could occur to San Clemente Island Indian paintbrush within Horse Beach Canyon from increased use of Horse Beach Canyon Road. San Clemente Island Indian paintbrush occurrences in Horse Beach Canyon are located downslope of Horse Beach Canyon Road, which is currently a poorly maintained dirt road, but is proposed for significant increases in vehicle use as part of the Assault Vehicle Maneuver Corridor. Based on information provided in the BA, approximately 656 assault vehicle trips up and down Horse Beach Canyon Road could occur, with vehicles entering and exiting at TAR 21, and travelling well inland. Assault vehicles are large vehicles, many of which are tracked. The EFV weighs approximately 76,000 pounds (AAAV EIS). Increased travel along Horse Beach Canyon Road may result in erosion problems or transport of non-native plant material into Horse Beach Canyon, especially since the canyon lies downslope from the road.

One of the most significant ecological effects that vehicular routes have on soils in desert regions involves changes in water runoff patterns. Vehicular routes that run straight up hillslopes can promote soil erosion and the development of rills and gullies. Vehicular routes that run parallel to elevation contours can also alter runoff patterns by redirecting water along roadside ditches to low points along the road, after which water continues on downslope in a more concentrated stream than otherwise would have occurred. This process concentrates channels at higher slope positions (Montgomery 1994), resulting in more elongated first-order drainage basins, and accelerated rates of soil erosion (Forman and Alexander 1998). Vehicular routes with dirt surfaces can also be a significant source of dust, which can have significant effects on plant vigor downwind from vehicle activity. Dust is likely to be generated on Horse Beach Canyon Road during training activities that use heavy assault vehicles. Whether such dust could accumulate on plants in Horse Beach Canyon is unknown, but given the prevailing wind direction, downwind dust deposition appears likely.

The potential effects of erosion on San Clemente Island Indian paintbrush will be minimized through the Navy's commitment to develop an erosion control plan and finalize AVMA, AMP, and AFP areas based on field review with soil erosion experts and military personnel, such that operational areas minimize inclusion of steep slopes and drainage heads. The erosion control plan will include portions of China Point Road and Horse Beach Canyon Road that are within the IOA. The goals of the plan would be to: (1) minimize soil erosion within each of these

operational areas and minimize offsite impacts; (2) prevent soil erosion from adversely affecting federally listed or proposed species or their habitats; (3) prevent soil erosion from significantly impacting other sensitive resources, including sensitive plant and wildlife species and their habitats, jurisdictional wetlands and non-wetland waters, and the Area of Special Biological Significance (ASBS) surrounding the island. The Navy will also develop and implement a project to monitor for erosion, dust generation, and deposition of dust in habitats adjacent to the AVMA, AMP, AFP, and amphibious landing sites. If the erosion control plan and monitoring project are implemented prior to the increased activities outlined in the proposed action, we expect adverse effects to the paintbrush from erosion and/or dust to be minimized in the AVMA, AMP, and AFP areas, and avoided in the Horse Beach Canyon Road area.

To reduce the potential for transport of invasive plants to the island, military and non-military personnel will be asked to conduct a brief check and remove any visible plant material, dirt, or mud on equipment and shoes, prior to coming to San Clemente Island. Tactical ground vehicles will be washed of visible plant material, dirt and mud prior to embarkation for San Clemente Island (The washing procedure is not required for amphibious vehicles after 15 minutes of self-propelled travel through salt water prior to coming ashore on San Clemente Island).

Invasive Plant Species

Invasive species, such as non-native grasses, could affect San Clemente Island Indian paintbrush through competition, effects on host plants, or effects on fire frequency. For example, invasion of grasses may alter fire frequency by rapid production of highly flammable fuel, thus leading to more frequent fires and potentially to conversion of shrub lands to grasslands (D'Antonio and Vitousek 1992).

Vehicular routes are a primary pathway for plant invasions into arid and semi-arid ecosystems (Johnson *et al.* 1975; Amor and Stephens 1976; Brooks and Pyke 2001; Gelbard and Belnap 2003). Vehicles serve as dispersal vectors for alien plant propagules (Clifford 1959; Schmidt 1989; Lonsdale and Lane 1994), and disturbances within vehicular route corridors facilitate establishment of invading ruderal plants (Greenberg *et al.* 1997). Increased use of Horse Beach Canyon Road is likely to create conditions that will allow establishment of invasive plant species adjacent to the San Clemente Island Indian paintbrush population in Horse Beach Canyon.

To reduce the potential for invasive plant species establishment and spread in San Clemente Island Indian paintbrush habitat, the Navy will monitor for invasive non-native plant establishment within TAR 21 and along the edges of China Road and Horse Beach Canyon Road, including the IOA. If invasive plant species are identified, the Navy will control them to prevent their spread into Horse Beach Canyon. Specifics of the monitoring and control will be developed in coordination with the Service and initiated prior to the Navy conducting the new activities proposed in the BA. Monitoring and control measures will be in accordance with safety requirements, which are currently under Navy review. Because of access restrictions described below, invasive plant removal within Horse Beach Canyon and China Canyon is not proposed.

The Navy has also committed to continue invasive exotic plant species control on an island-wide scale. The focus of the invasive exotic plant control program will continue to be the control of highly invasive exotic plants that have the potential to adversely impact habitat for federally listed species in known locations and the early detection and eradication of new occurrences of such species.

Access Restrictions

In 2006, the Navy began to review access policies within Impact Areas, and initiated restricted access into some areas of San Clemente Island due to elevated safety concerns. Until this time, Horse Beach Canyon, China Canyon, China Beach, Pyramid Beach, and other areas that lie within Impact Area boundaries had been periodically surveyed for natural resources for over 20 years. Initial access restrictions required that surveyors obtain EOD escort or clearance prior to surveys. Policy was signed in 2006 that allowed access into Impact Areas for target placement and range maintenance, but biological monitoring and archaeological monitoring were not allowed within Impact Areas under this policy. The Navy proposes to continue the policy that excludes Impact Area access for biological monitoring as part of the proposed action. Thus, safety concerns and resulting access policies will preclude the ability to monitor and manage approximately 16-17 percent of the San Clemente Island Indian paintbrush occurrences on San Clemente Island (*i.e.*, the occurrences in Impact Areas I and II).

Conclusion

After reviewing the current status of San Clemente Island Indian paintbrush, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of San Clemente Island Indian paintbrush. We have reached this conclusion for the following reasons

- (1) About 44 percent of San Clemente Island Indian paintbrush occurrences are outside areas subject to significant training activities, and only 16-17 percent of occurrences are within areas where San Clemente Island Indian paintbrush is likely to be adversely affected (*i.e.*, Impact Areas I and II and AFP 1). The presence of San Clemente Island Indian paintbrush outside the Impact Areas and training areas will help to ensure survival of this narrowly-restricted island species. In addition, the Navy through their proposed conservation program will implement monitoring and management actions for San Clemente Island Indian paintbrush occurrences outside of the Impact Areas to support recovery of the species;
- (2) Increased ordnance use in Impact Areas has the potential to impact 16-17 percent of the San Clemente Island Indian paintbrush occurrences; however, the Navy has committed to target placement that will minimize damage or destruction of individual occurrences of this plant. With these measures, we anticipate no significant change in

the distribution of the San Clemente Island Indian paintbrush population in the Impact Areas as a result of increased ordnance use.

- (3) The Navy will minimize the potential impacts from increased invasive species establishment by conducting invasive species control along China Road, Horse Beach Canyon Road, the IOA adjacent to these roads, and within TAR 21 to the maximum extent possible given safety constraints in the area;
- (4) The Navy will minimize the potential impacts from increased fire frequency by implementing a FMP and develop an erosion control plan to address potential effects of erosion and/or dust on the San Clemente Island paintbrush occurrences near the AVMA, AMP, AFP, and in the Horse Beach Canyon Road area; and
- (5) The San Clemente Island Indian paintbrush has substantially increased in numbers and distribution since the time of its listing primarily due to conservation actions supported by the Navy (*e.g.*, removal of feral grazing animals, invasive plant management); with continuation of the Navy's conservation program for San Clemente Island, including actions to promote the recovery of listed plants such as the San Clemente Island Indian paintbrush, we anticipate effects of the proposed action will be offset and will not result in an appreciable reduction in the numbers, reproduction, or distribution of San Clemente Island Indian paintbrush.

San Clemente Island larkspur (*Delphinium variegatum* var. *kinkiense*)

Status of the Species

Listing Status

The San Clemente Island larkspur was listed as an endangered species on August 11, 1977, and subsequently addressed in the Channel Islands Recovery Plan (Service 1984). Critical habitat has not been designated for this species.

Species Description

San Clemente Island larkspur is an herbaceous perennial in the buttercup family (Ranunculaceae) that flowers from March to April (California Native Plant Society 2001). It grows 14 to 85 cm (6 to 33 in.) in height, but generally is less than 50 cm (20 in.) tall (Warnock 1993). The flowers are light blue to white and are bilateral with five petal-like sepals and four smaller petals. The uppermost sepal is a straight or downcurved spur that is characteristic for the genus. Flowers are borne along branched flower stalks typically bearing less than 12 flowers (Warnock 1993; Junak and Wilken 1998). Leaves are generally found along the lower one-third of the stem and have overlapping lobes that radiate from hairy petioles. The fruit is a follicle (dry, pod-like structure with a single suture), with up to three follicles possible per flower (Junak and Wilken 1998).

Each follicle bears many winged seeds that are likely wind dispersed when the fruit passively splits open (Junak and Wilken 1998).

San Clemente Island larkspur is one of three subspecies of *D. variegatum* and one of two that are found exclusively on San Clemente Island (Dodd and Helenurm 2002). The other subspecies restricted to the island, *D. v. ssp. thornei* (Thorne's larkspur), is the only other taxon within the genus found on San Clemente Island (U.S. Navy 2001). The third subspecies, *D. v. ssp. variegatum* (Royal larkspur), is found exclusively in mainland California and ranges from the coast to the foothills in central and northern California (Dodd and Helenurm 2002).

Three floral characters, sepal color, lateral sepal length, and lower petal blade length, are used to distinguish the subspecies (Dodd and Helenurm 2000). In general, Royal larkspur differs from the two island subspecies by having darker (deep versus bright or light blue) flowers and shorter lower petal blades (Dodd and Helenurm 2000). The island subspecies are distinguished by Thorne's larkspur having bright blue (*i.e.* darker), slightly larger flowers than San Clemente Island larkspur (Dodd and Helenurm 2000; Warnock 1993). Thorne's larkspur also generally occurs in the southern portion of San Clemente Island while San Clemente Island larkspur generally is found in the northern portion of the island (Dodd and Helenurm 2000).

Dodd and Helenurm (2000) found there is broad variation within populations and substantial overlap among the subspecies for the three floral characters, with the two metric characters, lateral sepal length and lower petal blade length, providing no clear distinction between taxa. Of the floral characters, sepal color appears to be the least ambiguous for differentiating the subspecies, but it may still be problematic for the island subspecies where central populations contain both light and dark individuals as well as individuals of intermediate color (Dodd and Helenurm 2000; Dodd and Helenurm 2002). Because natural hybridization has been documented to occur regularly among other taxa in the genus, the intermediate character of central populations suggests there may be hybridization among the subspecies in these populations (Dodd and Helenurm 2002).

Habitat Affinities

The San Clemente Island larkspur is endemic to San Clemente Island and is found within mid- to high-elevation grasslands on the east side of the northern and central portions of the island where it occurs in clay, loam and rocky soils. This vegetation community is recovering following a long period of over-grazing by introduced mammalian herbivores but continues to exhibit the legacy of overgrazing in the form of accelerated erosion and the dominance in many areas of naturalized invasive alien species, particularly exotic annual grasses. Although currently not widespread, the colonization of clay grasslands by coyote brush may reduce habitat suitability over the long term in some areas.

Life History

Some species of *Delphinium* are self incompatible (Waser and Price 1983 from Junak and Wilken 1998), but the mating system for *D. v. kinkiense* remains poorly understood. Dodd and Helenurm (2002) conclude from their study of genetic variability among populations of *D. variegatum* that the two insular subspecies (*D. v. ssp. kinkiense* and *D. v. ssp. thornei*) are largely outcrossing with a pattern of near random mating.

Outcrossing rates for the mainland subspecies (*D. v. variegatum*) indicate that it sustains higher levels of inbreeding (Dodd and Helenurm 2002). Pollinators that have been observed on San Clemente Island larkspur include a large black and white solitary bee (Evans and Bohn 1987) and a bumblebee (*Bombus*) (Junak and Wilken 1998).

Junak and Wilken (1998) estimated the number of flowers and fruits per inflorescence in three populations of San Clemente Island larkspur and studied the viability and germination of seeds collected from a single population. They found on average from 64.5 to 78.5 percent of flowers produce fruits, and there were a significantly greater number of flowers than fruits. This is consistent with self-incompatibility and/or a requirement for insect mediated pollination (Junak and Wilken 1998). They also found that that seed germination (43 percent) was not significantly less than viability (53 percent) when analyzed around 20 weeks following collection. They concluded that recruitment does not appear to be limited by fruit production. In contrast with the results of Junak and Wilken (1998), Evans and Bohn (1987) were unsuccessful getting freshly collected seeds to germinate. This may be due to a requirement for seeds to go through a period of dormancy prior to germination (Evans and Bohn 1987; Junak and Wilken 1998).

During efforts to collect seed for the purposes of plant propagation, Evans and Bohn (1987) found seed predation to be heavy in one population of San Clemente Island larkspur. They found holes chewed through the bottom portion of seed capsules, but they were unable to ascertain the identity of the seed eater. During their survey efforts, Junak and Wilken (1998) have not seen evidence of seed predation.

Rangewide Distribution and Threats

Since the San Clemente Island larkspur's entire distribution is restricted to the action area of San Clemente Island, its island-wide distribution and current threats to the species are discussed in the Environmental Baseline section below.

Conservation Needs

A recent 5-year review of the status of San Clemente Island larkspur (Service 2006b) identified the following conservation needs for this species.

- (1) Following the recommendation of Dodd and Helenurm (2002) perform further taxonomic study on *D. v. kinkiense* and *D. v. thornei* to determine whether these taxa have been correctly designated as subspecies.
- (2) Develop and implement a species reintroduction program in coordination with San Clemente Island restoration actions to accelerate the recovery of this species. Such a plan should use genetic and geographic information to prevent the loss of genetic integrity, if warranted, between the two island subspecies.
- (3) Control erosion within island grasslands, with priority given to locations where erosion may be threatening specific occurrences of San Clemente Island larkspur.
- (4) Perform additional ecological studies to determine what species may be eating seeds of San Clemente Island larkspur and whether seed predation is a significant threat to the recovery of this species.
- (5) Work with the Navy to develop a program to monitor the status of San Clemente Island larkspur populations to better understand population dynamics and track the recovery of the species. Directed sensitive plant surveys should also continue to be implemented every several years to document new occurrences and further range expansions.
- (6) Study the effect of fire on San Clemente Island larkspur and establish appropriate fire management goals for island grasslands that are sensitive to this species.

Environmental Baseline

Distribution

The distribution of San Clemente Island larkspur is restricted to San Clemente Island. At the time of listing in 1977, San Clemente Island larkspur was known from only two occurrences. During sensitive plant surveys performed in 1996 and 1997, Junak and Wilken (1998) documented 16 occurrences of San Clemente Island larkspur totaling 5,400 individuals and ranging in size from 7 to 1,450 individuals (median = 200, mean = 337). The majority of occurrences were located east of TARs 14 and 15 where these ranges overlap with the proposed VC-3 AVMA. In 2003, Junak (2006) documented one additional occurrence of San Clemente Island larkspur supporting about 200 individuals. Dodd and Helenurm (2000, 2002), also performed fieldwork in 1996 and documented 10 occurrences of San Clemente Island larkspur (range of individuals = 16 – 2,500, median = 200, mean = 584) and three locations where they suspect there are mixed populations of San Clemente Island and Thorne's larkspur (range of individuals = 200 – 1,000, median = 350, mean = 517).

Although the precise survey locations of Dodd and Helenurm (2000, 2002) are needed to accurately quantify the number of known occurrences for the species, it appears that, since

removal of feral mammalian herbivores, around 9,500 individuals have been documented from 24 locations supporting just San Clemente Island larkspur and an additional 1,550 plants of mixed and possibly hybridizing genealogy occur in three locations where the two island subspecies are suspected to co-occur. Because survey efforts have focused on documenting new occurrences of San Clemente Island larkspur, there is little information for directly inferring population trends. However, the one population that has been tracked has expanded from one plant to several hundred individuals. The discovery of 26 occurrences in 1996-1997 (Junak and Wilken 1998; Dodd and Helenurm 2000), an additional occurrence in 2003 (Junak 2006), and two additional occurrences in 2006-2007 (Tierra Data, Inc. 2008) further suggests that San Clemente Island larkspur has made modest but appreciable gains since the removal of feral goats and pigs from the island in the early 1990's. Although estimates of the number of occurrences vary depending on the criteria used to define them, all current occurrences of San Clemente Island larkspur are estimated to comprise a total of 7,389 individuals (U.S. Navy 2008a).

With the exception of one disjunct southernmost occurrence, all the occurrences are generally continuously scattered from north to south at varying distances along 12 km (7.45 mi.) of the high plateau above the eastern escarpment of the island. Within this area, 17 northern occurrences are approximately 3 km (1.9 mi.) away from 9 occurrences that are focused towards the central portion of the island. The single disjunct occurrence is found about 12.4 km (7.7 mi.) to the south of the closest neighboring occurrence, near the southern tip of the island above Pyramid Head.

Among the nine occurrences in the central portion of the island, three are suspected of supporting mixed populations and possible hybrids of *D.v. kinkiense* and *D.v. thornei* (Dodd and Helenurm 2002). Because the latter species is generally distributed towards the southern portion of San Clemente Island (Dodd and Helenurm 2000, 2002), the southernmost occurrence of *D.v. kinkiense* at Pyramid Head appears somewhat anomalous given the predominance of *D.v. thornei* toward this end of the island. However, historical records suggest San Clemente Island larkspur may also have once been found in another location towards the southern end of the island within Mosquito Canyon (U.S. Navy 2001). Whether this represents a natural portion of the species range or represents an area of possible introduction by animals or man is unknown.

Many of the San Clemente Island larkspur occurrences are clustered in proximity to one another, suggesting that these occurrences may be ecologically and genetically related to one another. The California Natural Diversity Database (CNDDB) attempts to capture this relationship by defining an occurrence as "...any population or group of nearby populations located more than 0.25 miles [400 meters] from any other population" (p. iii, California Department of Fish and Game, Natural Diversity Database, August 2006). While this is an arbitrary mapping standard, in the absence of specific information about seed dispersal and pollinator movement distances, botanists occasionally use it for grouping occurrences mapped at a finer scale to obtain an indication of the number of functional "populations" there may be for a species. The effects analysis below is based on effects to clusters of occurrences as described by the CNDDB rather than individual occurrences documented by biologists. To avoid confusion, the clustered

occurrences described by CNDDDB will be referred to as “clusters.” Using CNDDDB’s definition, there are 11 clusters of San Clemente Island larkspur on the island as opposed to 29 occurrences.

Threats

Several threats exist for San Clemente Island larkspur including erosion, competition with invasive plant species, modification of San Clemente Island habitats by military activities, and unnaturally high fire frequencies. Within the known range of San Clemente Island larkspur, some occupied slopes appear sheetwashed with severe piping and gullying nearby, presenting a threat from erosion (Kellogg and Kellogg 1994).

Competition within grasslands dominated by exotic annual grasses and other introduced plant species may also be a factor limiting the distribution of the species (U.S. Navy 2001). A number of non-native plant taxa have been found in association with San Clemente Island larkspur including: Australian saltbush (*Atriplex semibaccata*), wild oat (*Avena fatua*), ripgut brome (*Bromus diandrus*), foxtail brome, storks bill (*Erodium moschatum*), smooth colts ear (*Hypochaeris glabra*), common catchfly (*Silene gallica*), common sow thistle (*Sonchus oleraceus*), and sand spurrey (*Spegularia villosa*) (Junak and Wilken 1998). Many of these species, particularly including the exotic annual grasses, are likely to be permanently established within island grasslands (Kellogg and Kellogg 1994).

Periodic foot traffic associated with NSW training may occur within the species habitat in TAR 14 and TAR 15. Baseline levels of foot traffic are infrequent (8 Special Warfare operations at TAR 14 and 15 under baseline conditions) and entail small groups moving across the landscape.

Invasive plant species, established and spread on the island as a result of past and ongoing human uses overlap the range of this species under baseline conditions and may compete with the species for light, nutrients, and moisture under baseline conditions. The Navy is conducting invasive species control efforts on San Clemente Island; however, many of the invasive species that dominate San Clemente Island larkspur habitat, (*e.g. Avena sp*) are not addressed under the current invasive species control efforts.

A number of fires have been recorded since 1979 within the range of San Clemente Island larkspur. High fire frequency, such as is found in particular within the southern portion of the species range in and adjacent to SHOBA, is a potential threat that could limit the distribution of the larkspur by overwhelming its tolerance threshold to fire.

Conservation Actions

The appearance of around 25 new occurrences (9 new clusters) of San Clemente Island larkspur since the early 1990s suggest this species is responding favorably to the removal of feral herbivores from San Clemente Island.

The Navy's INRMP contains the following objective relevant to the protection of San Clemente Island larkspur: "[To] protect, monitor, and restore plants and cryptogams in order to manage for their long-term sustainability on the island" (U.S. Navy 2001). Associated with this objective are a number of proposed management strategies that include: consideration of San Clemente Island larkspur as a "management focus plant" such that it is considered independently from its associated plant community for management; conducting status surveys for this species; ensuring that management focus plants have a network of suitable sites; performing pollination studies on San Clemente Island larkspur; and continuing to apply genetic research and management approaches to its management.

Other INRMP strategies targeted towards loam and clay grasslands, in which San Clemente Island larkspur occurs, include: control erosion, with priority given to locations where erosion may be lowering the water table and affecting listed species such as the San Clemente Island larkspur; improve the dominance of needlegrass and other native herbaceous species; reduce exotic plant cover from 1992-1993 baseline levels; manage fire intervals and patch size with a preliminary target of a 5-year minimum return interval and 121-ha (300-ac) patch size; allow patches of coyote brush to fluctuate naturally; and experiment with fire management to improve native plant dominance while protecting sensitive plant populations.

Todate, a number of the INRMP management strategies, or aspects of them, have been implemented. The Navy has implemented rare plant surveys that have documented new occurrences of San Clemente Island larkspur. Genetic research and natural history studies have also been performed. Concerted efforts have been made to control escape of fire from military training activities. However, other objectives have not yet been achieved, such as reducing the percent cover of invasive plants from 1992-93 baseline conditions (K. O'Connor pers. comm. 2006).

Effects of Action

The majority (8 of 11) of San Clemente Island larkspur clusters are located outside any training areas. However, 3 clusters lie within the IOA, and approximately 4 of 11 clusters lie within 0.8 km (0.5 mi.) northeast of TARs 14 and 15 and the proposed VC-3 AVMA. Proposed training and fire management activities may adversely affect this species primarily as a result of fires, fire management and suppression, and vehicle and foot traffic.

Fires

Ordnance use is proposed within TAR 14 and 15. While no San Clemente Island larkspur occur within the boundaries of these TARs, four clusters are within about 0.8 km (0.5 mi.) of the boundary to TAR 14 and 15. These TARs are located upwind from larkspur locations under prevailing wind conditions. Ordnance is not used in these areas under baseline conditions, so a historical pattern of fires is not available to provide projections on the number of ignitions or extent of fires that may be expected as a result of proposed use.

The Navy has conducted fire modeling of training use at TARs 14 and 15. Based on the modeling, fires ignited in this area could spread into San Clemente Island larkspur clusters especially during nighttime hours when fire suppression would be more difficult, affecting approximately 3 of the 11 clusters and 5,000 individuals 12 hours after ignition under moderate fire conditions. However, this is anticipated to be unlikely under implementation of the FMP because ignitions would occur in grassland habitat in accessible terrain where fire suppression is most feasible.

Based on the species life history, which includes dormancy during dry conditions, plants may be dormant during drier conditions during which fire is most likely. The California Channel Island Species Recovery Plan (Service 1984) states that “[F]ield observation following fire suggests that this species is adapted to fire during its dormant period” (p. 53). However, not much else is known regarding the tolerance of this species to fire, such as what the mechanism is for regrowth (*e.g.* from resprouts or seed) and what minimum fire return interval the species can tolerate. If underground storage roots survive fires, plants could benefit from added nutrients, canopy opening and other aspects of altered competitive status created by an appropriately timed burn. If fires occur when plants are active, they could affect seed set and kill plants. If fires are intense, they could also affect the viability of underground storage roots.

To address the potential for ignition, the Navy has proposed to align training with vegetation and weather conditions and stage adequate resources to suppress fires as part of a FDRS. In addition, the FMP incorporates a series of increasing precautions and fire suppression measures related to increasing FDRS ratings. These measures include: 1) having a fully equipped and staffed fire truck positioned within line of sight of the TAR and action area and having the ability to be on scene and pumping water within 10 minutes of an ignition report, whenever any type of incendiary ordnance is used; and 2) at higher danger ratings, imposing restrictions on the use of demolitions or other flame or heat producing ordnance, including flares, tracers, and pyrotechnics, during daytime hours except under specific conditions.

The Navy’s fire management practices are anticipated to minimize ignitions as well as the spread of fires. The proposed action also includes a Navy commitment to conduct an annual review of fire management and fires that will allow adaptive management, if required. Once live-fire and demolition training commences in TAR 14 and TAR 15, a better understanding of the likely fire patterns associated with range use will emerge. The Navy will also evaluate the potential impacts of fire on the San Clemente larkspur.

Fire Management and Suppression

Fire management may entail future creation of fuelbreaks in areas that support San Clemente Island larkspur. No specific fuelbreak locations have been proposed in the vicinity of this species to date. If fuelbreaks are created using Phos-Chek or herbicide, as proposed within the project description, San Clemente Island larkspur individuals that lie within the fuelbreak footprint could be destroyed. The use of Phos-Chek may also favor the expansion of non-native species due to the fertilizing effect of this retardant. Since the boundaries of future fuelbreaks

have not yet been identified, we anticipate that the Navy will consult with the Service regarding any future plans to establish fuel breaks with the potential to impact San Clemente Island larkspur. Thus, the impacts of new fuelbreaks on San Clemente Island larkspur are not considered in this analysis.

Vehicle and Foot Traffic

Proposed training activities would include new and significant increases in vehicle and foot traffic entering and exiting the IOA and VC-3 AVMA, both from the water and from elsewhere on San Clemente Island. The majority of San Clemente Island larkspur clusters are located outside any training areas. However, three (25 percent of the San Clemente Island total) of the 11 clusters are located within the boundaries of the IOA, and downhill from the proposed VC-3 AVMA. The most intensive use of the IOA would occur two times per year during a 4-day Battalion Sized Landing operation during which 1,500 troops would proceed up the island. Of the personnel involved in the Battalion Sized Landing, approximately half would be traveling in vehicles. The remaining personnel (approximately 750) would travel up the IOA corridor on foot and bivouac at locations en route to SHOBA Impact Areas.

Based on an erosion study by the Navy (2008), the three larkspur clusters in the IOA are within watersheds that could experience erosion as a result of assault vehicle use of the VC-3 AVMA. The erosion study indicates that 251 individuals within one cluster lie within the watershed most likely to receive any offsite impacts associated with erosion. To address erosion problems, the Navy proposes to develop and implement an erosion control plan in coordination with the Service to minimize the potential for erosion problems beyond the AVMA boundaries and reduce the potential for impacts to listed species. The Navy will also develop and implement a project to monitor for erosion, dust generation, and deposition of dust in adjacent habitats. If the erosion control plan and monitoring project are implemented prior to broader uses of the proposed AVMA outlined in the proposed action, we do not expect adverse effects to these 251 individuals.

Vehicular routes are also a primary pathway for plant invasions into arid and semi-arid ecosystems (Johnson *et al.* 1975; Amor and Stephens 1976; Brooks and Pyke 2001; Gelbard and Belnap 2003). Vehicles serve as dispersal vectors for alien plant propagules (Clifford 1959; Schmidt 1989; Lonsdale and Lane 1994), and disturbances within vehicular route corridors facilitate establishment of invading ruderal plants (Greenberg *et al.* 1997). Vehicle use at the VC-3 AVMA and IOA is likely to create conditions that will allow establishment of invasive plant species within the upper watershed of the three downhill three larkspur clusters.

Vehicular routes with dirt surfaces can also be a significant source of dust, which can have significant effects on plant vigor downwind from vehicle activity. Approximately two larkspur clusters within the IOA close to Ridge Road and VC-3 AVMA are likely to experience impacts associated with dust due to vehicle use.

To reduce the potential for transport of invasive plants to the island, military and non-military personnel will be asked to conduct a brief check and remove any visible plant material, dirt, or mud on equipment and shoes, prior to coming to San Clemente Island. Tactical ground vehicles will be washed of visible plant material, dirt and mud prior to embarkation for San Clemente Island. (The washing procedure is not required for amphibious vehicles after 15 minutes of self-propelled travel through salt water prior to coming ashore on San Clemente Island.)

The Navy proposes to implement the following additional measures to avoid and/or minimize impacts to listed species from vehicle use in these areas: 1) surveying for federally listed and sensitive plant species; 2) conducting periodic monitoring of these areas as part of vegetation/habitat and sensitive species survey updates for the INRMP; 3) briefing military units on maneuver area boundaries prior to conducting operations; and 4) conducting assault vehicle travel or maneuvering only within these boundaries.

Foot traffic associated with Battalion Sized Landing could result in damage to individual larkspur plants if they are trampled; however, personnel participating in this training exercise travel in a dispersed fashion, which would minimize the number of people that would travel over any one spot, and thereby reduce the potential for significant impacts to the larkspur. Damage that could occur would be expected to be minor and would have little potential to affect an entire cluster due to the dispersed nature of the personnel traversing the island. San Clemente Island larkspur could be affected by foot traffic only during its winter-spring season of growth when foliage is above ground. The rest of the year plants would not be directly affected, since they exist as dormant storage roots and dormant seed. Marines will generally travel in a dispersed pattern during the proposed training activities, and the small and generally temporary direct effect that this dispersed foot travel would have on plants is not expected to have a significant impact on the species.

Invasive Plant Species

Invasive plant species are likely to be introduced to San Clemente Island by ongoing and increased training activity on the island and are also likely to be spread by increased movement of people, equipment, and vehicles. Vehicular routes are also a primary pathway for plant invasions into arid and semi-arid ecosystems (Johnson *et al.* 1975; Amor and Stephens 1976; Brooks and Pyke 2001; Gelbard and Belnap 2003). Vehicles serve as dispersal vectors for alien plant propagules (Clifford 1959; Schmidt 1989; Lonsdale and Lane 1994), and disturbances within vehicular route corridors facilitate establishment of invading ruderal plants (Greenberg *et al.* 1997). Invasive species are widely recognized as a leading cause of species loss world wide second only to direct habitat loss and fragmentation (Pimm and Gilpin 1989). Island ecosystems and species are especially vulnerable to invasion (Mack *et al.* 2000). Invasive species may affect ecosystem processes. For example, invasion of grasses may alter fire frequency by rapid production of highly flammable fuel, thus leading to more frequent fires and eventual conversion of shrub lands to grasslands (D'Antonio and Vitousek 1992). Non-native invasive species may compete with San Clemente Island larkspur for nutrients, water, or sunlight. Spread of invasive species from inadvertent introductions caused by vehicular or foot

traffic could adversely affect this species given its proximity to TAR 15, VC-3 AVMA, and the IOA. San Clemente Island larkspur clusters lie downhill from the proposed VC-3 AVMA and invasive species may become established by the downslope movement of seeds and water into these clusters.

The Navy proposes to monitor for invasive plant species, especially around the AVMC, including AVMA, so we anticipate that monitoring may detect invasions to allow subsequent treatment. In addition, ongoing monitoring of the San Clemente Island larkspur population will allow identification of any emergent weed issues and allow management to occur. The Navy has also committed to continue invasive exotic plant species control on an island-wide scale. The focus of the invasive exotic plant control program will continue to be the control of highly invasive exotic plants that have the potential to adversely impact habitat for federally listed species in known locations and the early detection and eradication of new occurrences of such species.

Conclusion

After reviewing the current status of San Clemente Island larkspur, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of this species. We have reached this conclusion for the following reasons:

- (1) The majority (8 of 11) of San Clemente Island larkspur clusters are located outside any training areas;
- (2) Although three of the eleven clusters of San Clemente Island larkspur are located within the boundaries of the IOA, the area would be used by large numbers of people only two times per year, reducing the potential for significant long term direct effects to the clusters within the IOA;
- (3) The Navy will minimize the potential impacts from increased invasive species establishment by conducting invasive species control;
- (4) San Clemente Island larkspur is likely to withstand low intensity fires when the species is dormant and may benefit from such fires due to reduced competition and canopy opening. In addition, we expect that implementation of the FMP in coordination with the Service will limit the frequency of fires within San Clemente Island larkspur habitat, including the four clusters within 0.8 km (0.5 mi.) of TAR 14 and 15 and the AVMA. We anticipate that through its annual review process, the Navy will identify mechanisms to reduce fire return interval within areas to the east of TAR 14 and TAR 15 if San Clemente Island larkspur clusters experience repeated fires;

- (5) One cluster of San Clemente Island larkspur containing 251 of 9,500 individuals on the island may be at increased risk of offsite erosion impacts associated with use of the proposed VC-3 AVMA. We anticipate that erosion-related impacts will be minimized through implementation of an Erosion Control Plan in coordination with the Service;
- (6) The San Clemente Island larkspur has increased in numbers and distribution since the time of its listing primarily due to conservation actions supported by the Navy (*e.g.* removal of feral grazing animals, invasive plant management); with continuation of the Navy's conservation program for San Clemente Island, including actions to promote the recovery of listed plants such as the larkspur, we anticipate effects of the proposed action will be offset and will not result in an appreciable reduction in the numbers, reproduction, or distribution of the San Clemente Island larkspur.

San Clemente Island broom (*Lotus dendroideus* var. *traskiae*)

Listing Status

San Clemente Island broom was listed as endangered on August 11, 1977 (42 FR 40682) and subsequently addressed in the Channel Islands Recovery Plan (Channel Islands Recovery Plan)(Service 1984). Critical habitat has not been designated for this species.

Species Description

San Clemente Island broom is a semi-woody, short-lived (less than 5 years), subshrub in the legume family (Fabaceae). This shrub is typically less than 1.2 m (4 ft) in height with slender, erect green branches (Munz 1974). Its leaves have 3 to 5 leaflets, each approximately 0.64 cm (0.25 in) long. San Clemente Island broom has relatively small, yellow, bisexual flowers that radiate in 1 to 5 flowered groupings from flower stalks that arise from the leaf axils (between the stem and leaf) of terminal shoots (Junak and Wilken 1998). Pistils (female reproductive structures of the flower including an ovary and pollen receiving structure) are initially yellow but, with age, turn orange then red (Service 1984). Flowers are present from March through May, and in several locations, halictid bees, bumblebees, and small beetles have been observed foraging on the flowers (Allan 1999; Junak and Wilken 1998). This variety differs from other varieties of *Lotus dendroideus* in having greatly elongated fruits (Allan 1999). The fruits do not split open to release their seeds at maturity (Isely 1993).

Habitat Affinities

San Clemente Island broom is endemic to San Clemente Island (Isely 1993) and is one of five representatives of the genus *Lotus* found on the island (U.S. Navy 2002). The species occurs on north-facing slopes, canyon bottoms, or ridgelines (Junak 2006). It grows somewhat colonially around rock outcrops in grassy areas or along the interface between grassland and maritime sage scrub (Allan 1999; U.S. Navy 2002). It occurs below 396 m (1,300 ft) elevation in well-drained

soils, but where more soil moisture is available. Based on vegetation mapping for the San Clemente Island INRMP (U.S. Navy 2002), San Clemente Island broom is associated with canyon woodland and maritime desert scrub along the northeast escarpment.

Life History

A study by Junak and Wilken (1998) found that, on average, a single San Clemente Island broom individual can produce approximately 36 to 64 flowering shoots, 118 to 144 flowers per shoot, and 4 to 6 seeds per fruit. These data suggest that under ideal conditions, an individual of this species can produce a high volume of seeds (16,000 or more). Because individual plants have a life span of less than 5 years, it is suspected that populations persist through periodic recruitment from the soil seed bank (M. Wall pers. com. 2006).

Like most legumes, San Clemente Island broom seeds require some sort of scarification or gradual seed coat degradation for germination to take place (M. Wall pers. comm. 2006). Although germination is enhanced by hot water to soften the seed coat, this may not be true for dry heat (*e.g.*, fire). In fact, experiments conducted on other species at the Rancho Santa Ana Botanical Gardens indicate that heat above 93 degrees C (200 degrees F) can be detrimental to seeds (M. Wall pers. comm. 2006).

San Clemente Island broom has been known to hybridize with the more common, native island lotus, *Lotus argophyllus* var. *adsurgens*, but only in disturbed areas in Wilson Cove (Liston *et al.* 1990; Allan 1999). No documented evidence of hybridization has been recorded in either disturbed or undisturbed areas on other portions of the island.

Rangewide Distribution and Threats

Since the San Clemente Island broom's entire distribution is restricted to the action area of San Clemente Island, its island-wide distribution and current threats to the species are discussed in the Environmental Baseline section below.

Conservation Needs

A recent 5- year review of the status of San Clemente Island broom (Service 2007b) resulted in the following recommendations:

- (1) Study the range (frequency and intensity) of fire conditions that San Clemente Island broom individuals and its seed bank can withstand. Determine the fire interval at which San Clemente Island broom best survives and reproduces;
- (2) Conduct genetic research island-wide on individuals to determine if this species has high genetic variability among populations;

- (3) Follow up on research conducted by Liston *et al.* (1990) to determine if hybridization is a serious threat to the recovery of San Clemente Island broom;
- (4) Identify areas where erosion may be threatening San Clemente Island broom individuals and implement erosion control measures; and
- (5) Establish a non-native annual grass removal program in San Clemente Island broom habitats such that percent cover of these species decreases by at least 10 percent.

Environmental Baseline

Distribution

The distribution of San Clemente Island broom is restricted to San Clemente Island, and since the 1970s, the documented distribution of San Clemente Island broom has included north-facing slopes over most of the eastern and western sides of the island (Service 1984, U.S. Navy 2002, Junak and Wilken 1998, Junak 2006). As with other sensitive plant species on the island, surveys have focused on identifying new occurrences rather than tracking the status of previously recorded occurrences.

The earliest published information regarding population size for *Lotus dendroideus* var. *traskiae* can be found in the San Clemente INRMP, which states that 9 occurrences and 1,340 individuals were present on the island in 1980 (U.S. Navy 2002). The source of these data is unknown, and a distribution map is not provided. According to the Channel Islands Recovery Plan (Service 1984), by 1984 only six populations of San Clemente Island broom were known, and each was generally associated with rocky areas. The largest numbers of individuals were growing in the vicinity of Wilson Cove, which is located on the northwest side of the island. No specific abundance estimates were given.

Later surveys conducted in 1996 and 1997 documented a total of 64 occurrences of San Clemente Island broom, collectively comprising more than 3,000 individuals (Junak and Wilken 1998). Approximately 50 percent (1,492 of 3,064) of these individuals were found in Wilson Cove. Island-wide occurrences ranged from isolated plants to populations of 5 to 750 individuals. Individuals were found primarily on north-facing slopes, ridges (Junak 1996), or among large boulders situated in grassland areas (Allan 1999) between 8 m (25 ft) and 427 m (1,400 ft) in elevation. Eighty-three percent (53 of 64) of these occurrences were scattered along the eastern side of the island, where, due to prevailing winds and associated cloud cover and isolation, more humidity is probably available (U.S. Navy 2002). The remaining locations were clustered in the middle, western portion of the island.

More recent surveys for San Clemente Island broom were conducted between 2003 and 2006. Surveyors mapped 69 occurrences comprising approximately 6,570 individuals (Junak 2006). Occurrences ranged from isolated plants to a single population with 2,300 individuals. At a majority of the sites, plants had either flowers or fruits, suggesting that this taxon has adequate

resources for reproduction (Junak 2006). New occurrences were mainly concentrated on north-facing slopes along the southern two-thirds of the island on the eastern and western sides. These newer occurrences were sometimes in proximity to individuals detected during the 1996 and 1997 surveys. Additional surveys of the IOA conducted from 2006 through 2007 detected one new occurrence of approximately ten plants above the eastern escarpment in SHOBA (Tierra Data, Inc. 2008).

When combined, the 1996-1997 surveys and the 2003-2007 surveys suggest that San Clemente Island broom can currently be found in 147 locations and numbers approximately 9,674 individuals (U.S. Navy 2008a). This is a significant increase from the original population estimates in 1980 of 9 occurrences and 1,340 individuals. The currently known occurrences for this species now span the entire length of the island, with numerous occurrences documented in and around Wilson Cove, and one occurrence documented approximately 19 miles south near Pyramid Cove at the southern tip of the island (Junak and Wilken 1998, Junak 2006). The majority of the remaining occurrences tend to be clustered on north-facing slopes on the eastern side of the island.

As of 2006, on a broad scale 20 occurrences fell within SHOBA and 85 occurrences fell outside of SHOBA (Junak and Wilken 1998, Junak 2006). As of 2004, approximately 25 percent (2,030 of 7,900) of the San Clemente Island broom individuals could be found in the vicinity of Wilson Cove. Based on modifications made by the Navy during consultation to reduce the potential for impact to this species, of the occurrences near Wilson Cove, only 1 is in Tar 11, but 22 are within 305 m (1,000 ft) of TAR 11 (Figure 1). Three occurrences lie within Eagle Canyon, downhill but over 305 m (1,000 ft) from the boundary of proposed AFP 6. Fourteen locations are known from the IOA, and there is the potential for additional locations to be discovered there (U.S. Navy 2008). Thus, only 10 percent of the occurrences (*i.e.*, 15 out of 147) of this species lie in operational boundaries (1 in Tar 11 and 2 in the IOA), and another 17 percent (*i.e.*, 25 out of 147) lie within areas that may experience indirect effect from increased operation as a result of the proposed action.

Threats

Despite the improvement in the status of San Clemente Island broom evident by the increase in distribution and abundance of this species, this plant still faces threats including invasive plant species, erosion, military training activities and related fire, and potential hybridization with the more common *Lotus argophyllus* var. *adsurgens*. Invasive plant species may compete with San Clemente Island broom for water, light and nutrients. Non-native annual grasses were found associated with San Clemente Island broom in 69 percent of its locations in 1996 and 1997, and percent cover of these species was over 40 percent in San Clemente Island broom habitats. Non-native annual grasses may alter the prevalence of fire (Brooks 1999) that otherwise could affect the persistence of this species. Another non-native species, ice-plant (*Carpobrotus edulis*), also appears to be hindering the recovery of San Clemente Island broom (Allan 1999). This invasive species occupies large areas of Wilson Cove where it may be out-competing native species such as San Clemente Island broom for space, nutrients, and water (Allan 1999). Allan (1999) states that

the encroachment by ice-plant contributes to habitat destruction, which may lead to the long-term establishment of hybrid swarms between San Clemente Island broom and the more common *L. a.* var. *adsurgens*.

Erosion is evident on many gradual and steep slopes within and around Wilson Cove, including slopes that support the San Clemente Island broom. Military activities in the vicinity of Wilson Cove have the potential to adversely affect the species due to its proximity to facilities and the general level of human activity in the area. In one recent incident, personnel involved with a clean up project conducted scrap metal removal using heavy equipment within an occurrence of San Clemente Island broom located near Wilson Cove. The Navy is assessing the damage to the site, and level of impact to the species, and intends to remedy the loss to San Clemente Island broom (K. O'Conner pers. comm. 2008), although details pertaining to the extent of the damage to the occurrence and intended remedies have not been provided to the Service.

The San Clemente Island broom occurs in some areas of the island that may experience elevated fire frequency in SHOBA and TAR 11. The relationship between fire and the ecology of San Clemente Island broom has not been studied. Although fire may aid the dispersal of broom individuals (U. S Navy 2002), the most beneficial fire intervals and intensities are unknown. According to the species account provided in the INRMP, members of the genus *Lotus* "seed prolifically following fire" and "some regeneration after fire has been observed in this species" (U.S. Navy 2002). Because this species is short-lived and relies on its seed bank for recruitment, fire may create openings in the vegetation where San Clemente Island broom seedlings can become established. However, in areas that burn on a more frequent basis the seed bank may become depleted if individuals burn before they produce seeds. Although an individual plant has the ability to produce vast amounts of seed (Junak and Wilken 1998), the seed bank must be replenished on a regular basis to ensure the continued survival of this species.

Conservation Actions

Surveys conducted since the complete removal of non-native mammalian herbivores from San Clemente Island in 1992 indicate that San Clemente Island broom is increasing in both the number of locations and individuals. This suggests that a principle threat to the species was eliminated with the removal of non-native grazing animals from the island.

The San Clemente Island INRMP proposes an array of management strategies to address identified goals and objectives for specified management units and their natural resources. Of relevance to the protection of San Clemente Island broom, INRMP includes an objective to: "Protect, monitor, and restore plants and cryptogams in order to manage for their long-term sustainability on the island" (U.S. Navy 2002). Associated with this objective are a number of proposed management strategies that include the following: consideration of San Clemente Island broom as a "management focus plant" such that it is considered independently from its associated plant community for management; conducting status surveys for this species; ensuring that management focus plants have a network of suitable sites; performing pollination studies on San Clemente Island broom, and continuing to apply genetic research and management

approaches to its management. Other INRMP strategies targeted towards the terrace complex of maritime desert scrub, in which San Clemente Island broom occurs, include: accelerating the recovery of shrubs on terrace faces and flats; reducing the percent cover of invasive plants from the 1992-93 baseline of 41 percent on terrace faces and 53 percent on terrace flats; controlling erosion, particularly in association with active and abandoned roads; and establishing a preliminary fire return interval of 5 years in grassy areas and 10 years or longer in shrublands.

To date, concerted efforts have been made to control escape of fire from the Impact Areas and to reduce the cover of non-native species (K. O'Connor pers. comm. 2006). The Navy has also funded rare plant surveys that have documented new occurrences of San Clemente Island broom occurs and field studies that have determined some aspects of its reproductive potential.

Effects of the Action

The proposed action includes new and/or increased ordnance use in Impact Areas I and II and training in the IOA, AFP 6 and TAR 11. These activities may result in direct or indirect adverse effects to San Clemente Island broom as a result of fires, fire management and suppression, vehicle and foot traffic, erosion and invasive plant species.

Fire

The proposed action could affect this species if fire, associated with increased operations in Impact Areas I and II, and TAR 11, is allowed to burn San Clemente Island broom populations. Increased fire frequency resulting from intensified uses could also lead to localized changes in vegetation (type conversion) that could indirectly affect San Clemente Island broom. The potential for elevated fire frequency to many of the occurrences within SHOBA is reduced by their location on the eastern side of the island, away from Impact Areas I and II. In consultation with the Service, the Navy modified the proposed boundaries of TAR 11 to reduce occurrence of this species within the TAR. The original boundaries of the TAR supported approximately 9 of 147 occurrences (6.1 percent of total occurrences) and 878 of 9,674 individuals (9.1 percent of total individuals). Revised boundaries support only one occurrence of the species, reducing the potential impacts to the species from any small fires that could result from flare use in this TAR. Although no live-fire or demolitions would occur, there is the potential for activities on the TAR, which include the use of helicopter operations, smoke generators, flares, pyrotechnics and all types of blanks, to start a fire. As a condition of the FMP (U. S Navy 2005b), standby fire fighting equipment and wildland fire-qualified crew would be available under conditions of moderate or higher fire danger. These conditions and overall implementation of the FMP should minimize the potential for fire to spread into occurrences of this species onsite or nearby.

The response of San Clemente Island broom to fire in is not well known. Burned individuals of this short-lived subshrub are generally killed outright by fire, but seedling establishment is fire-stimulated, and the species also establishes after minor disturbances, as do other members of this genus such as deerweed (*Lotus scoparius*) (U. S Navy 2002). Thus, in the absence of fire or minor disturbance, it is possible that San Clemente Island broom could gradually decline.

The Navy's fire management practices are anticipated to minimize ignitions as well as the spread of fires. The proposed action also includes a Navy commitment to conduct an annual review of fire management and fires that will allow adaptive management, if required. Once live-fire and demolition training commences in TAR 11, a better understanding of the likely fire patterns associated with range use will emerge. These measures should minimize the frequency and spread of fires that could result in type conversion of native habitat.

Fire Management and Suppression

Fire management may entail future creation of fuelbreaks in areas that support San Clemente Island broom. No specific fuelbreak locations have been proposed in the vicinity of this species to date. If fuelbreaks are created using Phos-Chek or herbicide, as proposed within the project description, San Clemente Island broom individuals that lie within the fuelbreak footprint could be destroyed. The use of Phos-Chek may also favor the expansion of non-native species due to the fertilizing effect of this retardant. Since the boundaries of future fuelbreaks have not yet been identified, we anticipate that the Navy will consult with the Service regarding any future plans to establish fuel breaks with the potential to impact San Clemente Island broom. Thus, the impacts of new fuelbreaks on San Clemente Island broom are not considered in this analysis.

Vehicle and Foot Traffic

Proposed training activities would include new and significant increases in vehicle and/or foot traffic entering and exiting the IOA, TAR 11, and AFP 6. The majority of the 147 San Clemente Island broom occurrences are located outside of any training areas. However, 14 occurrences are in the boundaries of the IOA, and one is in the boundaries of TAR 11. In addition, 22 are within 305 m (1,000 ft) of the IOA, and 3 occurrences are in a canyon downhill from AFP 6.

Erosion caused by vehicle traffic in AFP 6 could affect three San Clemente Island broom occurrences in Eagle Canyon. The head of Eagle Canyon includes a segment of AFP 6 that is located on the eastern side of San Clemente Island Ridge Road and has been identified as having steep slopes. The occurrences, however, are located over 500 m (1,640 ft) from the edge of the AFP deep within the canyon, and the Navy proposes to develop and implement an erosion control plan in coordination with the Service to minimize the potential for offsite erosion to occur. The erosion plan will include using BMPs to reduce the potential for erosion beyond boundaries of operational areas, potentially including setbacks from steep slopes such as those at the eastern edge of the AFP 6. The Navy will also develop and implement a project to monitor for erosion, dust generation, and deposition of dust in adjacent habitats. If the erosion control plan and monitoring project are implemented prior to broader uses of AFP 6 outlined in the proposed action, we do not expect adverse effects to the three broom occurrences in Eagle Canyon.

Proposed training activities would include significant increases in foot traffic in the IOA which supports 14 occurrences of San Clemente Island broom. The most intensive use of the IOA would

occur two times per year during a 4-day Battalion Sized Landing operation during which 1,500 troops would proceed up the island. Of the personnel involved in the Battalion Sized Landing, approximately half would be traveling in vehicles. The remaining personnel (approximately 750) would travel up the IOA corridor on foot and bivouac at locations en route to SHOBA Impact Areas. In addition, the occurrence within the boundaries of TAR 11 could be directly affected by foot traffic within TAR boundaries. This occurrence would be exposed to foot traffic during approximately 30 days of use per year (33 NSW Operations and two 4-day Battalion-sized landings).

San Clemente Island broom is a small shrub and is unlikely to be affected by occasional foot traffic. Seedlings of the species could be crushed by foot traffic, if stepped on. Any effects of foot traffic on a local population of this species within the IOA would be dispersed (because the Marines travel in a dispersed manner), infrequent (up to twice per year, generally less) and temporary. The likelihood of direct effects within TAR 11 is reduced by the location of the San Clemente Island broom at the periphery of the TAR. However, the potential for indirect effects associated with introduction or spread of invasive species as a result of foot traffic within the IOA and within and surrounding TAR 11 is anticipated and may extend beyond the boundaries of these operational areas if new invasive species become established and spread. The potential for invasive species is of particular concern at TAR 11, since approximately 22 broom occurrences are located within 305 m (1,000 ft) of this operational area. The Navy proposes to monitor operational areas to detect any new introductions of invasive species and treat any observed introductions to prevent adverse effects to surrounding native plant communities and sensitive species, as discussed below.

Invasive Plant Species

Invasive plant species are likely to be introduced to San Clemente Island by ongoing and increased training activity on the island and are also likely to be spread by increased movement of people, equipment, and vehicles. Vehicular routes are a primary pathway for plant invasions into arid and semi-arid ecosystems (Johnson *et al.* 1975, Amor and Stephens 1976, Brooks and Pyke 2001, Gelbard and Belnap 2003). Vehicles serve as dispersal vectors for alien plant propagules (Clifford 1959, Schmidt 1989, Lonsdale and Lane 1994), and disturbances within vehicular route corridors facilitate establishment of invading ruderal plants (Greenberg *et al.* 1997). Spread of invasive species from inadvertent introductions caused by vehicular or foot traffic could adversely affect San Clemente Island broom, given its occurrence in and near the IOA and TAR 11.

Invasive species are widely recognized as a leading cause of species loss world-wide, second only to direct habitat loss and fragmentation (Pimm and Gilpin 1989). Island ecosystems and species are especially vulnerable to invasion (Mack *et al.* 2000). Invasive species may affect ecosystem processes. For example, invasion of grasses may alter fire frequency by rapid production of highly flammable fuel, thus leading to more frequent fires and eventual conversion of shrub lands to grasslands (D'Antonio and Vitousek 1992). Invasive species of particular concern include non native grasses, such as *Avena barbata*, and *Bromus* spp., fennel (*Foeniculum vulgare*), and Sahara mustard (*Brassica tournefortii*), which have already invaded

most of the known broom occurrences. Ice-plant is also of particular concern for the broom population in Wilson Cove. Non-native invasive species may compete with San Clemente Island broom for nutrients, water, or sunlight. In addition, non-native plants may provide additional flashy fuels that could change the frequency of fires under which San Clemente Island broom could persist.

To reduce the potential for transport of invasive plants to the island, military and non-military personnel will be asked to conduct a brief check and remove any visible plant material, dirt, or mud on equipment and shoes, prior to coming to San Clemente Island. Tactical ground vehicles will be washed of visible plant material, dirt and mud prior to embarkation for San Clemente Island (The washing procedure is not required for amphibious vehicles after 15 minutes of self-propelled travel through salt water prior to coming ashore on San Clemente Island.).

The Navy has also committed to continue invasive exotic plant species control on an island-wide scale, with an emphasis on particular areas including the IOA, TARs, and Wilson Cove. The focus of the invasive exotic plant control program will continue to be the control of highly invasive exotic plants that have the potential to adversely impact habitat for federally listed species in known locations and the early detection and eradication of new occurrences of such species.

Conclusion

After reviewing the current status of the San Clemente Island broom, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of this species. We have reached this conclusion for the following reasons:

- (1) About 90 percent (*i.e.*, 132 out of 147) of San Clemente Island broom occurrences are outside areas subject to significant training activities, and only 27 percent (*i.e.*, 40 out of 147) of occurrences may be adversely affected because of their locations within or in close proximity to defined training areas (*i.e.*, the IOA, TAR 11 and AFP 6). The presence of San Clemente Island broom outside training areas will help to ensure survival of this narrowly-restricted island species;
- (2) The Navy will minimize the potential impacts from increased invasive species establishment by continuing their island-wide invasive exotic plant species control program, with particular emphasis on San Clemente Island broom habitat in the IOA, TAR 11 and Wilson Cove;
- (3) The Navy will minimize the potential impacts from increased fire frequency by implementing a FMP and develop an erosion control plan to address potential effects of erosion and/or dust on the San Clemente Island broom occurrences near AFP 6; and

- (4) The San Clemente Island broom has substantially increased in numbers and distribution since the time of its listing primarily due to conservation actions supported by the Navy (*e.g.*, removal of feral grazing animals, invasive plant management). With continuation of the Navy stewardship for San Clemente Island, including actions to promote the recovery of listed plants, we anticipate impacts of the proposed action will be offset and will not result in an appreciable reduction in the numbers, reproduction, or distribution of the San Clemente Island broom.

San Clemente Island woodland star (*Lithophragma maximum*)

Listing Status

San Clemente Island woodland star was listed as an endangered species on August 8, 1997 (62 FR 42692). Critical habitat has not been designated for this species.

Species Description

San Clemente Island woodland star is a member of the saxifrage family (Saxifragaceae) and flowers from April to June (California Native Plant Society 2001). It is a rhizomatous (bearing horizontal subterranean stems), perennial herb with basal leaves and two or three stout flowering stems from 40 to 60 cm (16-24 in.) high. Each flower bearing stem produces 20 or more white to pinkish, bisexual, bell shaped flowers, each about 1 cm (0.5 in.) in length (Junak and Wilken 1998). The fruit is a 3-valved capsule with numerous seeds. The leaves are palmately compound (with the blade divided into leaflets that radiate from a common point) and arise from the base on slender petioles 15 cm (6 in.) long. San Clemente Island woodland star is the only species within its genus known to occur on San Clemente Island (U.S. Navy 2001).

Habitat Affinities

San Clemente Island woodland star is restricted to San Clemente Island, where it occurs exclusively in several steep canyons along the eastern escarpment towards the southern end of the island. Plants are generally found in shady conditions on ledges on canyon walls and on gentle north-facing slopes in moist canyon bottoms between elevations of 120 to 366 m (400-1200 ft) (Junak and Wilken 1998; Junak 2006; S. Junak pers. comm. 2006). Soils are usually at least vernal moist and are generally loams of varying depth that are derived from rock of volcanic origin (S. Junak pers. comm. 2006). A number of populations are found downslope from sizable groves of *Lyonothamnus floribundus* ssp. *aspleniifolius* (Santa Cruz Island ironwood), suggesting a possible association with this species (Junak and Wilken 1998; S. Junak pers. comm. 2006).

Life History

Little information is available regarding the reproductive ecology of San Clemente Island woodland star. Most of what is known is inferred from studies of other species in the genus.

White, sometimes scented flowers within the *Lithophragma* genus suggest plants may rely on moths for pollination (Taylor 1965; Kellogg and Kellogg 1994). During 3 years of field work, one genus of moth (*Lampronia*) and four genera of bees (*Andrena*, *Apis*, *Osmia* and *Chloralictus*) were collected during a study of several species of *Lithophragma* (Taylor 1965). Researchers have observed visitation by one moth species to *L. parviflorum* in a community where other white-flowered plant species were present, suggesting the possibility of pollinator host specificity (Taylor 1965). Thus, of the pollinators collected on the genus, moths were thought to represent the most important single class of pollinators (Taylor 1965). Based on the apparent scarcity of insect pollinators found on other *Lithophragma* species, it has been suggested that a lack of pollinators on San Clemente Island could be impairing successful sexual reproduction of San Clemente Island woodland star (Kellogg and Kellogg 1994).

Based on its growth habit and knowledge of vegetative reproduction in other *Lithophragma* species, San Clemente Island woodland star is likely capable of vegetative reproduction via rhizomes and bulblets (Bacigalupi 1963; Taylor 1965; U.S. Navy 2001). Studies to characterize sexual reproduction in the genus found that of seven species studied (including two subspecies of one species, for a total of eight taxa), four were entirely self-incompatible and the remaining species were partially so, with just 12-50 percent seed set resulting from self-pollination (Taylor 1965). Random crosses between members of the same population within a species were also unsuccessful for two species (*L. affine* and *L. heterophyllum*), suggesting that individuals in these populations possessed the same self-incompatibility alleles (Taylor 1965). This contrasts with over 90 percent successful crosses among individuals from different populations and suggests that populations of these species may sometimes be derived from one or a few plants that propagate via efficient vegetative reproduction (Taylor 1965). Evidence that a self-incompatibility system operates within the genus suggests that San Clemente Island woodland star may also be partially or completely self-incompatible (Taylor 1965; Junak and Wilken 1998).

Attempts to grow plants from seed have met with mixed, but usually poor, success (Helenurm 1998; Ferguson and Beauchamp 1981). Taylor (1965) reports that a controlling environmental factor for germination of a number of species in the genus is temperature, with optimal germination being found at temperatures that most closely approximate those in their natural environment. Ferguson and Beauchamp (1981) reported that no successful germination was achieved at Rancho Santa Ana Botanic Garden or Pacific Southwest Nursery from San Clemente Island woodland star seed that was collected during 1979 and 1980. Helenurm (1998) found seed germination and seedling survival rates under greenhouse conditions to be very low. He was able to improve seed germination by scarification and treatment with gibberellic acid, but seedling survival remained "...low due to the small size of seedlings and their susceptibility to pathogens" (Helenurm 1998). A 1998 effort at the Rancho Santa Ana Botanic Gardens to grow plants from seed obtained about 3 percent germination success, resulting in the propagation of 6 plants from 350 seeds (C. Ames pers. comm. 2006). Secondary collections of seed from those plants now contribute to the seed bank for this species (S. Jett pers. comm. 2006). A more recent effort to germinate seeds at the same location in 2006 was unsuccessful (C. Ames pers. comm. 2006).

Rangewide Distribution and Threats

Since the San Clemente Island woodland star's entire distribution is restricted to the action area of San Clemente Island, its island-wide distribution and current threats to the species are discussed in the Environmental Baseline section below.

Conservation Needs

A recent 5-year review (Service 2006c) identified the following conservation needs for San Clemente Island woodland star:

- (1) Study the reproductive ecology and mating system of San Clemente Island woodland star to determine whether populations suffer from low pollinator visitation and/or have a self-incompatibility mechanism (*e.g.* have genes that preclude mating among closely related individuals) that limits sexual reproduction in the species.
- (2) Perform additional genetic studies using randomly amplified polymorphic DNA RAPDs or other appropriate genetic markers to see if there is any detectable genetic variation in the species that will allow for inferences about relatedness of adjoining individuals, trends in genetic variation, patterns of gene flow, or other evolutionary processes.
- (3) Use existing or new seed collections to propagate and establish additional populations of San Clemente Island woodland star in appropriate habitat to help safeguard the species. Results from the prior two recommended actions should be used to select seed from the most genetically diverse source populations and to determine if transplantation into existing populations should be used to improve seed production and fitness of populations.
- (4) Work with the Navy to adopt a set of SHOBA access policies to facilitate effective management and monitoring of San Clemente Island woodland star. These policies should allow for greater flexibility in the timing of study and survey efforts and should prioritize providing access during critical times in the life cycle of San Clemente Island woodland star and invasive weeds.
- (5) Exclude fire from San Clemente Island woodland star habitat by using back-fires or other appropriate techniques to prevent wildfires from spreading east of Ridge Road.

Environmental Baseline

Distribution

San Clemente Island woodland star is restricted to several steep canyons along the eastern escarpment towards the southern end of San Clemente Island. San Clemente Island woodland star was thought to be extinct until two small populations were found in 1979 at the bottom of Bryce Canyon (9 plants) and at the bottom of Eagle Canyon (3 plants) on the southeastern side of San Clemente Island (Bacigalupi 1979; Ferguson and Beauchamp 1981). Since that time, a number of small populations have been discovered in precipitous canyons along the eastern escarpment of the island between Eagle Canyon and the south fork of Matriarch Canyon (M. Elvin *in litt.* 1996; Helenurm 1997; Junak & Wilken 1998; U.S. Navy 2001; Junak 2006).

At the time of listing in 1997, there were 11 known populations from the southeastern portion of San Clemente Island (62 FR 42692). Based on a recent compilation of records in Carlsbad Fish and Wildlife Office (CFWO) files, it appears that around 17 locations have now been documented for the species. However, this may not accurately represent the total number of extant occurrences since multiple records within the same canyon often reflect an accumulation of records made by independent observers using different mapping methods over a span of years. Thus, it is possible that two or more records in proximity to one another within the same canyon could refer to the same population.

Because documented occurrences sometimes fall in proximity to one another (*e.g.* less than 0.4 km (0.25 mi.)), different mapping techniques have been used to document occurrences, and occurrences are often comprised of just a few individuals, the spatial distribution of the species is best described by the canyons where occurrences are concentrated and where ecological processes are likely to operate in common. Thus, while around 17 occurrences appear to have been documented since the rediscovery of the species, there are just five canyon areas where plants are concentrated. These include from north to south: Eagle Canyon; Bryce Canyon; several un-named, closely spaced, branching canyons north of Mosquito Cove; Mosquito Cove Canyon; and Matriarch Canyon.

If one ignores the potential that more than one record could represent the same population and sums the most recent approximate count of individuals per occurrence measured since 1979, then about 641 individuals of San Clemente Island woodland star have been documented throughout its range. The majority of the occurrences (9 of 17 occurrences) and 71 percent of documented individuals (454 of 641 individuals) are concentrated within several closely spaced and sometimes interconnected branching canyons north of Mosquito Cove covering an area of 13.3 ha (32.9 ac). The two northern canyons, Eagle Canyon and Bryce Canyon, and the southernmost canyon, Matriarch Canyon, support very small satellite populations of 20, 34 and 10 plants, respectively. The fifth concentration of plants is comprised of two occurrences of around 60 and 65 plants each, which are found less than 0.4 km (0.25 mi.) apart in adjoining tributary forks of Mosquito Cove Canyon (Ferguson and Beauchamp 1981; M. Elvin *in litt.* 1996; Helenurm 1997; Junak & Wilken 1998; U.S. Navy 2001; Junak 2006).

Overall, the number of individuals counted per occurrence is very small with just 6 of the 17 occurrences having been documented with over 50 individuals. Counts have ranged from 2 to 104 individuals (median = 17, average = 30). Only two of the occurrences documented since the time of listing (Junak 2006) appreciably expand the range of the species. These include an observation of a small population of 7 plants towards the top of Bryce Canyon and an occurrence of 10 plants in Matriarch Canyon (Junak 2006).

Relative to the military use of San Clemente Island, the entire range of San Clemente Island woodland star falls within the SHOBA. There is little information for judging population trends because surveys conducted over the last decade have focused on documenting new occurrences rather than monitoring the status of known occurrences (S. Junak pers. comm. 2006). Because there is no information to indicate that specific occurrences have been lost from activities on San Clemente Island, most occurrences discovered since 1979 are assumed to remain extant.

In contrast to a statement in the final rule that around 200 plants were located during Spring 1996 field surveys (62 FR 42692), CFWO files now suggest that around 365 plants were found in 1996. In either case, these totals represent a compilation of data from several independent survey efforts, and neither should be viewed as a definitive single year population estimate.

The best information regarding population dynamics is obtained from those populations that have been visited more than once. At a population in lower Eagle Canyon, two plants were observed in 1979, with no plants observed during the succeeding 2 years. In upper Eagle Canyon, three visits to a population between 1980 and 1997 documented from 12 to 20 plants. Along the north fork of Mosquito Cove Canyon, 16 plants were recorded in 1991, and around 60 plants were recorded in 1996. At the two other occurrences where there is data for more than one year, population counts have remained fairly constant. This suggests that numbers of San Clemente Island woodland star may remain relatively stable from year to year (*i.e.*, the species is not prone to dramatic population fluctuations).

In summary, San Clemente Island woodland star has an extremely restricted and dissected distribution with one major concentration of plants in the branched canyons north of Mosquito Cove Canyon, a small to moderate sized population in Mosquito Cove Canyon, and three very small peripheral populations in the canyons at the southern and northern limits of its range.

Threats

The threats to San Clemente Island woodland star include erosion, invasive plant species, and unnaturally high fire frequencies. Although goats and all other non-native grazing animals had been removed by 1992, the legacy of these animals remains in the form of lost soil and accelerated and concentrated erosion in the steep eastern canyons. Soil loss in groves of oaks and ironwood trees associated with canyons along the eastern escarpment has led to root exposure and death of trees. Gullying and piping along plateau areas may be concentrating runoff to unnatural levels within the canyons below (Kellogg and Kellogg 1994).

Contemporaneous with, and likely aided by, the presence of feral grazing animals, a large number of invasive alien species have naturalized on the island and become a dominant component of many habitats. A 2007 flora compilation for San Clemente Island by the Navy listed 455 taxa (including species, subspecies, and varieties), of which 159 were exotic, 6 were listed as federally endangered, and 8 were believed to be extirpated. Several exotic plant species have been found to co-occur with San Clemente Island woodland star, including ripgut brome, goose grass (*Galium aparine*), common catchfly and common sow thistle (Junak and Wilken 1998).

Frequent fire on the plateau above the eastern canyons and occasional fire within those canyons also represents a source of ongoing disturbance that has potential to trigger erosion events, further facilitate the invasion by non-native plant species, and cause the direct loss of plants and seed. Frequent fires are not, however, expected to occur on the eastern escarpment, due to the steep slopes in this area and distance of the canyons from ignition sources.

Conservation Actions

The appearance of around 15 new occurrences of San Clemente Island woodland star since the early 1990s suggest this species is responding favorably to the removal of feral herbivores from San Clemente Island, despite ongoing threats from erosion, fire, and invasive plants.

The Navy's INRMP for San Clemente Island identifies goals and objectives for 18 management units based on each unit's ranking for both military and natural resource value. Funding allocations and implementation of tasks identified in the INRMP are based on identified programming and budgeting priorities for conservation programs, with priority given to mission obligations, requirements derived from existing laws and regulations, and objectives for federally listed species and their habitats (U.S. Navy 2001).

Of relevance to the protection of San Clemente Island woodland star, the San Clemente Island INRMP includes an objective to: "Protect, monitor, and restore plants and cryptogams in order to manage for their long-term sustainability on the island" (p. 4-39, U.S. Navy 2001). Associated with this objective are a number of proposed management strategies that include: consideration of San Clemente Island woodland star as a "management focus plant" such that it is considered independently from its associated plant community for management; conducting status surveys for this species; ensuring that management focus plants have a network of suitable sites; performing pollination studies on San Clemente Island woodland star; and continuing to apply genetic research and management approaches to its management. Other management measures that are identified in the INRMP specifically for management units where San Clemente Island woodland star is known to occur (Units 11, 14, and 18) include: managing fire encroachment risk from the west; managing fire size, intervals, and intensity within the management units; and managing invasive species, especially black mustard (*Brassica nigra*), along Ridge Road.

Possibly in conflict with protection and/or recovery of San Clemente Island woodland star is the competing objective included in the INRMP to protect military access to SHOBA firing ranges to the west of San Clemente Island woodland star occurrences due to SHOBA's high military value for ship-to-shore bombardment training (U.S. Navy 2001). To minimize this conflict, the INRMP includes a set of Fire Management Guiding Principles that derive in part from the Navy's consultation with the Service on their fire management practices (Service 1997, 2002).

To date, a number of the INRMP management strategies have been implemented. The Navy has implemented rare plant surveys that have documented new occurrences of San Clemente Island woodland star. Genetic research on this species has also been performed. Concerted efforts have been made to control escape of fire from the SHOBA Impact Areas. However, other objectives have not been achieved, such as pollination studies or applying genetic research to management of the species.

Effects of the Action

San Clemente Island woodland star does not occur within areas proposed for training activities on San Clemente Island. It is found only on the eastern side of the island where it drops off into a steep escarpment and a series of extremely steep canyons. The steepness of the terrain in which woodland star occurs and its location in relationship to proposed training activities make it unlikely that vehicle or foot traffic would directly affect the species. No trails or routes extend into the steep canyons where the species occurs so vehicle or foot traffic in the vicinity of the plant is unlikely. However, woodland star does occur in the vicinity of AFP 6 where it could be subject to increased fire frequencies, erosion due to vehicle and foot traffic, and invasive species.

Fire

Fire due to training activities is possible in habitat that supports woodland star; however, the species does not appear to be at risk of a high fire frequency. Although the range of the species is within SHOBA, the sites where it is found are on the eastern side of the island, and the potential ignition sources of most concern (*i.e.*, munitions use in Impact Areas I and II) are on the western side of the island. Activities in AFP 6 could also be an ignition source. However, we expect artillery firing activities in AFP 6 to occur on the west side of Ridge Road. The steep slope descending from potential ignition sources, the location of Ridge Road between most ignition sources and plant locations, and the distance between ignition sources and San Clemente Island woodland star occurrences reduces the potential for accidental fires to directly affect this species. Based on the recorded fire history, fires have burned downslope into canyons on the eastern side of the island once. While the increase in training frequency proposed within AFP 6 and Impact Areas I and II increase the potential for ignitions, the Navy's fire management practices are anticipated to minimize ignitions as well as the spread of fires into eastern canyons. The proposed action also includes a Navy commitment to conduct an annual review of fire management and fires that will allow adaptive management, if required.

Vehicle and Foot Traffic

Erosion caused by vehicle and foot traffic in AFP 6 could affect a small woodland star occurrence (approximately 20 plants) in Eagle Canyon. This occurrence is the northern most of the currently known locations. The head of Eagle Canyon includes a segment of AFP 6 that is located on the eastern side of Ridge Road and has been identified as having steep slopes. The occurrence, however, is located over 500 m (164 ft) from the edge of the AFP deep within the canyon, and the Navy proposes to develop and implement an erosion control plan in coordination with the Service to minimize the potential for offsite erosion to occur. The erosion plan will include using BMPs to reduce the potential for erosion beyond boundaries of operational areas, potentially including setbacks from steep slopes such as those at the eastern edge of the AFP 6.

Invasive Plant Species

Invasive plant species are likely to be introduced to San Clemente Island by ongoing and increased training activity on the island and are also likely to be spread by increased movement of people, equipment, and vehicles. Invasive species are widely recognized as a leading cause of species loss world wide second only to direct habitat loss and fragmentation (Pimm and Gilpin 1989). Island ecosystems and species are especially vulnerable to invasion (Mack *et al.* 2000). Invasive species may affect ecosystem processes. For example, invasion of grasses may alter fire frequency by rapid production of highly flammable fuel, thus leading to more frequent fires and eventual conversion of shrub lands to grasslands (D'Antonio and Vitousek 1992). Non-native invasive species may compete with San Clemente Island woodland star for nutrients, water, or sunlight. Although San Clemente Island woodland star occurs deep within canyons, invasive species may become established by the downslope movement of seeds and water into these canyons. Since it occurs within a canyon downslope from AFP 6, the potential for invasive plant species to be spread into San Clemente Island woodland star habitat at this location will be increased.

The Navy proposes to monitor for invasive plant species, especially around the AVMC, including AFPs, so we anticipate that monitoring may detect invasions to allow subsequent treatment. In addition, ongoing monitoring of the San Clemente Island woodland star population will allow identification of any emergent weed issues and allow management to occur. The Navy has also committed to continue invasive exotic plant species control on an island-wide scale. The focus of the invasive exotic plant control program will continue to be the control of highly invasive exotic plants that have the potential to adversely impact habitat for federally listed species in known locations and the early detection and eradication of new occurrences of such species.

Conclusion

After reviewing the current status of San Clemente Island woodland star, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the

action, as proposed, is not likely to jeopardize the continued existence of this species. We have reached this conclusion for the following reasons:

- (1) The proposed action is not expected to directly impact San Clemente Island woodland star. It is also expected that potential indirect impacts from fire, erosion, and invasive species will be controlled to an insignificant level by proposed fire management, erosion control measures, invasive species control, and species monitoring and management that will be implemented in coordination with the Service; Thus, the proposed action will not result in an appreciable reduction in the numbers, reproduction, or distribution of the San Clemente Island woodland star.
- (2) Fires, if they occur, are unlikely to burn into habitat occupied by this species;
- (3) Foot traffic and vehicle traffic are not expected to occur in the vicinity of the species as a result of training activity;
- (4) Although erosion could occur upslope from the occurrence in Eagle Canyon, San Clemente Island woodland star are located over 500 m (164 ft) from the edge of AFP 6. This distance from the AFP 6 boundaries reduces the potential for impacts to this species associated with erosion; and
- (5) Continuation of the Navy's conservation program for San Clemente Island will promote the recovery of the San Clemente Island woodland star.

Santa Cruz Island Rock-Cress (*Sibara filifolia*)

Status of the Species

Listing Status

Santa Cruz Island rock-cress was listed as endangered on August 8, 1997 (62 FR 42692). Critical habitat has not been designated for the Santa Cruz Island rock-cress.

Species Description

The Santa Cruz Island rock-cress is a slender annual herb in the mustard family (Brassicaceae) that flowers in April (Munz 1974). It is 13-38 cm (5-15 in.) tall. Pink to purplish flowers with spoon-shaped petals are borne in small terminal unbranched flower stalks. The leaves are 2.5-5cm (1 to 2 in.) long and have a prominent midvein and narrow linear lobes arising along their length.

Distribution, Abundance, and Habitat Affinity

Santa Cruz Island rock-cress was historically recorded in coastal scrub habitats on Santa Cruz and Santa Catalina islands. The species was thought to be extinct until it was discovered at the extreme

south end of San Clemente Island in 1986. It was re-discovered in one gully on Santa Catalina Island in 2001. It has not been seen on Santa Cruz Island since 1932 (Junak 2006). On Santa Catalina Island, Santa Cruz Island rock-crec occurs in two closely spaced locations within Wild Boar Gully (D. Knapp pers. comm. 2001, D. Knapp *in litt.* 2001). On San Clemente Island, Santa Cruz Island rock-crec occurs in several saddles on three adjacent, open ridgetops and on nearby flats at the southern end of the island near Pyramid Head, at elevations between 91 and 165 m (300 and 540 ft) (Junak 2006).

Described as common by early collectors (Greene 1887; Trask 1901; S. Junak pers. comm. 2006), it appears to have been wide ranging based on historic records from Santa Cruz and Santa Catalina Islands and recent records from San Clemente Island. At the time of listing in 1997, it was only known from San Clemente Island where fewer than 30 plants were found in one location during the 1996 season (62 FR 42692; Junak and Wilken 1998). Since that time, Santa Cruz Island rock-crec has been rediscovered on Santa Catalina Island and 11 additional occurrences have been documented on San Clemente Island. It has yet to be re-observed during various, mostly untargeted, plant surveys on Santa Cruz Island, where the last record of the species is from 1936 (Helenurm 2003; 62 FR 42692; K. Chess pers. comm. 2006).

Contemporary surveys have recorded occurrences with a few to several hundred individual plants each (2 to 500 plants per occurrence) (Beauchamp 1987; D. Knapp pers. comm. 2006; Junak and Wilken 1998; Junak 2006). Monitoring reveals that, as is typical of annual plant species, populations fluctuate in response to seasonal rainfall, and during some years, plants may not be evident (D. Knapp pers. comm. 2006; S. Junak pers. comm. 2006; K. Helenurm pers. comm. 2006). Some of the occurrences are comprised of scattered individuals and are not reliably observed on an annual basis (K. Helenurm pers. comm. 2006).

Historical and extant records suggest that Santa Cruz Island rock-crec can tolerate soils derived from a variety of parent materials including rocks of volcanic and metamorphic origin (S. Junak pers. comm. 2006). On Santa Catalina Island it is found in black sage (*Salvia mellifera*) dominated coastal sage scrub and is associated with foothill needlegrass (*Nassella lepida*), prickly-pear cactus (*Opuntia littoralis*), morning glory (*Calystegia macrostegia*), and dwarf flax (*Hesperolinon micranthum*) (D. Knapp *in litt.* 2001). On San Clemente Island, it is found on volcanic rock scree in association with cholla, spike-moss (*Selaginella bigelovii*) and San Clemente Island birds-foot trefoil (*Lotus argophyllus* var. *adsurgens*) (Beauchamp 1987; Elvin *in litt.* 1996). Characterized as occurring in shady places on the “northward slope” at its type locality (Greene 1887), subsequent collectors have found Santa Cruz Island rock-crec in open areas along dry rocky ridgelines, in saddles, or on nearby flats with thin soils and little surrounding vegetation. Despite the lack of surrounding vegetation, the rock-crec is often described as cryptic and difficult to detect because of its diminutive stature, short life, and tendency to blend in with the surrounding substrate as it ages and dries (J. Dunn pers. comm. 2006; S. Junak pers. comm. 2006).

Life History

Based on greenhouse observations, it appears that, reproductively, Santa Cruz Island rock-creep is capable of self-pollination and is self-compatible or, possibly, apomictic (capable of asexual reproduction) (M. Wall pers. comm. 2006; K. Helenurm pers. comm. 2006). Under natural conditions plants typically produce 2-10 fruits (K. Helenurm pers. comm. 2006).

Greenhouse-grown plants of Santa Cruz Island rock-creep are strikingly more robust than individuals observed in the wild (K. Helenurm pers. comm. 2006). At its type locality Santa Cruz Island rock-creep was described as occurring in shady places on the “northward slope” (Greene 1887). All other verified records and extant occurrences are from dry, open, rocky areas with thin soils and sparse vegetation. This suggests that although Santa Cruz Island rock-creep may have once been more broadly distributed among a range of habitats, it now persists in marginal conditions where it can escape competition from non-native exotic plants that have naturalized on the Channel Islands.

Genetic variation of three Santa Cruz Island rock-creep populations found on three adjoining ridges on San Clemente Island has been studied using two methods, allozyme analysis and RAPD analysis (Helenurm 1999, 2003). The allozyme study detected only two polymorphic loci out of 29 that were studied, indicating there is low genetic variation at both the species and population levels (Helenurm 2003). All of the polymorphism was detected within a single population indicating that most of the genetic variation is found within rather than among populations (Helenurm 2003). Populations that are as little as 150 m (492 ft) apart from one another were also found to be genetically distinct, suggesting there is little gene flow among them (Helenurm 2003). Thus, this study concluded that the low level of genetic variation, differentiation of populations, and low level of gene flow could allow genetic drift to act as a potent force to further reduce genetic variation in the species (Helenurm 2003).

The RAPD study provided an independent method for corroborating the results of the allozyme analysis (Helenurm 1999). Using 11 RAPD primers, a total of 69 loci were detected of which 64 were polymorphic (92.8 percent). Thus, the RAPD study revealed more genetic variation than was detectable using allozymes. It also detected genetic variation within all of the populations studied, whereas the allozyme study only found one population that contained genetic variation. However, the RAPD analysis fully corroborated the conclusion of the allozyme study, that a high level of genetic differentiation exists among closely adjacent populations, and gene flow is extremely limited in the species. Interestingly, the large proportion of unique genotypes in each of the populations suggests the species reproduces primarily through outcrossing (Helenurm 1999). Still, extremely limited gene flow suggests that genetic variation can only be protected through the protection of all populations (Helenurm 1999). Loss of genetic variation could impair the ability of this species to adapt to a changing environment (Helenurm 1999).

Threats

Santa Cruz Island rock-creep is threatened by grazing, competition with exotic plant species, and fire. The direct impact of grazing on Santa Cruz Island rock-creep has likely been much reduced through the removal of feral goats and pigs from Santa Catalina Island and San Clemente Island, and the complete removal of feral sheep and substantial removal of feral pigs from Santa Cruz Island. However, the effect that mammalian herbivores have had (*e.g.*, destruction of habitat and introduction of non-natives) probably still affects this species, particularly due to the retention of bison and mule deer on Catalina Island. Wild Boar Gulch (45 ha (112 ac)), the location of Santa Cruz Island rock-creep occurrences on Santa Catalina Island, was fenced in 1999 prior to the re-discovery of the species. The threat associated with bison has been reduced by this action.

One of the chief threats to Santa Cruz Island rock-creep is the spread of invasive (non-native) plants into its habitat. Invasive species may compete with Santa Cruz Island rock-creep for space or other resources such as light, water, and nutrients. Invasive plants can also alter ecological processes such as nutrient cycling (Zink *et al.* 1995) or the prevalence of fire (Brooks 1999) that otherwise could affect the persistence of this species. Presently, invasive species are not abundant on the thin rocky soils where extant occurrences of Santa Cruz Island rock-creep are found, but they are dominant in areas that were likely part of its historic range. Invasion of the Channel Islands by several species of annual non-native grasses is of particular concern due to the ability of these species to invade thin rocky soils and because, once established, they are unlikely to be eradicated.

Fire may threaten Santa Cruz Island rock-creep due to its unknown response to fire and potential for wildfires to burn a significant percentage of the population, should they occur. Fire may not have previously been an important evolutionary force for this species, so a change in fire regime may have adverse effects on Santa Cruz Island rock-creep. While it is anticipated that some proportion of Santa Cruz Island rock-creep populations could persist as dormant seed in the soil following a fire, the small, thin coated seeds of this species do not appear to be well adapted to withstand fire.

Recent, small-scale germination trials at the Rancho Santa Ana Botanic Garden obtained about 33 percent germination success for untreated seeds, 26 percent germination success for seeds exposed to cool smoke treatment, and zero percent success for seeds exposed to heat and smoke treatment (C. Ames pers. comm. 2006). In the absence of insulation by soil, investigators found that the thin coated seeds were killed by 5 minutes of exposure to hot smoke in a chamber that reached about 93° C (200° F) (M. Wall pers. comm. 2006). Further suggesting the species may be poorly adapted to fire, a fire in 1995 is reported to have impacted a known occurrence of Santa Cruz Island rock-creep, with subsequent surveys in 1996 unable to detect plants at this location (Service 1997; M. Elvin pers. comm. 1996). Certainly, any loss of plants from fire prior to setting seed would be a threat to the small populations of this species. A change to an increased fire regime associated with the invasion of non-native grasses would likely exacerbate this threat.

On Catalina, fire is of concern due to the potential for naturally caused ignitions that may result in larger fires, combined with the restricted distribution of the rock-creep. On San Clemente Island, the threat of fire is elevated due to the proximity of the rock-creep occurrences to ignition sources. Likely exacerbating this threat is the invasion of annual grasses and other non-native species into Santa Cruz Island rock-creep habitat due to the increased fuel load they provide for fire. Invasion and proliferation of various brome grasses and Mediterranean grass in the Mojave Desert has been implicated as a major factor responsible for reduced fire intervals and increased fire intensity in this formerly sparsely vegetated biome (Brooks 1999; USGS Website <http://www.werc.usgs.gov/invasivespecies/mojavegrassfire.html>). Grasses exploit many different microhabitats and create a continuous and persistent fuel bed by filling in what was once plant free space with living plants and thatch (Brooks 1999). Because annual grasses vary in density with rainfall they have potential to significantly alter the fuel condition in wet years. Grasses also provide a “flashy” fuel that is easily ignitable due to the short time needed for fuel moisture to drop to low levels, even during a diurnal cycle.

Conservation Needs

A recent 5-year review of the status of Santa Cruz Island rock-creep (Service 2006d) resulted in the following recommendations:

- (1) Because Mediterranean grass is thought to be restricted to a few locations at the southern end of San Clemente Island, take prompt action to eradicate this alien plant from the island.
- (2) Work with the military to adopt a set of access policies for the shore bombardment area on San Clemente Island to facilitate effective management and monitoring of rock-creep. These policies should include adoption of early warning mechanisms for the detection and eradication of new invasive species as well as allow for greater flexibility in the timing of surveys and invasive species control measures.
- (3) Use information from genetic research and existing or new seed collections to propagate and establish additional populations of Santa Cruz Island rock-creep on San Clemente and Santa Catalina Islands. Because there remains potential to rediscover rock-creep on Santa Cruz Island, reintroduction efforts should await the results of directed surveys for the species within appropriate habitat on that island.
- (4) Study the distribution and feeding habits of chukar on San Clemente Island to help determine whether it poses a threat to rock-creep populations.
- (5) Study the reproductive ecology of the Santa Cruz Island rock-creep on San Clemente and Catalina Islands to determine the processes that may be responsible for the low rate of gene flow apparent on San Clemente.

Environmental Baseline

Like the other Channel Islands, San Clemente Island has experienced a history of ongoing habitat modification due to grazing and browsing of non-native goats, sheep, deer, pigs, and cattle introduced by people. Erosion, reduced shrub cover, and changes in soil composition are evidence of this overgrazing (Schwartz 1994, Halvorson 1994, U.S. Navy 2002), as is the vegetation recovery that is occurring following the removal of these animals (Tierra Data Systems 2004, 2005).

Distribution

On San Clemente Island, the distribution of Santa Cruz Island rock-creep is restricted to the southern tip of the island above Pyramid Head where it occurs in several saddles on adjoining open ridgetops and on nearby flats (Junak and Wilken 1998; Junak 2006). Surveys conducted by Junak and Wilken in 1996 and 1997 found a total of five populations comprising a total of 758 individuals (Junak and Wilken 1998). Three additional occurrences with a total of 67 individuals of this inconspicuous plant have since been reported in the same general area (Junak 2006). Current estimates based on surveys through 2007 (including unpublished 2007 data) are 12 San Clemente Island occurrences with 905 individuals (U.S. Navy 2008a). All of these occurrences are found within around 195 ha (0.75 square mile) (S. Junak pers. comm. 2006.) but are genetically differentiated (Helenurm 2003), suggesting their mutual conservation is important to retention of genetic diversity. The twelve occurrences are distributed in three locations, two at the southern end of San Clemente Island Ridge Road and one downslope from AFP 1 (U.S. Navy 2008).

Threats

All occurrences of Santa Cruz Island rock-creep on San Clemente Island lie within proximity to each other and are within the boundaries of SHOBA. Occurrences currently face risk associated with baseline levels of operational use on San Clemente Island. Baseline levels of use may result in fires and contribute to the potential for expanded abundance and distribution of invasive plant species on this island. The recent discovery of Mediterranean grass (*Schismus arabicus*) on the southern end of San Clemente Island along with the existing distribution of wild oats and foxtail chess have been highlighted as particularly important threats on San Clemente Island (S. Junak pers. comm. 2006; L. Kellogg pers. comm. 2006; and K. O'Connor pers. comm. 2006).

One of the locations that support occurrences of this species is downhill from and within 76 m (250 ft) of the existing AFP 1. Based on the Navy's recent erosion study (U.S. Navy 2008), the plants do not occupy the same watershed as AFP 1, but they are downhill in the adjacent watershed. AFP 1 supports artillery maneuvering and use under baseline conditions, although the Service has not specifically addressed this use in previous consultation. The area downhill from AFP 1 is not subject to significant erosion under baseline conditions because only a small portion of the mapped AFP 1 is used. Erosion has not affected the mapped occurrences of Santa Cruz Island rock-creep because the plants, though downhill, are in the adjacent watershed.

Mustard (*Brassica tourneforti*) and grasses (*e.g.*, *Shismus arabicus*) are of particular concern for Santa Cruz Island rock-cress because they can spread in the dry conditions that characterize the sites where the Santa Cruz Island rock-cress is located. These species can increase fuel loads in habitat that has little existing fuel and increase the risk of fire burning through the area. Use of the AFP may be facilitating the establishment of invasive plants because both of these species have been documented in the area, and *Brassica tourneforti* was treated in 2005 in proximity to the AFP (U.S. Navy 2005a).

Two occurrences of this species are also within 40 m (125 ft) of the turnaround at the end of San Clemente Island Ridge Road near Pyramid Head (U.S. Navy 2008). Under baseline conditions, this area could be exposed to foot traffic due to its proximity to the end of the road.

All occurrences of Santa Cruz Island rock-cress are within approximately 3 km (1.9 mi.) of Impact Area I and are therefore at risk of fire under baseline conditions due to their proximity to the Impact Area. The sparse vegetation in the immediate vicinity of the occurrences, however, currently reduces the risk of fires burning these plants. The occurrences lie east of the Impact Area, and based on fire mapping, one fire has burned close to the known occurrences of Santa Cruz Island rock-cress since 1979.

Conservation Actions

Santa Cruz Island rock cress is among the sensitive plant species periodically monitored and subject to invasive species control by the U.S. Navy on San Clemente Island (Junak and Wilken 1998; Junak 2006). Research pertaining to the genetics of this plant is also underway (Helkenurm 1999, Helkenurm 2003).

The San Clemente Island INRMP proposes an array of management strategies to address identified goals and objectives for specified management units and their natural resources. Of relevance to the protection of the San Cruz Island rock-cress, the INRMP includes an objective to: “Protect, monitor, and restore plants and cryptogams in order to manage for their long-term sustainability on the island” (U.S. Navy 2002). Associated with this objective are a number of proposed management strategies that include the following: consideration of San Cruz Island rock-cress as a “management focus plant” such that it is considered independently from its associated plant community for management; conducting status surveys for this species; ensuring that management-focus plants have a network of suitable sites; performing pollination studies on San Cruz Island rock-cress; and continuing to conduct genetics research.

Possibly in conflict with protection and/or recovery of San Cruz Island rock-cress is the competing objective included in the INRMP to protect military access to the SHOBA firing ranges due to SHOBA’s high military value for ship-to-shore bombardment training (U.S. Navy 2002). To date, a number of the INRMP management strategies, or aspects of them, have been implemented. The Navy has implemented rare plant surveys that have documented several occurrences of San Cruz Island rock-cress. Genetic research and pollination studies have also

been performed. The Navy has recognized and addressed, to some extent, the potential for invasive species establishment and spread into this area by monitoring for invasive plant species and treating them when possible. Concerted efforts have been made to control escape of fire from the SHOBA Impact Areas. However, other objectives have not been achieved, such as ensuring a network of suitable sites; controlling erosion in some areas; and the community goal of reducing the percent cover of invasive plants from 1992-93 baseline conditions (K. O'Connor pers. comm. 2006.).

Effects of the Action

All occurrences of Santa Cruz Island rock-creep lie outside of operational boundaries described within the proposed action, thus direct effects to Santa Cruz Island rock-creep are not expected. Potential effects to Santa Cruz Island rock include an increase in the frequency of operations at the IOA, AFP 1, and San Clemente Island Ridge Road that may increase exposure of Santa Cruz Island rock-creep occurrences to fire, fire management and suppression activities, erosion from vehicle traffic, foot traffic, and invasive species. The Navy will implement significant conservation measures to minimize the effects of their FMP and training activities on the Santa Cruz Island rock-creep.

Fire

All occurrences of Santa Cruz Island rock-creep are within approximately 3,000 m of Impact Area I. Increased training frequency as described in the proposed action increases the risks associated with fires and could affect this species if fires are ignited and spread into occupied habitat. The species is distributed adjacent and uphill from Impact Area I and close to AFP 1; however, the sparse vegetation and resulting fuel where the species is present, combined with the relative infrequency of baseline training events, has resulted in an absence of fires from the specific locations that support Santa Cruz Island rock-creep. Operations proposed within Impact Area I (downhill from Santa Cruz Island rock-creep occurrences) and at AFP 1 (uphill from Santa Cruz Island rock-creep occurrences) could increase the fire frequencies at these sites. Increased fire frequency resulting from intensified uses could also lead to localized changes in vegetation (type conversion) that could indirectly affect Santa Cruz Island rock creep.

The response of Santa Cruz Island rock-creep to fires, should they occur, is not known. This species flowers and sets seed very early in the year (April), making plants less likely to burn, since fires are more likely when dry conditions prevail later in the spring. Seeds on the ground surface, however, would be vulnerable to fire, which appears to adversely affect seed survival and germination (C. Ames pers. comm. 2006, M. Wall pers. comm. 2006). If invasive grasses become more abundant in the areas that currently support Santa Cruz Island rock creep, the potential for fires is likely to increase.

Implementation of the FMP includes implementation of the FDRS and appropriate timing of operations to minimize the potential for ignitions and spread of fires, as well as presence of suppression resources to prevent the spread of fires. Fuelbreaks and suppression measures

outlined within the FDRS should prevent fire frequency outside Impact Areas (*e.g.* Santa Cruz Island rock-cress occurrences adjacent and uphill from Impact Area I and close to AFP 1) from increasing to levels incompatible with the persistence of this species.

The proposed action also includes a Navy commitment to evaluate the potential impacts of fire on Santa Cruz Island rock cress and conduct an annual review of fire management and fires that will allow adaptive management. These measures should minimize the frequency and spread of fires that could result in type conversion of native habitat.

Fire Management and Suppression

Future fire management practices, including development of fuelbreaks as well as fire suppression, may adversely affect Santa Cruz Island rock-cress due to the proximity of Santa Cruz rock-cress occurrences to Impact Area I and AFP 1. Fuelbreak development and maintenance would entail herbicide or retardant use, as well as controlled burns. Herbicide or Phos-Chek retardant could directly affect Santa Cruz Island rock-cress if applied to areas supporting occurrences, although the response of this species to these materials has not been studied. Phos-Chek would likely facilitate growth of annual grass species, which are currently considered a threat to Santa Cruz Island rock-cress. Controlled burns have been used in the past, on the edges of San Clemente Island Ridge Road and within the Impact Areas. Controlled burns have exceeded the intended burn boundaries on several occasions and point to at least the potential for controlled burns to impact the resources they are intended to protect.

The Navy proposes to minimize the potential for effects to listed species associated with future fuelbreak installation by considering the locations of documented occurrences as fuelbreak lines are developed, by studying the effects of Phos-Chek on San Clemente Island vegetation, and avoiding application of Phos-Chek within 91 m (300 ft) of mapped listed species to the extent consistent with fuelbreak installation. The Navy also proposes to conduct an annual review of fires and fire management practices, which will aid in assuring that fuelbreaks benefit, rather than adversely affect the Santa Cruz Island rock-cress.

Since the boundaries of future fuelbreaks have not yet been identified, we anticipate that the Navy will consult with the Service regarding any future plans to establish fuel breaks with the potential to impact Santa Cruz Island rock-cress. Thus, the impacts of new fuelbreaks on Santa Cruz Island rock-cress are not considered in this analysis.

Vehicle and Foot Traffic

Vehicle traffic is not planned to occur within Santa Cruz Island rock-cress habitat, so direct effects of vehicle traffic are not anticipated. However, indirect impacts from vehicle and foot traffic may occur to two occurrences of rock-cress within 40 m (125 feet) of San Clemente Island Ridge Road Ridge Road and two other occurrences within 75 m (250 ft) of AFP 1.

Based on a Navy erosion study (2008), the two Santa Cruz Island rock-cress occurrences near AFP 1 are in the canyon directly downslope from AFP 1. Currently, only a small portion of the mapped AFP 1 is used. A significant increase in vehicle use within AFP 1 is anticipated as part of the proposed action, which will increase the potential for areas downslope to erode (although the soils at the site may reduce the erosion potential) and for invasive species to become established in the vicinity of Santa Cruz Island rock-cress occurrences.

Vehicular routes are a primary pathway for plant invasions into arid and semi-arid ecosystems (Johnson *et al.* 1975, Amor and Stephens 1976, Brooks and Pyke 2001, Gelbard and Belnap 2003). Vehicles serve as dispersal vectors for alien plant propagules (Clifford 1959, Schmidt 1989, Lonsdale and Lane 1994), and disturbances within vehicular route corridors facilitate establishment of invading ruderal plants (Greenberg *et al.* 1997). San Clemente Island Ridge Road and the portions of AFP 1 that are used by vehicles as part of the proposed action are likely to support conditions that will allow establishment of invasive plant species adjacent to the four nearby Santa Cruz Island rock-cress occurrences.

Vehicular routes with dirt surfaces can also be a significant source of dust, which can have significant effects on plant vigor downwind from vehicle activity. Dust is likely to be generated at San Clemente Island Ridge Road and AFP 1 during training activities that use heavy assault vehicles. Whether such dust could accumulate on plants near these areas is unknown; however, given the prevailing wind direction, downwind dust deposition appears likely to occur up to an undetermined distance from this road.

The habitat of the Santa Cruz Island rock cress is outside training area boundaries and is unlikely to be subject to operational foot traffic. The location of the species in proximity to the unmarked terminus of the IOA and San Clemente Island Ridge Road, however, makes it subject to some degree of incidental foot traffic as overall use of the IOA and road increases.

The Navy proposes to develop and implement an erosion control plan in coordination with the Service to minimize the potential for erosion problems beyond the AFP 1 boundaries and to reduce the potential for impacts to listed species. The erosion plan will include using BMPs to the reduce potential for erosion beyond boundaries of operational areas, potentially including setbacks from steep slopes. The Navy will also develop and implement a project to monitor for erosion, dust generation, and deposition of dust in adjacent habitats. If the erosion control plan and monitoring project are implemented prior the expansion of AFP 1 and increased operational use outlined in the proposed action, we do not expect adverse effects to the rock-cress from erosion and/or dust.

To reduce the potential for transport of invasive plants to the island, military and non-military personnel will be asked to conduct a brief check and remove any visible plant material, dirt, or mud on equipment and shoes, prior to coming to San Clemente Island. Tactical ground vehicles will be washed of visible plant material, dirt and mud prior to embarkation for San Clemente Island (The washing procedure is not required for amphibious vehicles after 15 minutes of self-propelled travel through salt water prior to coming ashore on San Clemente Island.). The Navy

also proposes to brief military units on maneuver area boundaries prior to conducting operations and to conduct assault vehicle travel or maneuvering only within these boundaries.

The Navy also proposes to brief military units on maneuver area boundaries prior to conducting operations to minimize the potential of incidental foot traffic in Santa Cruz Island rock cress habitat; however, providing markers to aid in identification of range boundaries or sensitive areas is considered incompatible with training (D. Lee, pers. comm. 2008).

Invasive Species

A significant increase in the operational use of the IOA, AFP 1 and San Clemente Island Ridge Road is anticipated as part of the proposed action. Travel of vehicles from other areas (*e.g.* Camp Pendleton) and between different parts of San Clemente Island is likely to result in increases in the distribution and abundance of invasive plant species on the island. Because of its proximity to the IOA, AFP 1, and San Clemente Island Ridge Road, the Santa Cruz Island rock-cress could be affected by invasive species introduced or spread by foot and vehicle traffic within the operations areas. Invasive species are widely recognized as a leading cause of species loss world wide second only to direct habitat loss and fragmentation (Pimm and Gilpin 1989). Island ecosystems and species are especially vulnerable to invasion (Mack *et al.* 2000). Invasive species may affect ecosystem processes. For example, invasion of grasses may alter fire frequency by rapid production of highly flammable fuel, thus leading to more frequent fires and eventual conversion of shrub lands to grasslands (D'Antonio and Vitousek 1992). Non-native invasive species may compete with San Cruz Island rock-cress for nutrients, water, or sunlight. In addition, non-native plants may provide additional flashy fuels that could change the frequency of fires in this area. Of particular concern for Santa Cruz Island rock cress habitat is Mediterranean grass (*Schismus arabicus*), which has established and is starting to spread in the SHOBA area and has been documented at or very near AFP 1 (Junak 2003). This species, which has spread rapidly through the California deserts, is tolerant of arid habitats and could eventually carry fire into the habitat of the rock cress (Junak, pers. comm..2005) if it were to spread into that habitat.

To reduce the potential for invasive plant species establishment and spread in Santa Cruz Island rock cress habitat, the Navy will prioritize areas surrounding Santa Cruz Island rock-cress occurrences as primary targets for weed eradication to the extent practicable and as appropriate based on potential impacts. In addition, to maintain or improve the status of Santa Cruz Island rock-cress, the Navy will investigate feasibility of establishing additional colonies in suitable habitat farther away from the IOA and AFP 1 using the on-island nursery to propagate from local seed.

Conclusion

After reviewing the current status of the Santa Cruz Island rock-cress, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the

action, as proposed, is not likely to jeopardize the continued existence of this species. We have reached this conclusion for the following reasons:

- (1) All occurrences of Santa Cruz Island rock-creep lie outside of operational boundaries described within the proposed action;
- (2) The Navy will prioritize areas surrounding Santa Cruz Island rock-creep occurrences as primary targets for weed eradication to the extent practicable and as appropriate based on potential impacts;
- (3) The Navy will minimize the potential impacts from increased fire frequency by implementing a FMP and develop an erosion control plan to address potential effects of erosion and/or dust on the Santa Cruz Island rock-creep occurrences near the IOA, AFP 1 and San Clemente Island Ridge Road area;
- (4) The Navy will assure that application of retardant and/or herbicide will not occur within 91 m (300 ft) of mapped locations of Santa Cruz Island rock-creep;
- (5) The Navy will investigate feasibility of establishing additional colonies in suitable habitat farther away from the IOA and AFP 1 using the on-island nursery to propagate from local seed.
- (6) Santa Cruz Island rock-creep has increased in numbers and distribution since the time of its listing primarily due to conservation actions supported by the Navy. With continuation of the Navy's stewardship on San Clemente Island, including actions to promote the recovery of listed plants such as the rock-creep, we anticipate impacts of the proposed action will be offset and will not result in an appreciable reduction in the numbers, reproduction, or distribution of this species.

Birds

Brown pelican (*Pelecanus occidentalis*)

Status of the Species

Listing status

Due to population declines, the brown pelican (*Pelecanus occidentalis*) was listed on October 13, 1970 (35 FR 16047). The species *Pelecanus occidentalis* is generally recognized as consisting of six subspecies. The California brown pelican (*P. o. californicus*) ranges from California south to Colima, Mexico, including the Gulf of California. The Service issued a recovery plan for the California brown pelican in 1983 (Service 1983).

On February 4, 1985, the Service delisted the brown pelican in Alabama, Florida, Georgia, South Carolina, North Carolina, and points northward along the Atlantic Coast (50 FR 4938).

However, the brown pelican continued to be listed as endangered throughout the remainder of its range, including Mississippi, Louisiana, Texas, California, Mexico, Central and South America, and the West Indies.

On July 5, 1994, the Service received a petition from the State of Louisiana requesting that we remove the brown pelican in Louisiana from the Federal List of Threatened and Endangered Wildlife (List). We did not act on this petition due to other higher priority actions. On December 14, 2005, we received a petition from the Endangered Species Recovery Council to remove the California brown pelican subspecies (*P. o. californicus*) from the List.

On May 24, 2006 (71 FR 29908), we published a notice announcing our 90-day finding for the petition, in which we concluded that the petition presented substantial scientific or commercial information indicating that the petitioned action may be warranted. We then initiated a 12-month status review on the rangewide status of the brown pelican (71 FR 29908). On February 20, 2008, we published our 12-month finding on the petition to delist the California brown pelican and a proposed rule to delist the brown pelican in its entirety, based on recovery (73 FR 9408).

Species Description

Two subspecies of brown pelican primarily inhabit North America, the California brown pelican and the eastern brown pelican (*P. o. carolinensis*), although *P. o. occidentalis*, a subspecies found in the West Indies and along the Caribbean Coast of South America, occasionally wanders to the coasts of Mexico and Florida. The California brown pelican is a large marine bird weighing up to 3.6 kg (8 lb) that is recognized by its large bill, a prominent, unfeathered throat pouch, and a wingspread up to 2 m (7 ft) (Sykes 1983). Adults in non-breeding plumage have a white head and neck. During the breeding season, the hindneck and nape are dark brown. The body and wings are grayish brown, and the primaries and secondaries are dark brown. The bill is gray, and the throat pouch is black. Immature brown pelicans are mostly brown with a dark neck and head and white belly (Sykes 1983). The California brown pelican can be distinguished from the eastern brown pelican by having a larger size and darker hindneck while in breeding plumage (Wetmore 1945) and a bright red gular pouch during courtship and egg-laying period. They are rather clumsy on land and fly with their necks folded, heads resting on their backs, using slow, powerful wingbeats.

Distribution and Abundance Affinity

Currently-listed brown pelican populations occur primarily in coastal marine and estuarine (where fresh and salt water intermingle) environments along the coast of the Gulf of Mexico from Mississippi to Texas; along the Pacific Coast from British Columbia, Canada, south through Mexico into Central and South America; and in the West Indies, but are occasionally sighted throughout the U.S. (Shields 2002). Because the brown pelican is a wide-ranging,

mobile species, is migratory throughout much of its range, may shift its breeding or wintering areas in response to local conditions, and many of the birds in populations consist of subadults and non-breeding adults that do not return to nesting sites, it is difficult to provide specific numbers of breeding pairs for individual populations or an accurate range-wide assessment of current numbers of pelicans. However, the brown pelican is currently broadly distributed and is found throughout most of its historic range. The global population of the listed entity, which does not include birds along the Atlantic Coast of the U.S., Florida, or Alabama, is estimated to be over 620,000 birds (Service 2007c).

1. Distribution and Abundance of California Brown Pelican

The most recent population estimate of the brown pelican subspecies that ranges from California to Mexico along the Pacific Coast is approximately 71,200 nesting pairs, which equates to about 142,000 breeding birds (Henny and Anderson 2007). They nest in four distinct geographic areas: (1) The SCB, which includes southern California and northern Baja California, Mexico; (2) southwest Baja California; (3) the Gulf of California, which includes coastlines of both Baja California and Sonora, Mexico; and (4) mainland Mexico further south along the Pacific coastline (including Sinaloa and Nayarit) (Service 1983).

During the late 1960s and early 1970s, the SCB population declined to fewer than 1,000 pairs and reproductive success was nearly zero (Anderson *et al.* 1975). In 2006, approximately 11,695 breeding pairs were documented at 10 locations in the SCB: three locations on Anacapa Island, one on Prince Island, and one on Santa Barbara Island in California; three on Coronados Islands, one on Islas Todos Santos, and one on Isla San Martin in Mexico within the SCB (Henny and Anderson 2007). The populations on Todos Santos and San Martin islands were previously extirpated in 1923 and 1974, respectively; however, these were recently found to be occupied (Gress *et al.* 2005). Todos Santos Island had about 65 nests in 2004, but there were no nests in 2005. This colony is currently considered to be ephemeral, occurring some years and then not others (Gress *et al.* 2005). At San Martin Island, 35 pairs were reported in 1999, a small colony was noted in 2000, and 125-200 pairs were seen in 2002, 2003, and 2004 (Gress *et al.* 2005).

The southwest Baja California coastal population has about 3,650 breeding pairs, the Gulf of California population is estimated at 42,970 breeding pairs, and the mainland Mexico population has about 12,880 breeding pairs (Henny and Anderson 2007). The Gulf of California population remained essentially the same from 1970 to 1988 (Everett and Anderson 1991). It is thought that populations in Mexico have been stable since the early 1970s (when long-term studies began) because of their lower exposure to DDT, although annual numbers at individual colonies fluctuate widely due to prey availability and human disturbance at colonies (Everett and Anderson 1991). In summary, preliminary estimates of nesting pairs in 2006 suggest a large and healthy total breeding population for California and the Pacific coast of Mexico (Henny and Anderson 2007).

2. Distribution and Abundance of Southern California Bight (SCB) Pelican Population

As described above, the SCB brown pelican population was estimated to be about 11,695 pairs in 2006, which was a non-El Nino year and, therefore, provided near optimal conditions for breeding (Henny and Anderson 2007). These near optimal conditions likely induced much of the adult population to attempt to breed and may explain why the 2006 estimate is substantially higher than the estimate of 6,000 pairs based on surveys through 2003 (Gress *et al.* 2005).

The SCB pelican population declined to fewer than 1,000 pairs, and reproductive success was nearly zero, during the late 1960s and early 1970s (Service 1983). Reproductive success and population numbers began recovering in the late 1970s, although the Coronados Islands colony in the SCB declined and experienced low productivity from the late 1970s to the late 1980s due to chronic human disturbance from fishermen visiting the islands and possible overfishing (Anderson 1988). It is thought that many of these pelicans went to Anacapa and Santa Barbara Islands because a colony was established at Santa Barbara Island in the early 1980s after a 50-year or longer absence and the Anacapa Island colony increased dramatically during this time (Service 1983; Gress *et al.* 2005). The largest colony in the SCB occurs at West Anacapa Island, with a mean of 4,500 nesting pairs and a mean of 0.67 young fledged per nest attempt from 1985 to 2005 (Service 2007c; Gress *in litt.* 2005). The Santa Barbara Island colony has continued as the second-largest colony in the SCB since the 1980s, with a mean of 825 pairs from 1985-2005. The Coronados Islands had a mean of 630 pairs from 1985 to 2005 (Gress *in litt.* 2005); however, this colony has improved in recent years and there were about 830 pairs per year from 2002 to 2004 (Gress *et al.* 2005; Gress *in litt.* 2005). San Clemente Island does not support a breeding colony of the California brown pelican.

Habitat Affinity

Brown pelicans nest in colonies on offshore islands with limited mammalian predators and human disturbance, are of sufficient elevation to prevent flooding of nests, and are associated with an adequate and consistent food supply. During the non-breeding season, which varies between colonies, but typically extends from July to January, brown pelicans roost communally. Roosting sites and loafing areas are essential habitat for breeding brown pelicans and non-breeding local and migrants from Mexico. Brown pelicans are tropically-derived seabirds that have wettable plumage so they must have terrestrial roost sites to dry their plumage after feeding or swimming (Jaques and Anderson 1987). Roost sites are also important for resting and preening. The essential characteristics of roosts include: nearness to adequate food supplies, presence of physical barriers to predation and disturbance, sufficient surface space for individuals to interact normally, and adequate protection from adverse environmental factors such as wind and surf (Jaques and Anderson 1987). Offshore rocks and islands; river mouths with sand bars; and breakwaters, pilings, and jetties are important roosting sites. Adult brown pelicans are efficient predators, and therefore many individuals spend a considerable portion of the day on land, and all congregate at night roosts during the dark hours (Jaques and Anderson 1987). Pelican concentrations shift in response to prey distributions. The dispersion of suitable roost sites influences bio-energetic considerations, not only for shelter, thermoregulation, and

plumage maintenance, but for efficient travel time to food resources (Jaques and Anderson 1987). Communal roosts may also provide increased protection from potential predators, act as centers for social facilitation of food finding, and other functions yet to be identified.

Offshore habitat associated with island colony sites is also essential habitat for California brown pelicans. Brown pelicans are dependent on food resources near the colony site during the breeding season. The offshore zone within 29 to 48 km (18 to 30 mi) of the colony is critical to pelican food supplies, especially when young are being fed (Anderson and Gress 1984). Waters near colony sites are also important for wintering migratory birds and for newly-fledged young when they begin feeding for themselves. Offshore aquatic habitat, including the abundance and availability of brown pelican food resources, is a major factor in determining the population status of brown pelicans and the degree of breeding success (Service 1983).

Life History

The nesting season for the brown pelican occurs in summer and autumn. Adult pairs congregate in densely populated nesting colonies on offshore islands. Adults fly out to sea to forage by plunge diving into fish schools near the surface of the water. Juveniles grow rapidly during years when fish are abundant but substantial juvenile mortality may occur during years when populations of prey species decline. Pelicans require several years to reach sexual maturity, during which they wander along the coast from Central America to southwestern British Columbia. Northerly movements are generally restricted to warmer seasons of the year, most commonly June through October.

Adult brown pelicans are primarily fish eaters and consume up to 2 kg (4 lbs) of fish per day. Their diet consists mainly of northern anchovy, Pacific sardine (*Sardinopus sagax*), and other surface-schooling fish (Anderson *et al.* 1980, 1982; Anderson and Gress 1984). To catch fish, they dive steeply into the water from as high as 18 to 21 m (60 to 70 ft) above the surface, where they may submerge completely or only partly depending on the height of the dive, and surface with a mouthful of fish. California brown pelicans are rarely found away from salt water and do not normally venture more than 32 km (20 mi) out to sea.

Threats

Brown pelicans experienced widespread reproductive failures in the 1960s and early 1970s. Much of the failure was attributed to eggshell thinning caused by high concentrations of dichlorodiphenylethylene (DDE), a metabolite of dichlorodiphenyltrichloroethane (DDT). Other factors implicated in the decline of this species include human disturbance at nesting colonies and food shortages. In 1972, the U.S. Environmental Protection Agency banned the use of DDT in the United States and placed restrictions on the use of other pesticides. Since then, the level of chemical contaminants in pelican eggs has decreased, and brown pelican nesting success has subsequently increased.

Current threats facing the endangered brown pelican include the following: nesting and roosting habitat destruction from coastal development; storm effects to habitat, particularly along the U.S. Gulf Coast; human disturbance of nesting and roosting pelicans; fluctuations in prey abundance due to changes in weather patterns (*i.e.*, frequency of El Nino events) or overfishing; and persistence of DDT and other pesticides in the marine environment (Service 2008). Despite the potential threats identified above, brown pelican numbers rangewide have generally been stable or increased in recent years. Almost all of the U.S. nesting sites are protected from habitat destruction and human disturbance, and a significant number of nesting sites outside the U.S. are also protected. Large hurricanes have degraded nesting and roosting habitat along the U.S. Gulf Coast in recent years, but the great majority of nesting and roosting habitat remains, and pelicans have shown that they are capable of dispersing from damaged nesting sites to use new sites. In addition, Federal and State agencies are anticipated to continue active maintenance and restoration of barrier islands that may serve as nesting and roosting habitat for pelicans. Fishing along the west coast of the U.S. for northern anchovies, a primary food source for brown pelicans, has been very limited in recent years due to a depressed market, which is thought to be a long-term or possibly permanent condition. DDT and other pesticides persist in the marine environment, particularly in southern California, and may be continuing to suppress productivity. However, DDT levels in the environment continue to drop, and population numbers of brown pelicans in affected environments continue to remain steady or increase (Service 2008).

1. Threats to SCB Pelican Population

Although food availability, human disturbance at breeding and roosting sites, and chronic levels of DDT in the marine environment may still be suppressing productivity, brown pelican population numbers have increased steadily in the SCB. After experiencing nearly complete reproductive failure during the late 1960s, with nesting attempts often numbering less than 1,000 per year until the late 1970s, brown pelican productivity started to improve following the ban on DDT, although the Coronados Islands colony in the SCB declined and experienced low productivity from the late 1970s to the late 1980s due to chronic human disturbance from fishermen visiting the islands and possible overfishing (Anderson 1988). The increase in productivity that started in 1974 was correlated with an increase in eggshell thickness. Since 1974, food availability has become the most important limiting factor influencing brown pelican breeding success within the SCB, and both nesting attempts and productivity can fluctuate greatly year-to-year based on the availability of small surface-schooling fishes. The brown pelican was the first federally listed seabird to apparently recover from the effects of pesticides.

Environmental Baseline

San Clemente Island is not used as a breeding site by California brown pelicans, although islands to the north and south of San Clemente Island (Los Coronados, Santa Barbara Island) do support nesting colonies of the California brown pelican. Pelicans do, however, frequent the nearshore and offshore waters surrounding San Clemente Island, and beaches, shoreline, and offshore rocks are used as onshore roosting sites. Aerial surveys of the island in 1992 and 1993 detected 92 and 348 pelicans, respectively (U.S. Navy 2002) concentrated in two roosting areas: Castle Rock, a

rock cluster that lies about 900 m (2,953 ft) from shore at the northern end of the island and Bird Rock, which also lies off the northern end of the island, about 1.0 km (0.6 m) east of Castle Rock. Post-1993 aerial survey information is not available. However, brown pelicans were commonly seen by Science Applications International Corporation (SAIC) personnel in November 1998 at Wilson Cove and other northern San Clemente Island locations, as well as flying over the water on the eastern side of the island, but none were observed resting or roosting on beaches or cliffs on the island itself. Brown pelicans were seen in large numbers on Bird Rock during SAIC surveys in May 2000, mixed in with double-crested cormorants (*Phalacrocorax auritus*) and western gulls (*Larus occidentalis*), and in May 2005 at Wilson Cove. A few small groups and individuals were also seen at that time in Horse, China, and Pyramid Coves, flying offshore of SHOBA.

Existing activities potentially affecting California brown pelicans include NSW training activities, heavy ordnance use, and underwater demolitions that occur in the vicinity of offshore rocks and beaches surrounding San Clemente Island where pelicans may be roosting. The potential effects of NSW development and use of the small arms range (also called the “Steel Ranges”) were addressed in a Biological Opinion dated January 17, 2001 (FWS 1-6-00-F-19) regarding the development of TARs on San Clemente Island; however, we have not previously consulted on the effects of ongoing underwater demolitions. The January 17, 2001 Biological Opinion anticipated that up to three brown pelicans that use Castle Rock as a roosting area could be injured or killed each year due to use of the rifle range at TAR 4. However, in coordination with the Service, NSW planners oriented the range in a manner that is expected to reduce the potential for a direct hit to the brown pelicans that inhabit the vicinity of Castle Rock. Therefore, although a stray bullet may occasionally kill or injure a pelican, the number is anticipated to be significantly lower than the three pelicans per year described in our previous biological opinion. Occasional disturbance of roosting pelicans was also anticipated as a result of using the rifle range. However, the rifle range was built near the maximum limits of where one might expect disturbance of pelicans due to small arms fire, and there is a reasonable likelihood that pelicans exposed to the sound of distant gunfire for 300 days per year have become acclimated to the noise (Service 2001a).

Effects of the Action

The proposed action includes a variety of activities that will likely disturb or temporarily displace California brown pelicans that are using offshore waters and onshore roosting sites and, in a few rare cases, kill or injure individual birds. Activities with the potential to affect pelicans include: increased frequency in ship-shore training activities within Impact Areas I and II; continued use of the rifle range in TAR 4 north of the San Clemente Island runway; increased underwater demolitions training within TAR 2, TAR 3, TAR 21, and the newly designated TAR 8; increased transportation to and from the island using boats, planes, and helicopters; and increased amphibious landings at Northwest Harbor (TAR 2 and 3), West Cove (TAR 5), Horse Beach (TAR 21), and Wilson Cove (no TAR). However, as described below, these disturbances are anticipated to be temporary, and most of the training activities using heavy ordnance, which has the greatest potential to disturb pelicans, will be concentrated in the Impact Areas in the southern portion of the island, away from the Castle Rock and Bird Rock roosting sites off the

northern tip of the island. In addition, the Navy will implement measures to minimize death or injury to pelicans and disturbance of the Castle Rock and Bird Rock roosting sites. Therefore, the proposed activities are not anticipated to substantially impair pelicans' essential foraging and roosting behaviors.

The use of heavy ordnance during ship-shore training will be concentrated in Impact Area I and II in the SHOBA on the southern end of the island. A few pelicans may be loafing on the beaches (China Beach or Horse Beach) or foraging in the near-shore water in the vicinity of Impact Areas I and II at the start of a training exercise, and these individuals are likely to move to other areas to forage or loaf due to the noise from ordnance landing and exploding in the Impact Areas. There is a possibility that an individual or individuals may be injured or killed by a round if it lands in the vicinity of pelicans; however, all of the targets are onshore above the beaches, and pelicans will likely move out of the vicinity of the training exercise after it begins, so the possibility of a direct hit is unlikely. Due to their low density in open waters, particularly with increasing distance from shore (Bonnell 1994), and the likelihood that any pelicans in the vicinity would relocate to less disturbed areas during the proposed operations, the risk of a brown pelican in the air being hit by a projectile fired from a ship is also unlikely.

Small arms exercises are conducted onshore; however, the range of munitions extends almost a mile offshore. During use of the rifle range, nearshore waters are cleared of boating activity due to the safety risk. Castle Rock lies offshore north of San Clemente Island within the range of small arms used in the range adjacent to TAR 4. In our January 17, 2001, Biological Opinion addressing the development of TAR 4 and use of the rifle range, we anticipated that up to three pelicans per year could be injured or killed by stray bullets from the rifle range. However, in coordination with the Service, Naval Special Warfare planners oriented the range in a manner that is expected to reduce the potential for a direct hit to the brown pelicans that inhabit the vicinity of Castle Rock.

Underwater demolition, to teach the safe use of explosives for beach clearance, is conducted in the nearshore areas of the Northwest Harbor area, including TAR 2 and 3 (BUD/S Beach and Graduation Beach), and TAR 21 (Horse Beach) and SOAR, and SWAT offshore waters. Underwater demolition exercises may entail a single explosion, or a series of explosions (multiple charges). The largest of the underwater demolitions is a Mat Weave, which is comprised of 6 charges of 8 m (25 ft) demolition tubing. During any given exercise there may be a few pelicans foraging in the area or resting on the water nearby. Underwater demolition exercises may disturb pelicans if they are present within the vicinity of training exercises. Pelicans may also prey upon the stunned or dead fish that are present in the water column after an underwater demolition exercise. If multiple charges are used, pelicans may be attracted to fish that have been stunned or killed by an initial charge, then suffer injury or fatality by a subsequent charge.

To reduce the possibility of harming or killing a pelican, the NSW personnel currently refrain from conducting demolition exercises until birds are out of the area. The Navy will continue this measure to ensure that California brown pelicans are not in proximity to over-blast pressure prior

to underwater demolition activities. In addition, sequential underwater detonations will be conducted either less than 10 seconds apart or greater than 30 minutes apart to avoid impacts to birds attracted by fish kill. It is important to note that no instances of harm or mortality to brown pelicans have been recorded under baseline levels of this training activity.

Fish, the primary prey item of California brown pelicans, may be injured or killed from the detonations; however, limited nearshore and offshore areas would be affected, and the potential loss of this food source to pelicans is insignificant. Pelicans may take advantage of the foraging opportunity provided by fish affected by underwater detonations.

Boats, helicopters, and airplanes are used to transport people and equipment to and from the island. These activities have the potential to disturb pelicans in proximity to the boats and aircraft and possibly to kill or injure a pelican as a result of an airstrike. Fixed-wing aircraft departing NALF San Clemente Island will occasionally fly over Castle Rock. However, departing aircraft are in a climbing pattern and would be more than 152 m (500 ft) above Castle Rock and would not disturb pelicans. UAVs operating in their normal altitudinal ranges are not expected to disturb pelicans because of their small size and quiet operation. In addition, the Navy will implement the following measures to reduce the potential for roosting pelicans to be disturbed and for pelicans to be struck by vehicles: helicopters and boats will be routed away from Castle Rock to the maximum extent practicable when transporting people to and from TAR 4, and a minimum distance of 100 m (328 ft) for helicopters and 25 m (82 ft) for vessels from Castle Rock will be maintained when transporting people from shore. These avoidance and minimization measures were committed to in association with our January 17, 2001, Biological Opinion addressing the development of TARs on the island and will continue to be implemented in association with the proposed project. The potential for pelicans to be struck by aircraft is low. Based on information within the BA, the lowest flight level that is allowed for aircraft during offshore Mine Laying Exercises at San Clemente Island Range Complex (SCIRC) is 61 m (200 ft) above sea level during daytime. Since pelicans typically fly less than 18 m (60 ft) above sea level, the potential for airstrike is unlikely.

In summary, with the proposed avoidance and minimization measures, the training activities are anticipated only to displace a few pelicans at a time and minimize disturbance of the identified roosting sites at Castle Rock and Bird Rock. Displaced pelicans are anticipated to move from the area where training activities are taking place and forage or roost at another location. This disturbance is not anticipated to substantially impair the pelicans' ability to conduct essential foraging and roosting behaviors. The likelihood of a pelican being injured or killed during any particular training activity is low, but with a wide variety of training activities, including ship-shore bombardment and use of the rifle range, taking place in areas where pelicans forage and roost, it is likely that a few individual pelicans will be killed or injured, although such events are anticipated to be rare. The previous biological opinion estimated that three pelicans per year would be injured or killed by stray bullets from the rifle range, but this number is anticipated to be substantially lower as a result of the reorientation of the range. With reorientation of the range, we estimate up to one pelican per year will be impacted through use of the rifle range, and two pelicans per year will be impacted by all other training activities on the island, for a total of

three pelicans per year that may be killed or injured as a result of the existing and proposed increase in training activities.

Conclusion

After reviewing the current status of the brown pelican, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the brown pelican. We have reached this conclusion for the following reasons:

- (1) Currently-listed brown pelican populations are very widely distributed along the coast of the Gulf of Mexico from Mississippi to Texas; along the Pacific Coast from British Columbia, Canada, south through Mexico into Central and South America; and in the West Indies. The global population of the listed entity, which does not include birds along the Atlantic Coast of the U.S., Florida, or Alabama, is estimated to be over 620,000 birds. The status of brown pelicans, including the California brown pelican and the SCB population (estimated to be 11,695 pairs in 2006), has significantly improved since its listing in 1970 to the point that the Service in 2008 proposed the entire species for delisting;
- (2) The death or injury of up to three pelicans per year in association with the proposed training would remove about 0.01 percent of the SCB population and a tiny fraction of the listed entity each year; the Navy has committed to conservation measures that will minimize this impact;
- (3) The disturbance of foraging and roosting pelicans on San Clemente Island is not anticipated to substantially impair their ability to conduct essential foraging and roosting behaviors; and
- (4) San Clemente Island does not support a breeding colony of brown pelicans, so the proposed action will not affect the species' reproduction.

San Clemente Loggerhead Shrike (*Lanius ludovicianus mearnsi*)

Status of the Species

Listing Status

The San Clemente loggerhead shrike was listed as endangered on August 11, 1977 (42 *Federal Register* 40682) due to its declining population size from past habitat degradation, feral predators, and anthropogenic threats. The San Clemente loggerhead shrike is addressed in the Channel Islands Recovery Plan (1984). Critical habitat has not been designated for this species.

Species Description

The San Clemente loggerhead shrike is one of eleven subspecies of loggerhead shrike and occurs only on San Clemente Island. The San Clemente loggerhead shrike is a medium-sized (45-50 grams (g) (1.6-1.8 ounces (oz)) passerine that resembles the mockingbird (*Mimus polyglottus*) in its striking black, white, and gray plumage. Like other subspecies of loggerhead shrike, the San Clemente shrikes have gray backs, light breasts, black wings with prominent white patches at the base of the inner primaries, and black tails with white bars and outer edgings. Tail and wings are often flashed in various displays that emphasize the contrasting white and dark features (Cade 1962). These shrikes have large heads, as the common name implies, with black facial marks around the eyes, and powerful, black, hooked bills with a subterminal maxillary tooth on each side enabling these predators to kill vertebrate prey their own size and larger by biting the neck and disarticulating the vertebrae (Cade 1967; Smith 1973).

Habitat Affinities

During the past 30 years the shrikes on San Clemente Island have been restricted to nesting predominantly in sparse wooded habitats that have undergone severe degradation from over-browsing by goats and pigs (Scott and Morrison 1990; Kellogg and Kellogg 1994; Juola *et al.* 1997). Shrubs and trees suitable for shrike nesting are predominantly restricted to steep canyons on the southern third of the island and along the eastern escarpment and occupy only two percent of the landscape (Kellogg and Kellogg 1994). The distribution of appropriate nesting substrate has begun to increase as shrub cover has expanded on the island in response to the removal of goats and pigs. Nests have been found at several sites on the San Clemente Island plateau in recent years in addition to well-established sites within canyons. Nests have occurred most frequently in isolated or small stands of lemonade berry, island cherry (*Prunus lyonii*), and toyon (*Heteromoles arbutifolia* and *H. macrocarpa*) (Scott and Morrison 1990), but also occasionally in island oak (*Quercus tomentella*), California sagebrush, California lilac (*Ceanothus* spp.), coyote bush, and cholla (*Opuntia prolifera*) (Mader and Warnock 1999). Nests have also occurred within human structures, including buildings, fencelines, and junk piles. Juola *et al.* (1997c) compared vegetation community abundance island-wide to the amount of each community found in breeding territories. Canyon shrub/woodland and maritime desert scrub cholla phase were used disproportionately to their percent cover on the island, a fact likely due to the presence of suitable shrubs for nest sites and cover in these plant communities.

Canyon/shrub woodland and maritime desert scrub cholla phase, combined, are currently found on approximately 16 percent of the island or 2,282.18 ha (5,637 ac). Thus, the nesting habitat on San Clemente Island remains very limited owing to the absence, in many areas, of trees and shrubs suitable for nesting. Numerous areas on the island show evidence of shrub and tree regeneration since the removal of goats and pigs in the early 1990's, and active restoration efforts may also accelerate regeneration of shrub and canyon woodland communities.

Loggerhead shrikes generally occupy open, xeric to mesic grasslands interspersed with widely spaced trees and shrubs, preferably with some bare ground (Yosef 1996). Components of habitat

that are important to shrikes include: a) sufficiently spaced, exposed hunting perches (1-2 m (3.3-6.6 ft) high) for observing prey, b) impaling structures for holding and storing prey, c) prey abundance and availability (facilitated by short grass and bare ground), and d) densely foliated shrubs or small trees (preferably thorny ones) with suitable nest sites 1.0-3.0 m (3.3-9.9 ft) above ground (Yosef 1996). These components are often found in natural scrub desert, shrub-steppe, western oak savanna, and southern savanna vegetation types, but also in a variety of agricultural landscapes, especially well-grazed pastures separated by hedgerows or trees planted as wind breaks and ornamentals, as well as in some suburban and lightly industrialized areas (Cade and Woods 1997).

Life History

San Clemente loggerhead shrikes feed on a wide variety of vertebrate and invertebrate prey (Scott and Morrison 1990), including small arthropods, small birds, small mammals, and lizards. Primarily sit and wait foragers, shrikes typically take a stand on a favorite perch and make attacks out and back from there. Shrikes catch and carry only one item per foray, but they are capable of flying with prey equal in size to their own body mass. They process and tear apart large prey by impaling it on thorns or other sharp objects or by wedging it tightly into the fork of a branch. Smaller prey (less than about 12 mm/0.5 in) is usually consumed whole.

On San Clemente Island, shrikes forage in canyons where nesting occurs and also on the plateaus and shoreline strands. They typically hunt from perches such as snags, shrubs, dead cholla stalks, and rock outcrops in sparsely vegetated areas, but they may also be seen using fence posts, wires, and utility poles and lines along roadways.

Loggerhead shrikes show a high degree of intraspecific aggression and occupy all-purpose territories (Yosef 1996). In some southern populations (*e.g.*, Florida), mated birds remain together in the same territory all year (Yosef 1996), while in other areas the male holds a permanent territory and the female leaves after breeding and takes up residence in separate adjoining territory. On San Clemente Island, male shrikes typically remain on the nesting territory throughout the winter months, and individuals seen during the winter months away from known breeding territories typically include females, local birds of the year, and wintering birds from off-island (see Mundy *et al.* 1997a and b; Mader and Warnock 1999; Heath *et al.* 2007).

San Clemente loggerhead shrikes begin forming pair-bonds as early as December, but January is the main period for early breeding behavior. Pair-bonds often form between the same individuals if both mates have survived the winter, but some individuals switch mates, even in the same season (Warnock and Mader 1999). Females do most of the nest-building, with males bringing some nest materials and food to females as they construct. Loggerhead shrikes often build more than one nest before starting to lay eggs. Courtship feeding and copulation precede laying by a week or more. Clutch completion usually occurs in mid-March. Second and other breeding attempts may extend the laying season into June. San Clemente loggerhead shrikes lay 4-6 eggs (mean 5.1 \pm 0.8 SD). Incubation ranges from 15 to 18 days (Cade 1992; Yosef 1996). Only females incubate and develop brood patches. Males feed their mates at the nest. Young

loggerheads stay in their nests for 16-20 days, typically 17 days (Yosef 1996). Young often remain on branches close to their nests for 4-5 days after departure. Disturbance of the nest can cause premature departure even before 16 days of age. Wing and tail feathers are still growing at the time of departure, and their growth is not completed until some 30 days after hatching. Consequently, fledglings are extremely vulnerable to predators.

On San Clemente Island, parental care (feeding and protection) of fledglings lasts from 25 to 95 (mean 50 +/-11.9 SD) days (Scott and Morrison 1990). Young begin foraging for themselves at approximately 30 days of age, but hunting skills develop gradually, and the parents continue to feed the young for 25 days after they leave the nest. During this fledgling period, young shrikes disappear from family groups at different periods, but it is usually not possible to tell whether these disappearances result from fatalities or from individual differences in juvenile dispersal times. Also, in some families the adult female abandons her mate and young during the fledgling period to nest again, leaving the male to complete parental duties (Yosef 1996).

Juvenile shrikes remain sociable after leaving the nest during the fledgling period when they are still dependent on their parents for food and protection. Around the time that fledglings disperse from their natal territory, they become increasingly intolerant of each other and display intraspecific aggressiveness. The parent shrikes also display aggression towards the fledglings during this period. After dispersal from the natal territory the young of the year take up a single, independent existence and become territorial, presumably by early winter.

Rangewide Distribution and Threats

Since the entire distribution of the San Clemente loggerhead shrike is restricted to the action area of San Clemente Island, its island-wide distribution and current threats to the species are discussed in the Environmental Baseline section below.

Conservation Needs

The 2006 Population Monitoring Report for the San Clemente loggerhead shrike (Heath et al. 2007) includes the following recommendations for this species:

- (1) Further efforts are needed to reduce San Clemente loggerhead shrike mortality associated with human activities, particularly impacts with moving vehicles. The approved plan to pave San Clemente Island Ridge Road may increase overall traffic speed through shrike habitat, which is likely to reduce driver ability to respond to wildlife in the roadway. Methods of decreasing vehicle speed should be explored, including movable speed bumps, warning signs, and more stringent enforcement of existing speed limits. Education of island residents could also help reduce the number of shrikes that are adversely affected by hazards such as sticky rodent traps, waste oil canisters, water buckets, etc.

- (2) Habitat restoration efforts should be continued to improve nesting habitat, provide protective cover, and mitigate the deterioration of habitat quality caused by anthropogenic disturbances such as military activities and consequent invasion by non-native plant species.
- (3) A population model should be developed to aid in the management of the species and the development of a Recovery Plan.

Environmental Baseline

Distribution

The San Clemente loggerhead shrike is distributed primarily within the southern 2/3 of San Clemente Island. During the early 1990's, distribution was restricted to several canyons at the southern end of the island, and most of these were in the immediate vicinity of Impact Areas I and II. Since that time, the distribution on the island has increased to include additional habitat on the east side and west side of the island. Significantly, an increasing proportion of the shrike population is distributed away from Impact Areas I and II and the potential effects of heavy ordnance training and operations. While shrikes are more broadly distributed away from Impact Areas I and II, they remain well distributed throughout SHOBA. Although relatively fewer shrikes are present in SHOBA at the present time compared to the early 1990's, between 30 and 36 percent of the shrike population used breeding habitat in SHOBA between 2004 and 2006 (Bradley *et al.* 2007).

Shrikes are often distributed in a linear fashion, using habitat found within and adjacent to deeply incised canyons. The mean linear abundance of nesting loggerhead shrikes reported from selected canyons between 1994-2000 (Table 9) was the same as the mean linear density reported in 1990 (Scott and Morrison 1990). Since 2001, however, the mean linear density of nesting shrikes has increased in all canyons with the exception of China Canyon (where mean linear density was already high), located adjacent to Impact Area II (Table 9). Increases were generally greater for canyons outside SHOBA than those inside SHOBA, likely because initial densities were lower outside the SHOBA, and release of captive-reared shrikes was focused in areas outside the SHOBA.

Table 9. Linear abundance of nesting loggerhead shrikes on San Clemente Island from selected canyons (1994-2004)

Canyon Name	Mean number of shrike pairs/km 1994-2000 ^a	Mean number of shrike pairs/km 2001-2004
Cave ^c	0.2	0.5
Horse ^c	0.1	0.7
Box	0.2	1.3
Norton	0.2	1.0
Middle Ranch	0.1	0.5
Wallrock	0	0
China ^c	0.7	0.8
Horse Beach ^c	0.1	0.2
Average	0.2 ^b	0.6

^a The shrike population remained relatively static up to the year 2000 and began sharply increasing in the year 2001.

^b The same average density reported by Scott & Morrison 1990.

^c Canyon located within the SHOBA boundary

Around the turn of the century, the loggerhead shrike was considered “tolerably common” and well distributed on San Clemente Island (U.S. Navy 2002). However, early field ornithologists, such as Grinnell, did not quantify their narrative assessments of species abundance, so it is not possible to make a numerical interpretation of the phrase “tolerably common.” Between 1985 and 1998 the population estimates ranged from 6 (1988) to 16 pairs (1994) (U.S. Navy 2002). After 1998, efforts to increase the distribution and abundance of the loggerhead shrike were intensified and the San Clemente Recovery Program began to play an important role in improving the status of the San Clemente loggerhead shrike. The shrike population increased from four breeding pairs in 1991 to over 40 breeding pairs in 2005 (Lynn *et al.* 2006). In 2006 and 2007, the numbers of breeding pairs were 50 (Bradley *et al.* 2007) and 48 (Bradley *et al.* 2008), respectively (Table 10).

Table 10. San Clemente Island Loggerhead Shrike Breeding Pairs from 1994 to 2007

Year	1994	95	96	97	98	99	2000	01	02	03	04	05	06	07
Pair Estimate	32	29	16	20	14	22	22	49	40	40	55	40	50	48

The number of geographically distinct breeding sites that have recorded use by shrikes on San Clemente Island is approximately 106, if all sites are compiled through 2007 (U.S. Navy, unpublished data 2008c). Since sites appear to be used repeatedly, sites that have been used in the past are likely to be used in the future. The location of both currently used and formerly used

nest sites relative to training areas provides information regarding the anticipated future impacts of training activities on the island.

The most recently used sites reflect the current distribution of San Clemente loggerhead shrikes; however, we anticipate the distribution and abundance of this species to continue to increase in response to the active recovery program that includes release of shrikes hatched in captivity. As distribution and abundance increase, it is likely that shrikes will most often use territories that are currently, or have recently, been used. Table 11 outlines the distribution of shrikes in or within 305 m (1,000 ft) of operational areas of the island.

Note that the operational areas are largely overlapping (*i.e.*, Impact Areas I and II are fully contained within the SHOBA.).

Table 11. Distribution of shrike nest sites in and within 305 m (1,000 ft) of operational areas.

Operational Area	Nest sites within operational area, including current and former sites (% total nest sites)	Nest sites within 1,000 ft of operational area (% total nest sites)	2007 Nest sites within operational area (% 2007 total sites)	2007 Nest Sites within 1000 ft of operational area (% total 2007 sites)
SHOBA	66 (62)	n/a	27 (56)	n/a
Impact Areas I and II a,b	9 (8)	8 (8)	unknown	3(6)
AFP 6	0 (0)	1 (1)	0 (0)	0 (0)
IOA/AVMA	6 (6)	n/a	0 (0)	n/a

a Sixteen percent of the current and former shrike nest sites are in, or within 305 m (1,000 ft) of Impact Areas I and II (combining first two columns in table).

b Six percent of the known nest sites active in 2007 are in or within 305 m (1000 ft) of Impact Areas I and II. The actual number of active nest sites may be higher, since the area within Impact Area boundaries were not monitored in 2007.

Threats

A number of threats exist for San Clemente Island Clemente loggerhead shrike, including baseline levels of ordnance use, fires, fire management activities, air traffic, and vehicle use (Biological Opinions FWS 1-6-97-F-21, FWS-2808, FWS 1-6-04-F-3934.1). Most of the baseline threats to this species associated with human activities are concentrated in the area surrounding Impact Areas I and II. Baseline operations at Impact Areas I and II include extreme levels of noise and vibration during ordnance use and elevated fire frequency predominantly on the plateaus surrounding China, Horse Beach, Red, and Kinkipar Canyons. Fires, fire management, and air traffic are also most likely to occur in this area. The percentage of the island-wide shrike population that inhabits the immediate vicinity of Impact Areas I and II has declined since 1998, when 40 percent of the known breeding population was within 305 m (1,000 ft) of Impact Area boundaries. Currently, 16 percent of the total documented nest sites

occur in or within 305 m (1000 ft) of Impact Areas I and II. This change reflects the increasing abundance and distribution of shrikes on other parts of the island.

Baseline levels of ordnance use present a threat to San Clemente loggerhead shrikes because of the proximity of current nesting locations and available nesting habitat to Impact Areas I and II. Ordnance currently exposes shrikes nesting in proximity to Impact Areas to increased risk of being directly hit, or being disturbed by noise associated with heavy ordnance use to a level that would affect their feeding, breeding, or sheltering behaviors. There is no conclusive information linking nest failure or shrike disappearance at any of the nests in canyons close to Impact Areas I and II to ordnance use in the vicinity. It is possible that such losses have occurred, but access limitations preclude monitoring within the Impact Areas where losses are more likely. Access limitations (due to the volume of operations being conducted within SHOBA during which monitoring cannot be conducted for safety reasons) also reduce the frequency of monitoring in areas adjacent to Impact Areas. Shrikes are not currently nesting at several previously occupied nest sites within or in proximity to the Impact Areas (*e.g.*, Red 1), which may indicate that disturbance at these sites is too great to sustain ongoing habitation by shrikes. However, shrikes have used many sites intermittently on the island and continue to use some sites in close proximity to the Impact Areas (*e.g.*, China 3), so the absence of shrikes at sites could also be due to other variables unrelated to ordnance impacts.

Depending on their location, timing, and severity, fires may present a threat to the San Clemente loggerhead shrike population due to the proximity of shrike nests to ignition sources. The baseline fire history, including repeated instances in which fires have burned to canyon edges, but not affected nesting habitat in canyon bottoms, has not resulted in a demonstrable decrease in shrikes in the portions of SHOBA that have experienced repeated burns. In addition, there is no conclusive information linking nest failure or shrike disappearance at any of the nests in canyons close to Impact Areas I and II to fires that have occurred in the vicinity. It is possible that such losses have occurred, however access limitations preclude monitoring within the Impact Areas where losses are more likely, and reduce the frequency of monitoring in adjacent areas.

Invasive, non-native plants have exacerbated fire danger to maritime scrub plant communities on San Clemente Island by creating micro-climates that increase the risk of fire during more of the year. Fire can severely impact or eliminate plant populations by killing individual plants, their underground rhizomes, and the soil seed bank, and leave the soil under hydrophobic conditions (Agee 1993; Keane *et al.* 2002; Keeley 2002; Arno and Fiedler 2005). Under baseline conditions, the Navy has significantly reduced the potential for wildfires to occur outside of the Impact Area boundaries by implementation of timing restrictions on training activities that use incendiary devices, maintenance of fuelbreaks around Impact Areas, and providing on-island fire suppression during the fire season. The existing program has resulted in a significant decrease in the number and extent of fires associated with training over the last 7 years.

Baseline fire management activities include maintenance of previously developed fuelbreaks using herbicides, Phos-Chek, and strip burns. The Navy currently coordinates with personnel that monitor shrike nests to reduce the potential for disturbance associated with fuelbreak

maintenance. There have been several instances, however, when burns conducted to maintain fuelbreaks have escaped, with potential to adversely affect shrikes.

Vehicle use presents a threat to San Clemente loggerhead shrikes under baseline conditions because shrikes may forage or nest in the vicinity of roads and may be struck by vehicles if they fly across the road when a vehicle approaches. Approximately one shrike per year is killed as a result of collisions with vehicles under baseline conditions.

The San Clemente loggerhead shrike is also threatened by demographic and environmental stochasticity due to its small population size. For example, in 2006, the ratio of males to females observed in the wild was skewed, with more males present. This resulted in disruption of breeding activities of paired individuals and compromised planned releases associated with the recovery program (Heath *et al.* 2007).

Predation threatens the San Clemente loggerhead shrike under baseline conditions. Low reproductive success has been observed in some years that may be caused by non-native predators (feral cats and rats). The Navy is addressing this threat under baseline conditions by implementing an aggressive non-native predator control program.

Conservation Actions

San Clemente Loggerhead Shrike Recovery Program

In the mid-1990's, the Navy initiated an ambitious program to protect and recover the San Clemente loggerhead shrike, which includes: (1) year-round monitoring, (2) year-round predator management, (3) periodic supplemental feeding, (4) ongoing genetic analyses, (5) on-island captive propagation of shrikes, and (6) annual releases. The program has made a significant contribution to the improved status of this species over the last 10 years. Monitoring has provided important demographic data needed to assess the status of the population, facilitated predator management, provided information necessary for genetic analyses of the population, and allowed the Navy to implement measures to reduce the potential for impacts to individual nesting pairs. Based on an assessment conducted in 2006, predator management and supplemental feeding activities have improved the reproductive success of wild loggerhead shrikes (Heath *et al.* 2006). The captive propagation program has allowed genetic management of the shrike population to maximize the genetic heterozygosity of the population, provided a mechanism for the Navy to address potential impacts to individual nests that cannot be avoided, and provided shrikes for re-introduction into the wild. The shrike recovery program has resulted in the release of 255 San Clemente loggerhead shrikes between 1999 and 2005, of which 87 (34 percent) bred in the wild (defined as laying at least one egg), and 69 (79 percent of the 87 breeders) successfully fledged at least one young. The Navy proposes to continue the program as part of the proposed action.

The Navy's INRMP outlines the successful recovery program that has contributed to the improved status of the San Clemente loggerhead shrike and also includes other conservation

actions that likely benefit the San Clemente loggerhead shrike such as ongoing efforts at invasive plant species control and native plant restoration.

Population Viability Analysis

The Zoological Society of San Diego, with support from the U.S. Navy conducted a population viability analysis (PVA) of the shrike population, using the program VORTEX. Based on the initial assessment of the population demographic variables, the report states that the releases currently conducted as part of the shrike recovery program are a significant factor in ensuring the survival of this population. With increased population size or increased carrying capacity (from habitat restoration), the shrike may be able to maintain viability without the release effort; however, at this time, too little data are available to predict when this might occur.

The purpose of the analysis was to understand the potential effect of shrike incidental take anticipated as a result of the proposed increases in training operations on the island. The analysis assumes that releases will continue at current levels and that the majority of the operational impacts to the shrike at a population level will be in the form of reduced productivity rather than decreases in adult or juvenile survivorship. With these assumptions, the PVA suggested that if operational use results in a 10 percent reduction in reproduction island-wide, extinction risk would increase slightly relative to a scenario without operations.

Effects of the Action

Shrikes on San Clemente Island are likely to be exposed to increased ordnance use, fires, fire management and suppression, vehicle traffic, foot traffic, and invasive species establishment and spread as a result of proposed new and increased training intensity on San Clemente Island in the IOA, Impact Areas I and II, VC-3 AVMA, AFP 6, and TAR 16. The proposed action also includes significant conservation measures that are expected to contribute to the recovery of this species. The proposed action includes increases in use that have the potential to limit the ability of the Navy to implement certain aspects of the San Clemente loggerhead shrike recovery program.

Ordnance Use

An estimated 16 percent of existing and historical nesting sites are in or within 305 m (1,000 ft) of areas that may be subject to heavy ordnance use (Impact Areas I and II). Heavy ship-to-shore ordnance use occurs within Impact Areas I and II under baseline conditions. Shrikes have shown a remarkable ability to persist and successfully reproduce adjacent to this training activity at baseline levels. Shrikes have continued to inhabit and reproduce in areas adjacent to and within the Impact Areas, despite the baseline levels of disturbance associated with training activities. However, the overall percentage of the shrike population that inhabits the area adjacent to the Impact Areas has been reduced as the island-wide abundance and distribution of this species has increased. While the linear abundance of shrikes observed in China Canyon has increased slightly, the linear abundance of shrikes in other canyons away from the Impact Areas (*e.g.*, Box

and Norton Canyons) has increased substantially, likely in response to targeted release of captive-reared shrikes and non-native predator control (Table 9). The frequency and duration of training exercises that include heavy ordnance use are expected to increase as part of the proposed action, which will increase the frequency of disturbances and the risks associated with ordnance use in the vicinity of Impact Areas I and II.

The use of heavy ordnance in proximity (*i.e.*, 305 m or 1,000 ft) to shrikes and/or shrike nests places them at risk from direct impacts (*i.e.*, direct hit, flying debris, pressure blast, and exposure to extreme levels of noise and vibration). In addition, ordnance use may start fires that could affect shrikes, nests, or habitat, as discussed below. The response of shrikes to the disturbance associated with ordnance use has not been observed, but as with any disturbance, shrikes may react by taking flight, seeking shelter, or altering foraging or breeding behavior. The use of howitzers, proposed for AFP 6 will result in noise levels that are also likely to disturb shrikes. The Navy will evaluate nest success data for San Clemente loggerhead shrike in sites nearest AFP 6, including those in Eagle and Cave Canyons, and compare it to other sites in and out of SHOBA with the objective of determining whether or not nest success rates adjacent to AFP 6 are typical for the species.

Operations that combine various exercises are expected to have greater effects on shrikes because of the noise and level of activity. Because operations involving ordnance use in Impact Area I and II happen routinely, shrikes not in the immediate vicinity of target areas are likely to acclimate to the noise and show little or no behavioral response (VanderWerf *et al.* 2000). The sound levels associated with ordnance use may impair shrike communication and associated behavior by making it hard for them to hear vocalizations of other shrikes in the vicinity. Inability to hear vocalizations may affect detection of potential mates or territorial defense. Shrikes, however, have continued to use China Canyon and Red Canyon for nesting, including some territories in or within 305 m (1,000 ft) of Impact Areas. Approximately 16 percent of all former and current nesting sites are in or within 305 m (1,000 ft) of Impact Areas I and II (Table 11). Some territories that have been previously used are no longer used by shrikes, so at some level ordnance use and associated disturbance may affect shrike use of particular areas. To help minimize potential impacts, the Navy has committed to place heavy ordnance targets within Impact Area I and II away from sensitive resources, including San Clemente loggerhead to the extent feasible while meeting operational needs. The Navy's range schedulers will also be provided the location of shrike nests within operational boundaries.

The proposed action includes significant increases in training intensity within Impact Areas I and II, which will increase the frequency and duration of ordnance use in the vicinity of shrike nests within Red Canyon, China Canyon, and Horse Beach Canyon. The lack of occupancy (when most recently monitored) of some previously occupied territories in lower China Canyon and Horse Beach Canyon suggest that at some point, the frequency of operations or duration of operations may reach levels inconsistent with continued occupation by loggerhead shrikes. However, some sites within lower China and Red Canyons (just outside the Impact Areas) remain occupied; thus, occupation of the sites within the vicinity of the Impact Areas may be driven by factors other than frequency of operations. Monitoring in these areas (Red Canyon,

lower China Canyon, and Horse Beach Canyon) has been largely reduced due to safety concerns over the last 4 years, so it is not known whether shrikes have re-occupied these areas. We anticipate that disturbances associated with increased use of ordnance could result in lowered reproductive success or death of 1 pair of shrikes per year.

Fires

Proposed training activities in and around Impact Areas I and II and AFP 6 are likely to result in fires within occupied shrike habitat; however, fires are expected to occur primarily in foraging, rather than breeding, habitat. An estimated 17 percent of existing and historical shrike territories occur in or within 305 m (1,000 ft) of Impact Areas I and II and AFP 6. Fires may be ignited incidental to training operations, and the chances of ignition increase as the number of operations using pyrotechnics, incendiary devices, illumination rounds, and heavy artillery increase, especially if such use occurs during drier conditions. The Navy's FMP is expected to limit the number and extent of fires that burn outside the fuelbreak boundaries. In addition, historical fire patterns are evident from previous fires that have occurred in this area, and they indicate that fires are most likely to burn on terraces and plateaus outside canyons that support most of the shrike nesting habitat. However, fires occasionally burn within the canyons as well. Since 1979, an estimated three fires have burned within China Canyon and Horse Beach Canyon.

Fires that burn through occupied shrike nesting habitat may destroy nests or cause shrikes to abandon active nests. Fires could also kill or injure adult loggerhead shrikes due to smoke or heat in advance of flames. A fire in shrike nesting habitat, or heat and smoke in advance of a fire, could cause nest abandonment and possible loss of eggs or young. Fires that burn through shrike habitat may also cause damage to or loss of trees or shrubs that provide nesting substrate, hunting perches, and cover for shrikes. If fires occur repeatedly in the same area, they could prevent the establishment or re-establishment of trees and shrubs. Loss of trees and large shrubs would have a long-term negative impact for shrikes, because they use trees and shrubs for foraging perches, cover, and nesting.

The recent distribution of breeding shrikes on San Clemente Island has been predominantly in canyons, where trees and shrubs are now distributed. Since fires frequently skip over the canyons rather than burning down into the canyons, recent fires have rarely approached active shrike nests, but they have burned terraces and habitat outside of canyons. Despite the risks associated with fires, no specific losses of shrikes or shrike nests have been definitively attributable to fires. This pattern is expected to continue, although it remains possible that some shrikes or shrike nests within canyons could be lost to fires. The Navy will evaluate nest success data for San Clemente loggerhead shrike in sites nearest AFP 6, including those in Eagle and Cave Canyons, and compare it to other sites in and out of SHOBA with the objective of determining whether or not nest success rates adjacent to AFP 6 are typical for the species.

In some areas in the southern portions of the island, plant communities are recovering from over a century of overgrazing, and trees and shrubs are increasing in distribution to include terraces that are not afforded protection from fires associated with canyon topography. In addition,

changes in vegetation, including increased distribution of non-native invasive plant species, may result in unforeseen changes in fire patterns or frequency. If fires burn into shrike nesting habitat, impacts would be most likely be to nests and young, resulting in local decreases in loggerhead shrike productivity, and indirect effects associated with habitat modification.

Most fires that have occurred within the distribution of shrikes on San Clemente Island have burned within shrike foraging habitat. Such fires can have short term beneficial effects to shrikes because they remove heavy thatch associated with non-native annual grasses and expose prey items, increasing prey availability. The longer term effects of such fires, however, may be to preclude shrub re-establishment on the island plateaus, thereby limiting expansion of shrike nesting habitat on the island.

Measures to prevent and reduce adverse effects on shrikes, particularly from fire, are proposed by the Navy. These measures include development and implementation of the FMP; including an annual review of the placement of firebreaks; maintenance of fuelbreaks, creation of a tiered system of increasing prevention measures and increasing on site and quick response fire fighting capabilities related to increasing fire danger (using an agreed-upon FDRS), maintaining an on-island firefighting helicopter on standby (during fire season when the Fire Danger Rating is above Moderate); post-exercise surveillance to detect incipient fires; and stepwise operational restrictions under increasingly high fire danger ratings. The Navy has also developed and maintains fuelbreaks around Impact Areas I and II to reduce the potential for ignitions that occur within the Impact Areas to burn outside impact Area boundaries and into adjacent habitat.

In summary, while periodic fires are believed to have been a natural occurrence on San Clemente Island and have ecological benefits, fires burning too frequently could have long-term deleterious effects on shrikes by reducing vegetation and viable nesting habitat. One of the focal points of the FMP (U.S. Navy 2005b) is to avoid conditions that could lead to type conversion, such as repeated fires with short intervals that preclude regeneration of woody plants. Based on the fire history, anticipated increases in training, implementation of the fire management plan, we anticipate that few fires will consume canyon woodland habitat and result in direct or indirect adverse effect to San Clemente loggerhead shrikes.

The FMP is proposed as 5-year plan that will be reviewed and revised, if necessary. In addition, annual reviews of fire management activities will allow assessment of impacts and identification of additional measures that may be needed to protect resources. The Navy has identified thresholds that would trigger accelerated review of management. Within canyon woodland habitat, the Navy threshold that would trigger accelerated review is 12 ha (30 ac) over the next 5 years. This acreage exceeds the acreage of canyon woodland habitat identified in upper China Canyon (9 ha (22 ac)) that supports numerous shrike territories. The acreage is more than half of the acreage identified within Horse Beach Canyon (approximately 21.5 ha (53 ac)). Based on fire modeling exercises and historical fire patterns, we anticipate the acreage of fires within canyons will be less than the threshold identified by the Navy. Based on records, which include extensive monitoring of the San Clemente loggerhead shrike population over the last 10 years, no fires have resulted in recorded nest loss; however, we anticipate that increased risk of fires

associated with increased activities is likely to increase the potential for nest loss. We anticipate that operational activities and resulting fires, as managed under the FMP, could result in loss of 1 active shrike nest and 2 adults per year.

Fire Management and Suppression

Fire management and suppression will include maintenance of fuelbreaks that surround Impact Areas I and II and are located within San Clemente loggerhead shrike habitat. Maintenance of existing fuelbreaks in this area entails aerial application of Phos-Chek or herbicide using a low-altitude aircraft and periodic controlled burns along roadways or adjacent to the Impact Areas. These activities have the potential to disturb shrikes and result in the loss of active nests and territories within the footprint of the fuelbreak or proposed burn. In addition, the use of Phos-Chek warrants further study to determine whether this retardant will achieve the desired goals for fire control or cause impacts to the shrike and to determine whether the use of this retardant will facilitate the spread of non-native annual grasses around the Impact Areas. The Navy will minimize impacts to listed species and occupied habitat associated with Phos-Chek application by considering the locations of federally-listed species in advance of fuel break installation, including avoiding application of Phos-Chek within 91 m (300 ft) of mapped listed species to the extent consistent with fuelbreak installation. Under baseline conditions, the Navy coordinates with the Service on a project level when conducting these activities, and we anticipate that this level of coordination will continue under the Navy's annual review process for fires and fire management (U.S. Navy 2005b). This will allow the Navy to avoid impacts to San Clemente loggerhead shrike associated with maintenance of existing fuelbreaks.

Since the boundaries of future fuelbreaks have not yet been identified, we anticipate that the Navy will consult with the Service regarding any future plans to establish fuel breaks with the potential to impact San Clemente loggerhead shrike. Thus, the impacts of new fuelbreaks on San Clemente loggerhead shrike are not considered in this analysis.

Vehicle Traffic

Potential effects from vehicle traffic include disturbance, injury, or mortality to individuals and a chance of damage to nest sites or possible nest abandonment. Vehicle traffic is expected to increase with implementation of the proposed action in VC-3 AVMA, AFP 6, AVMR, and on San Clemente Island Ridge Road and Horse Beach Canyon Road. The Navy has reduced the speed limit on San Clemente Island Ridge Road to 56 km/h (35 mph) in an effort to reduce the potential for collisions with wildlife and has periodically erected temporary signs in some areas to advise travelers of the presence of loggerhead shrikes. Speed limit reductions have proven difficult to enforce, and vehicles are routinely observed by Navy Natural Resources personnel traveling in excess of the posted 56 km/h (35 mph) speed limit (Kelly Brock pers. comm. 2006). Vehicle speed may increase further when the San Clemente Island Ridge Road resurfacing project is complete. Combined with the increased use of the road, it is likely that the potential for vehicle strikes will increase.

We anticipate that the number of vehicle strikes will also increase as shrike abundance increases. Based on the observed mortalities to date, juvenile shrikes are most likely to be hit by vehicles, but it happens only rarely. Thus, based on the recorded frequency of vehicle collisions, the expanding shrike population, and the proposed increase in vehicle travel, we expect shrike deaths from vehicle collisions to increase to two juvenile shrikes per year.

Vehicle traffic within the AVMA's and along the AVMR is also likely to degrade shrike habitat in some areas by soil disturbance, erosion, and spread of invasive plant species. This is expected to occur within the VC-3 AVMA, AFP 6, and on Horse Beach Canyon Road.

Foot Traffic

Because most foot travel does not occur in the canyons and areas where shrikes are known to nest, operations that involve off road foot travel are unlikely to encounter nesting or foraging shrikes. Although small (platoon-sized) groups can patrol on foot in a wide variety of locations on the island, most of their activity would be within TARs or between TARs and not in southern canyons where shrikes have nested in recent years.

All off-road foot traffic involving larger groups of personnel is expected to be confined to the IOA. Since 2001, individual shrike pairs have adopted habitats on the plateau south of TAR 16 for nesting using low shrubs such as coyote brush for the nest sites. Three recent shrike nest sites have been located in coyote brush in proximity to Ridge Road and the AVMR within the IOA. Nests in these sites have the potential to be adversely affected by foot traffic. Shrikes that use habitat within the IOA are likely to experience disturbance associated with troop movements, particularly during the Battalion-Sized Landing, which is proposed 2 times per year as a 4-day event. Troops that move through the IOA would be on foot and would be walking abreast, spaced approximately 5 m (15 ft) apart. During the Battalion-Sized Landing, approximately 1,500 troops will be training, and approximately half will be on foot, moving the length of San Clemente Island toward SHOBA. Troops may also bivouac within the IOA; however, most bivouac activities are expected to occur adjacent to the AVMA's and AFP rather than throughout the IOA.

A shrike in the vicinity of advancing Marines in the IOA would be expected to avoid the approaching troops. However, since Marines would be crossing the landscape abreast of each other at approximately 5-m (15-ft) intervals, shrikes may be temporarily disturbed by their movements and continue to fly in front of the advancing troops. This behavior may disorient the birds and place them in the path of vehicles. For adult shrikes, collisions with vehicles are considered unlikely to occur, particularly on a routine basis. As noted above, juvenile shrikes have collided with vehicles, but the instances of such collisions are rare.

During the breeding season, approaching Marines are likely to cause any shrikes nesting within the IOA in the path of advancing troops to disperse from their nest. If shrikes are flushed in advance of troops and displaced, it is likely that they would return to the nest after the troops have passed. Exposure to passing troops is expected to be brief, since Marines would normally

be spaced apart in formation perpendicular to the direction of travel. However, the number of “waves” of infantry that could be passing through an area has not been determined, so whether there would be repeated exposure to passing groups is not known. Again, direct injury of adults is unlikely, but the potential for injury or death to eggs or nestlings is possible, particularly if adult response results in inadequate attention to the nest and therefore exposes the nests to increased predation risk. It is possible that individuals moving through the IOA could step on, or otherwise physically disturb nests, but we anticipate this risk to be low (*i.e.*, one active nest per year). Thus, the frequency of disturbance from troop movements that results in reproductive losses to shrikes is expected to be low and largely undetectable. Ongoing monitoring of the shrike population is expected to allow some capability of assessing this reproductive loss, since unexpected nest losses subsequent to training activities would be noted.

The future condition of vegetation within the IOA will affect the suitability of this area for loggerhead shrike nesting and foraging. Foot traffic through the area is likely to result in increased distribution and abundance of invasive non-native plants on San Clemente Island. Since large numbers of people will be moving across the landscape, it is likely that they will transport seed and plant propagules within the path of the IOA. The Navy proposes to minimize the potential spread of invasive species by implementing an Invasive Species Control Program. Portions of the IOA already support extensive non-native annual grasslands, which under existing conditions reduce shrike foraging capability by obscuring prey items.

The shrike population is increasing in numbers and distribution, and it is likely that the number of shrikes nesting within the IOA will increase with time as observed shrub re-establishment continues and additional nest sites become available within the IOA. No shrikes used the IOA during the 2007 breeding season, but based on former and current potential nesting sites, up to six sites are present that could be occupied in the future. Additional sites could be occupied as habitat improves. The Navy proposes to reduce the potential for adverse effects to the loggerhead shrike associated with foot traffic by monitoring the locations of shrike nests and giving troops the GPS coordinates of up to four nests (at any one time), which would be identified as a sensitive natural resource during the training operation. This is expected to reduce the potential direct effects associated with the proposed operational increases. With incorporation of the Navy’s proposed avoidance measure to reduce the potential for disturbance, we anticipate that shrikes and their nests will rarely be impacted by training conducted in the IOA (about 1 active nest per year).

Access Restrictions

The proposed action includes safety-driven access restrictions to Impact Areas I and II that will preclude further monitoring of the shrike population within these areas. Nonetheless, the ongoing monitoring that has occurred over the past 20 years provides valuable information regarding successful shrike use of these areas. Active management at shrike nesting territories within Impact Areas has not occurred in recent years under baseline conditions. Predator management along roadways, however, is an important component of the shrike recovery program that could be compromised if not conducted on China Point Road and Horse Beach

Canyon Road (outside the Impact Areas). However, we anticipate that feral cat removal will continue along China Point Road and the majority of Horse Beach Canyon Road. Since management activities that could benefit the shrike are anticipated to continue, we do not anticipate that the inability to monitor the shrikes that inhabit territories within the Impact Areas will preclude recovery of this species.

The number of training operations on San Clemente Island has increased over the past ten years, making it more difficult to accommodate management requirements of the Navy's shrike recovery program. The proposed increases in operational use outlined in the Navy's proposed action are likely to further complicate the Navy's efforts to accommodate these competing interests. However, the Navy has committed to continue the currently successful program of habitat restoration, predator management, monitoring, captive breeding, and re-introduction to benefit the San Clemente loggerhead shrike until such time that recovery objectives are identified and achieved.

In summary, the most likely adverse effects of Navy training activities on shrikes would be a small number of fatalities associated with operations or vehicle use, diminished reproduction or production of offspring (rather than population effects on adult survivorship), potential modification of habitat in areas that experience invasive plant species establishment and fires, and increasing challenges for access to allow management activities within Impact Areas. The Navy's proposed conservation measures reduce the potential for adverse effects by controlling the speed of vehicles, notifying infantry of shrike nest locations (up to 4), managing invasive plant species, and managing fire frequency. We anticipate that the concerted effort to recover the San Clemente loggerhead shrike will continue, as proposed, and will offset the anticipated losses to the shrike population and allow the species to continue on a trajectory towards recovery.

Conservation Actions

Despite the potential impacts to shrikes that nest adjacent to Impact Areas and occasional death or injury of individuals in other operational areas, continued increases in shrike distribution and abundance in other areas of the island is anticipated as a result of continued implementation of the Navy's successful shrike recovery program.

Conclusion

After reviewing the current status of San Clemente loggerhead shrike, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of San Clemente loggerhead shrike. We have reached this conclusion for the following reasons:

- (1) Eighty-four percent of the current or former territories of the loggerhead shrike on San Clemente Island occur in areas that are located more than 305 m (1,000 ft) from

Impact Areas I and II, and AFP 6 where most impacts from training and fires are expected;

- (2) Shrikes have continued to successfully nest within some areas included within the Impact Areas, and it is likely that despite the increases in disturbance and risk associated with the proposed action, that a subset of the shrikes that occur within this area will continue to successfully inhabit the area into the future;
- (3) A small number of shrikes and active nests may be harmed, killed, injured, or destroyed per year in association with the proposed action; we expect that this impact will be fully offset by the Navy's proposed continuation of the San Clemente loggerhead shrike recovery program; thus, this low level impact is not expected to result in an appreciable reduction in the numbers, reproduction, or distribution of the San Clemente loggerhead shrike population; and
- (4) Active recovery efforts that are included as part of the Navy's proposed action are expected to result in further increases in the population in areas relatively unaffected by training activities and promote the overall recovery of the species.

San Clemente Sage Sparrow (*Amphispiza belli clementeae*)

Status of the Species

Listing Status

The San Clemente sage sparrow was listed as a threatened species on August 11, 1977 (42 FR 40682), primarily because of its limited distribution and ongoing habitat destruction caused by overgrazing. The San Clemente sage sparrow is one of the seven species addressed in the (Channel Islands Recovery Plan) (Service 1984). Critical habitat for the sage sparrow has not been designated.

Species Description

The San Clemente sage sparrow, one of five subspecies of sage sparrows from North America, is endemic to San Clemente Island. It is a small songbird (15 cm (6 in) from beak tip to tail tip) with a brownish-gray back, light buffy underparts, and a small dark breast spot. Sage sparrows have a complete white eye ring and distinctive white and black malar stripes.

Habitat Affinity

The San Clemente sage sparrow uses a xerophytic scrub community. Maritime desert scrub (MDS) dominated by California boxthorn characterizes San Clemente sage sparrow habitat. San Clemente sage sparrow distribution appears to be primarily determined by the distribution of California boxthorn on San Clemente Island, and sage sparrow density has consistently been

positively correlated with the abundance of this plant species at the landscape scale (Hyde 1985; KEA 1997; Munkwitz *et al.* 2002; Beaudry *et al.* 2003, 2004; Turner *et al.* 2005, 2006; Kaiser *et al.* 2007a).

Sage sparrows use California boxthorn shrubs for nesting substrate, cover, and food resources. California boxthorn is a low growing shrub, which typically reaches a maximum height of 75 cm (29 in). Boxthorn branches are stiff and well armed with sharp, thorn-like tips. In areas where boxthorn forms extensive thickets, it provides excellent protection from avian and mammalian predators. Shrub height and structure are believed to be important characteristics that affect nest site selection. Sage sparrows prefer taller shrubs with larger canopies (Chase and Carlson 2002). On San Clemente Island, nest sites are characterized by relatively tall boxthorn shrubs (mean 45 cm (18 in)), greater and more evenly distributed boxthorn, less bare ground and litter, less grass, and a higher percent of cactus and forbs than in surrounding unoccupied habitat (Willey 1997; Hyde 1980).

Since 1999, researchers have recorded nesting in several other plant species, but they note that boxthorn remains the primary nesting substrate shrub species characteristic of San Clemente sage sparrow habitat (Kaiser *et al.* 2007). Boxthorn shrubs selected as nest sites have a high percentage of live foliage; nest shrubs observed by Willey (1997) were usually greater than 75 percent living; and no sage sparrow nests were found in shrubs that had less than 50 percent living foliage. Nests appear to be preferentially placed on the leeward side of shrubs. Work conducted by Hyde (1980) indicated that habitat supporting a high density of sage sparrows (*i.e.*, high density sage sparrow habitat) is characterized by more California boxthorn plants, generally higher plants, more cactus, and less grass cover and less bare ground when compared to habitat supporting a moderate density of sage sparrows (*i.e.* moderate density sage sparrow habitat).

Work conducted by KEA (1997) did not identify different boxthorn density in “high quality” when compared to “medium” or “low quality” sage sparrow habitat. However, they did observe higher boxthorn density at 20 cm (8 in), the typical height of sage sparrow nests [20 cm (8 in) (Willey 1990), 35 cm (14 in) (Hyde 1980), 23 cm (9 in) (Munkwitz *et al.* 2000)]. Hyde (1980) also found that nest shrubs are denser both vertically and horizontally at medium heights (20-45 cm) (8-18 in.) and less dense at ground level than other shrubs measured. In some years, primarily drought years, sage sparrow density appears to be influenced by other vegetation characteristics as well, such as cactus cover (Hyde 1985; Munkwitz *et al.* 2002; Turner *et al.* 2005), forb cover (Munkwitz *et al.* 2002, Turner *et al.* 2005), total plant species diversity (KEA 1997), vegetation height and density (Turner *et al.* 2005), and bare ground (Beaudry *et al.* 2003, 2004).

Life History

Sage sparrow breeding activity typically begins in late January or February, but has been recorded in early January (Melissa Booker, pers comm. 2008). The initiation of breeding activity appears to be tied to precipitation patterns. Breeding activity usually peaks in March and April and lasts through late June. San Clemente sage sparrows primarily nest in dense boxthorn.

The nest cup is made of grass, small twigs and forb stems and is lined with soft grasses, feathers, flower heads or fur. Nests are typically placed 20-35 cm (8-14 in) from the ground with at least an additional 20 cm (8 in) of canopy above the nest. Dense shrubs provide cover from prevailing winds and from predators (Willey 1997). Sage sparrows are able to successfully reproduce in their first year. Clutch size is usually 2-4 eggs, and in most years, 1-3 clutches are produced. During drought years, sage sparrows may not reproduce at all. Incubation typically lasts 11-14 days, and fledging occurs 10-14 days after hatching. The female incubates the eggs, and both parents feed the chicks. In some years, the reproductive rate has been notably high (*e.g.*, 90 percent in 1986, 97 percent in 1999), while in others, virtually no reproduction has occurred (*e.g.*, 2007).

Sage sparrows do not migrate, but juveniles move from natal/breeding territories during the winter months. Hyde (1980) found that adult sage sparrows exhibited little movement, and he observed that adult pairs remain on territory as late as October, when his study concluded. Willey (1986) measured an average breeding territory size of 3.1 ± 0.42 ha (7.75 ± 1.03 ac), and recent studies indicate that territory size may fluctuate in response to resource availability. Male sage sparrows aggressively defend territory boundaries with little overlap between adjacent pairs (Willey 1990). Territory size is lower in areas that have higher density of boxthorn shrubs (Beaudry *et al.* 2003, 2004; Kaiser *et al.* 2007).

Sage sparrows glean insects, spiders, fruits and seeds from the vegetation, and they also forage on the ground, often in openings beneath large boxthorn shrubs (Hyde 1980). While nestlings are primarily fed arthropods, Hyde (1985) found cactus fruit, boxthorn berries, and saltbush fruit to be particularly important food resources at different times of the year.

In most years, boxthorn flowers and fruits from March through May (Beaudry *et al.* 2004), providing foraging opportunities on insects attracted to the leaves, flowers and berries and on the berries and seeds themselves during the peak of the breeding season. However, in years with severe drought, such as 2002 and 2007, boxthorn did not flower and vegetative growth was minimal (Beaudry *et al.* 2003; Kaiser *et al.* 2007). Consequently, there were greater foraging opportunities for sage sparrows on other species that continued to produce flowers and berries during drought (Beaudry *et al.* 2003).

Population Trend

The size of the San Clemente sage sparrow population fluctuates significantly from year to year, appearing to respond to precipitation and resulting resource availability. During favorable environmental conditions, sage sparrow pairs can produce up to three successful broods in a single season, and if drought conditions exist, few individuals will attempt to breed. Consequently, the population has declined significantly after droughts, but it has rebounded rapidly when adequate rainfall has occurred.

Population estimates derived since the 1980's range from a low of 38 individuals (1984) to a high of 1,519 adults (2002) (Table 12). The years between 1999 and 2008 represent a range of

years where data was collected using the same methodology. Decreases are noted in the last 2 years (2007 and 2008). Low rainfall in 2007 likely contributed to this observed decline. The population estimates for the last 2 years fall within the normal variation seen for the population estimates derived over the past 10 years and should not be interpreted as a declining trend in the species. Nonetheless, it will be important to continue monitoring and assessing the status of the sage sparrow population on San Clemente Island.

Table 12. Sage sparrow adult population estimates 1976-2008 (from Kaiser *et al.* 2008)

Year	Area (ha)	Adult Population Estimate	Author(s)
1976	740	93	Byers 1976
1980	502	176	Hyde 1985
1981	502	360	Hyde 1985
1982	502	205	Hyde 1985
1983	502	198	Hyde 1985
1984	502	38	Hyde 1985
1985	502	91	Hyde 1985
1997	1821	294	KEA 1997
1999	2098	578	Munkwitz <i>et al.</i> 2000
2000	2098	452	Munkwitz <i>et al.</i> 2002a
2001	2098	578	Munkwitz <i>et al.</i> 2002b
2002	2098	1519	Beaudry <i>et al.</i> 2003
2003	2098	544	Beaudry <i>et al.</i> 2004
2004	2098	980	Turner <i>et al.</i> 2005
2005	2098	729	Turner <i>et al.</i> 2006
2006	2098	1216	Kaiser <i>et al.</i> 2007
2007	2098	716	Kaiser <i>et al.</i> 2008
2008	2098	539	Prelim unpub. #

Population viability analyses

Two population viability analyses (PVA) have been developed to evaluate threats such as low juvenile survival, increased drought frequency, and habitat loss. Beaudry (2004) used demographic data collected between 2000-2003 and modeled the sage sparrow population using the program VORTEX. Kaiser *et al.* (2008) built upon Beaudry's 2004 PVA and used the program VORTEX to model the population based on demographic data collected between 2000 and 2007. Both PVAs conducted sensitivity analyses to ascertain the relative effects of different variables to sage sparrow extinction risk.

While the most recent modeling effort predicted high quasi-extinction probabilities for the San Clemente sage sparrow, reviewers and the model's authors point out that the value of the PVA is in assessing the relative sensitivity of the population to variables rather than an assessment of

extinction probability (Brian Hudgens pers. comm. 2008). The primary demographic variable that contributed to modeled extinction risk was juvenile mortality. The modeled population responded significantly to changes in this demographic variable. Based on current monitoring techniques, juvenile sage sparrows appear to experience a high mortality rate on San Clemente Island, and since 2001, apparent juvenile survivorship has declined. Apparent juvenile survivorship estimates are based on complete band re-sight data, and it is possible that dispersal of juveniles to unsampled areas or failure to re-sight complete band combinations could contribute to the low numbers of banded birds that are re-sighted. Low re-sighting data results in low survivorship estimates. Sampling on San Clemente Island is mostly limited to the study plots and transects, which increases the potential that banded juveniles could be missed, thereby contributing to overestimates of juvenile mortality. Additional surveys conducted in 2007, however, did not reveal additional juveniles in other areas of the island that would indicate that survivorship is underestimated. To provide clarity to some of these issues, the Navy proposes to implement a recommendation contained within the Sage Sparrow Management Plan to conduct a radio telemetry study to provide additional information regarding survivorship and juvenile movement patterns on San Clemente Island.

Drought frequency was a second important factor influencing modeled extinction risk, and slight increases in drought frequency increased extinction risk. Simulated sage sparrow populations exhibited large annual fluctuations, which were correlated to year-to-year fluctuations in the amount of rainfall and may be connected to the seasonal pattern (distribution) of rainfall. Intensity and distribution of rainfall affects the timing and extent of vegetation growth and flowering. Sage sparrows generally respond to low rainfall by reducing reproductive effort, which results in depressed populations following drought years. Sage sparrows respond to favorable precipitation patterns and resulting conditions by producing multiple clutches, which then drive numbers back up in years that follow “good” precipitation years.

The modeled extinction risk appeared relatively insensitive to habitat loss or gain. Based on the model, under baseline conditions, the San Clemente sage sparrow could lose up to 90 percent of the available habitat with only a slight increase in extinction risk. This extreme result points to the inherent insensitivity of the model to habitat loss, due to the high baseline extinction risk that is derived primarily from the low apparent juvenile survival rate incorporated into the model under baseline conditions. If higher rates of juvenile survivorship are incorporated into the model to produce a lower baseline of extinction risk, the sensitivity of the modeled population to habitat loss increases. The relationship between habitat loss and survivorship is not known, and the PVA authors qualify the results of their modeling effort to predict that the San Clemente sage sparrow population may withstand low levels of habitat loss without deleterious effects to the overall population (B. Hudgens pers comm.. 2008). Based on the results of the PVA, the persistence of the San Clemente sage sparrow population is not likely to be significantly reduced by a limited loss of habitat. The population would, however, be affected by a reduction in juvenile survivorship.

Rangewide Distribution and Threats

Since the San Clemente Island sage sparrow's entire distribution is restricted to the action area of San Clemente Island, its island-wide distribution and current threats to the species are discussed in the Environmental Baseline section below.

Conservation Needs

The San Clemente sage sparrow needs continued habitat protection, protection from disturbance, and protection from predators. Based on results of the PVA, an increase in juvenile survivorship is necessary to improve the status of the population and decrease the apparent extinction risk. Since the cause(s) of juvenile and adult mortality have not been determined, further examination of these should be a priority. Concurrent with the proposed action to intensify training, the San Clemente sage sparrow population warrants additional monitoring to better understand the impact of increased training on the population and assure that management actions will be taken if the population status worsens.

Environmental Baseline*Distribution*

The San Clemente sage sparrow, endemic to San Clemente Island, is found primarily along the lower marine terraces on the western and northern parts of the island. The band of habitat that supports higher densities of sparrows has received little disturbance in the recent past.

Based on monitoring activities conducted between 1999 and 2008 and on plant community mapping (1994), San Clemente sage sparrow habitat includes approximately 2,098 ha (5,145 ac) (Kaiser *et al.* 2007) of maritime desert scrub habitat on San Clemente Island. A subset of the area mapped as sage sparrow habitat supports most of the sage sparrow population. The island-wide sage sparrow population varies from year to year based on environmental conditions but has ranged between 452 and 1,519 adult sparrows over the last 10 years (1999 -2008) for which data has been collected using the same methodology (Table 12).

The distribution of sage sparrows within different habitat categories differs from year to year, with high density habitat generally supporting the highest percentage of sage sparrows, followed by medium and low density habitat (Table 13). Approximately half of the sage sparrow habitat, including habitat categorized as "high density" and "medium density", supports an average 73 percent of the population. High density habitat appears important to sage sparrows during years associated with high productivity, but medium density habitat is also important to species persistence, especially in drought years, when few birds breed and a higher percentage of the population inhabits medium quality habitat (Brian Hudgens pers. comm. 2008).

Table 13. Percentage of Estimated Population (Density-based estimate) Within Density Categories

	1999	2000	2001	2002	2003	2004	2005	2006
High	43.9	44.6	39.4	42.1	30.8	24.4	33.7	35.9
Medium	37.4	39.4	35.6	33.1	43.4	36.7	32.6	34.7
Low	19	15.9	24.9	24.7	25.7	38.9	33.4	29.4

Threats

Current threats to San Clemente sage sparrow may include: 1) small population size and limited distribution; 2) habitat degradation associated with non-native plant proliferation; 3) predation by island foxes, feral cats, and rats; 4) mortality and/or habitat modification due to increased fire frequency and size and fire suppression activities; 5) human disturbance resulting from military training activities/harassment; and 6) mortality and/or modification of habitat due to human activities (Kaiser *et al.* 2007). In addition, rainfall patterns appear to contribute significantly to sage sparrow viability and resulting population size. Climate change would threaten the sage sparrow population if such change results in increased frequency of drought conditions on San Clemente Island.

Specific human activities that have and/or still represent potential adverse effects to sage sparrows and/or its habitat include: 1) development of the San Clemente Island runway that fragmented the island's sage sparrow habitat and continues to serve as a source of noise and potential disturbance to the sage sparrow; (2) existing recreational activities and associated disturbance along the West Shore, including low intensity foot and vehicle traffic associated primarily with fishing; (3) current training and associated impacts in training areas north of the runway, as addressed in Biological Opinion FWS 1-00-F-19, including fires, ordnance explosion-related disturbance and/or harm, foot traffic, and construction noise; (4) current training, ordnance disturbances and elevated fire frequency, as addressed in Biological Opinion FWS-2808; and (5) low-intensity training use of the West Shore, including periodic low intensity foot traffic.

Conservation Actions

The Navy has implemented activities to preserve the endemic flora and fauna of San Clemente Island. All feral goats and pigs were removed from the island by the Navy by 1992 (Kellogg and Kellogg 1994). The Navy also initiated a long term-vegetation monitoring program in 1992-1993 to track the status of sensitive plant species and to document vegetation changes on the island following animal removals (Tierra Data, Inc. 1998). Positive effects of vegetation recovery on sage sparrow habitat have been documented as a result of this effort. The Navy has also implemented predator management activities to reduce cat abundance throughout the island. The Navy has supported research activities for the sage sparrow by allowing biologists access to the island and by funding monitoring and management activities for sage sparrow and its habitat.

These activities have had positive effects on the sage sparrow and helped to support its continued existence on the island.

Effects of the Action

Approximately 169 ha (418 ac) of sage sparrow habitat (Table 14) and between 27 and 93 sage sparrows (Table 15) are supported within the boundaries of existing and proposed operational areas, respectively. The number of sage sparrows within operational boundaries is dependent upon the size of the population, which varies significantly from year to year, but an average of about seven percent of the population is estimated to occur within operational boundaries based on the last 10 years of survey data. San Clemente sage sparrows may be adversely affected in habitat within and surrounding operational areas by ordnance use, accidental fire, fire containment and suppression, air traffic, foot traffic and vehicle traffic. These adverse effects include modification and degradation of sage sparrow habitat; disturbance, death, and injury of individual sage sparrows, and loss of active sage sparrow nests. However, during any given year, we expect that some areas of suitable sage sparrow habitat within operational boundaries will remain and sage sparrows will continue to occupy these areas.

As part of the proposed action, the Navy will continue surveys and population analysis for the San Clemente sage sparrow and develop additional surveys to assess sage sparrow juvenile survivorship and habitat use. These surveys will be developed and scheduled such that access to training areas is not restricted when training is needed/requested.

Table 14. Sage Sparrow Habitat Within Operational Boundaries

Operations Area	Sage sparrow habitat in operational boundaries (acres)		
	High Density	Medium Density	Low Density
TAR 4	0	0	0
TAR 10	43.6	11.3	0
TAR 15	0	0	5.0
TAR 17	11.9	0	0
IMPACT AREA II (incl TAR 22)	0	0	176.9
Old Rifle Range AVMA (incl IOA and AMP)	0	0	142.5
IOA (outside of ORR AVMA)	0	0	23.0
BTS 2	0.5	0	0
BTS 3	0.9	0	0
BTS 4	0	0	2.1
Totals	56.9	11.3	349.5

Table 15. Number of Sage Sparrows Within Operational Boundaries Based on Density Category Estimates, 1999-2006

Operations Area	Estimate of Sage Sparrows in Operational Boundaries	
	Max	Min
TAR 4	0	0
TAR 10	33	12
TAR 15	1	0
TAR 17	8	3
Impact Area II (including TAR 22)	25	6
Old Rifle Range AVMA	20	5
IOA (outside of ORR AVMA)	3	1
BTS 2	1	0
BTS 3	1	0
BTS 4	1	0
Total	93	27

Construction of New Facilities

Construction of new buildings and parking is proposed to occur on 2 ha (5 ac) within TAR 10. However, these facilities will be located within an existing 2-ha (5-ac) area in TAR 10 that is already degraded and not likely used by sage sparrows. Further, construction activities will occur outside of the sage sparrow breeding season; thus, we do not anticipate that any individual sage sparrows or active nests will be impacted by this activity.

Ordnance and Demolition Use

The proposed action includes significant increases in the frequency and distribution of ordnance and demolition use within sage sparrow habitat on San Clemente Island. Broadly defined, “ordnance” and “demolition use” refers to a wide variety of weaponry and explosives, ranging from small automatic weapons and demolition charges to extremely large bombs. Ordnance proposed for use within sage sparrow habitat includes predominantly small arms and demolition charges. Increased frequency of heavy artillery use is proposed in and adjacent to low density sage sparrow habitat at one range. Live fire and demolition charge training activities are proposed in six areas within sage sparrow habitat where such training does not currently occur (*i.e.*, TAR 10, TAR 17, BTS 2, BTS 3, BTS 4, BTS 5, Figure 2). Additional sites with increased frequency of live-fire and demolition charges include five training areas in or adjacent to sage sparrow habitat (*i.e.*, TAR 4, TAR 15, BTS 1, BTS 8, and Impact Area II, Figure 2).

Ordnance and demolition use may disturb, injure, or kill adult sage sparrows, nestlings and/or eggs if sage sparrows occupy habitat in the area of munitions use, especially during the breeding

season. The response of sage sparrows to use of munitions is likely dependent upon the type used and the resulting disturbance (noise, ground disturbance, fire etc.), as well as the frequency and timing of operations. The small size of the sage sparrows and the relatively low density of occurrence (*i.e.*, a maximum density of less than one per acre in high density habitat) reduce the potential for a direct hit with munitions. However, because of the high number of rounds that are anticipated to be used at ranges on San Clemente Island, we foresee that a small number of sparrows will be directly hit with projectiles. Craters made by demolition charges may disturb a larger area and therefore are more likely to harm sage sparrows. Ordnance use can also result in ignition of accidental fires, and the potential for ignitions depends on the specific attributes of the munitions used, as discussed under the effects of fire below.

Ordnance use occurs within or adjacent to sage sparrow habitat in several areas of San Clemente Island under baseline conditions. For example, Impact Area II contains 72 ha (177 ac) of low density habitat within its boundary, which is approximately 7 percent of the mapped low density sage sparrow habitat on San Clemente Island, and supports an estimated 3-25 sage sparrows (approximately 1.6 percent of the island-wide population). However, Impact Area II has been a consistently used target area for the last 20 years. We expect that the area mapped as low density habitat in Impact Area II is likely degraded relative to low density habitat mapped elsewhere. Thus, we project that fewer than 3-25 sage sparrows will be killed in Impact Area II over time. The infrequency of sage sparrow sightings within habitat adjacent to Impact Area II, where heavy artillery is frequently used under baseline conditions, suggests that the frequent use of heavy artillery may reduce habitat use by sage sparrows. The density of sparrows, however, is lower in the southern portion of the island beyond the immediate vicinity of the Impact Areas, so the observed low densities could be due to factors other than ordnance use.

Frequent use of small arms and demolition training occurs under baseline conditions within training areas in sage sparrow habitat north of the San Clemente Island runway, including TAR 4, steel ranges, grenade range, and BTS sites. These areas are characterized by low densities of sage sparrows, and it is unknown whether or not human activities, including ordnance use, affect observed densities.

Sage sparrows do not occur within the boundary of TAR 4, but they continue to use and reproduce successfully in the habitat surrounding TAR 4. The observation of periodic demolition craters and other signs of munitions use could be related to the disappearance of individual sage sparrows that have been observed within the area surrounding TAR 4; however, a causal relationship has not been established, and the demographic parameters remain within the range of those observed outside the area surrounding TAR 4. It is likely that sage sparrows are periodically injured or killed and their nests disturbed or destroyed in the area surrounding TAR 4 by the human activity and use of live fire and demolitions that occur within TAR 4, though this impact is largely undetected. Based on observations adjacent to TAR 4, it appears that sage sparrows may be able to acclimate to noise and other human disturbances associated with some level of small arms use. The number of sage sparrows that are harmed or killed as a result of proximity to this training area has not been determined; however, based on information presented in monitoring reports, including birds that have disappeared and nests that have failed,

it appears that sage sparrows are irregularly harmed adjacent to TAR 4 by training within TAR 4 and in BTS 1 and BTS 8.

Fire

The proposed action includes training activities that are likely to result in fires. Accidental fires that could impact sage sparrows are most likely to result from use of grenades, small arms, detonation pyrotechnics, and from EOD ordnance detonation. The Navy proposes to implement a FMP that includes precautionary measures to reduce the potential for ignitions; however, fires are still likely to occur due to the types of training and frequency of use proposed. Implementation of the FMP is anticipated to align training exercises, weather conditions, vegetation conditions, and suppression assets in a manner that reduces the chance for a large fire, or repeated fires, that could result in type conversion.

The effects of accidental fire(s) on sage sparrows depend upon fire location, size, timing, and intensity. It is likely, based on examination of fire records where ordnance is used in existing TARs, that fires may occur during the breeding season of the San Clemente sage sparrow because some fires adjacent to existing training at TAR 4 and the steel ranges have occurred during the months of March, April, and June (U.S. Navy, unpublished analysis 2008b). If precautionary measures are implemented as outlined within the draft FMP, fire modeling and quick suppression response time suggests that fires within sage sparrow habitat are likely to be small and should occur within TAR boundaries or immediately adjacent to TARs.

Very few fires have occurred in sage sparrow habitat outside of the Whale Point area, so the actual extent and frequency of fires and fire pattern that will result from expanded incendiary/ordnance use within sage sparrow habitat will only be known once live fire and demolition training in TARs 10, 17 and BTS 2, 3, and 4 commences. The uncertainty, associated with the size and intensity of future fires and the effects of fires within occupied sage sparrow habitat, has been a source of ongoing concern due to the lack of fire history throughout the optimum sage sparrow habitat and the limited distribution of this habitat.

Fire in nesting habitat during the breeding season may cause adult or chick mortality, nest abandonment or failure, or reduce availability of food or other resources in a breeding territory, affecting nest success. Monitoring reports on the Whale Point population, which includes TAR 4, have documented eight fires in 2004 and 2005 (Turner *et al.* 2006, Turner *et al.* 2005). Based on monitoring of the vegetation and the sage sparrow population, nest success in habitat adjacent to TAR 4 that had periodic small fires remained comparable to nest success on other plots in habitat categorized as “medium density” habitat on San Clemente Island. Based on GIS analysis, sage sparrows also incorporated areas burned before the breeding season into breeding territories, providing additional information that sage sparrow populations may continue to use areas prone to small fires (U.S. Navy, unpublished analysis 2008b). This information suggests that if small fires occur within sage sparrow habitat, as is expected within and around TARs proposed within sage sparrow habitat, the habitat may still be successfully used by sage sparrows. Research on sage sparrow populations in other parts of the country provides some

support for this conclusion. In sagebrush grasslands in Idaho, male sage sparrows spend significantly more time in territorial maintenance after a fall burn than before (Winter 1984).

Frequent fires could be facilitated by operations-related ignition sources and abundant annual grasses. Scant information regarding the effect of increased fire frequency on the plant communities that constitute San Clemente sage sparrow habitat is available; however, fire is likely to affect the vegetation structure and could alter the plant community, if the fire return interval is short. Although fire is a natural process and can increase vegetative productivity (Carroll *et al.* 1993), repeated burning of the same area within a short period of time (1-2 years) could overwhelm the ability of some native plant species to recover from fire and result in habitat type conversion (*e.g.*, from shrubland to grassland).

Alteration of California boxthorn structure (reduction in height or amount of living foliage) may decrease nesting suitability and success, as sage sparrows show a preference for larger shrubs and shrubs with a high percentage of living foliage (Willey 1997). The available literature pertaining to California boxthorn portrays this boxthorn species as not being adapted to fire, nor expected to survive an intense fire. However, recent vegetation monitoring data along transects adjacent to TAR 4 (U.S. Navy, unpublished analysis 2008b) show California boxthorn survived burns in this area. The structure of boxthorn plants that appear to have survived is not noted within the transect data, so whether these plants retained suitability as sage sparrow nesting habitat is not known.

The Navy plans to reduce the potential for ignitions within sage sparrow habitat by adhering to a set of precautionary measures imbedded within a FDRS for the island. Precautionary measures include: 1) awareness of weather and vegetation conditions and use of ordnance during periods that are less likely to result in ignitions and 2) deployment of onsite fire-fighting equipment to reduce response times needed to suppress fires that do occur. In addition, NSW personnel will be trained to use onsite fire suppression resources that will be deployed in TARs and BTS sites if training is conducted during periods with higher ignition potential. It is likely that most fires would be extinguished while fires were still small and within the boundaries of the TAR or BTS site. Based on monitoring conducted north of the San Clemente Island runway, sage sparrows may continue to use habitat prone to small fires (U.S. Navy unpublished analysis 2008).

The Navy plans to re-evaluate the success of their fire management activities and the effects of fires in relationship to the status of the sage sparrow on an annual basis due to the uncertainty associated with the amount of habitat that could burn as a result of proposed training activities and the potential for fires to negatively impact the San Clemente sage sparrow population. To accomplish this, the Navy has proposed sage sparrow habitat impact thresholds that would trigger expedited review and potential application of adaptive management strategies. Fire thresholds would identify impact limits that the Navy would strive not to exceed within high density and medium density sage sparrow habitat. However, the response of sage sparrows to increased fire frequency in high density and medium density habitat has not been determined, so adaptive management prescriptions have not been defined.

Based on the FMP thresholds, a maximum of 18 ha (45 ac) of high density sage sparrow habitat could burn over the initial five-year duration of the FMP. If the acreage of moderate or higher fires (Score 3 or higher, National Park Service Scale) that occur in mapped high density habitat for the San Clemente sage sparrow exceeds 18 ha (45 ac), the Navy plans to accelerate review of the fire history and fire management to determine whether additional measures to reduce the amount of fire within sage sparrow habitat are warranted. Based upon these figures, approximately 5 percent of the high density habitat could be burned over the initial 5-year duration of the FMP before expedited review and potential application of adaptive management would be triggered. We anticipate, however, that with implementation of the FMP, the maximum limit of 18 ha (45 ac) burned over the first 5-year period will not be reached. Based upon the densities of sage sparrows recorded since 1999, 5 percent of the high density habitat is likely to support approximately 2-3 percent of the sage sparrow population, or 9 to 32 adult individuals.

No acreage threshold has been identified within the FMP for medium density or low density sage sparrow habitat. However, a target maximum fire “patch size” of 8 ha (20 ac) for medium density and 16 ha (40 ac) for low density sage sparrow habitat has been established by the Navy, which would apply everywhere except north of the runway. Habitat north of the runway and within Impact Area II is excluded from consideration because it lies within a Land MU with “highest military value,” as defined in the INRMP. The target maximum fire “patch size” for high density habitat established by the Navy is 2 ha (5 ac). Because no acreage threshold was established for low and medium density habitats and because we anticipate no large fires occurring with proper implementation of the FMP, we are making the assumption that no more than 8 ha (20 ac) of low density habitat and no more than 16 ha (40 ac) of medium density habitat will be burned over the first 5 years. Based upon these figures, approximately 2 percent of the low density habitat could be burned over the initial five-year duration of the FMP before expedited review and potential application of adaptive management would be triggered. Similarly, approximately 1.2 percent of the medium density habitat could be burned over the initial five-year duration of the FMP before expedited review and potential application of adaptive management would be triggered.

Based upon the densities of sage sparrows recorded since 1999, 2 percent of the low density habitat is likely to support approximately less than 1 percent of the sage sparrow population or 1-6 adult individuals. Similarly, 1 percent of the medium density habitat is likely to support approximately less than 1 percent of the sage sparrow population or 2-6 adult individuals.

We anticipate that the frequency and size of fires that occur in areas north of the runway adjacent to TAR 4 that were already authorized under Biological Opinion FWS 1-6-00-F-19 will be reduced by implementation of the precautionary measures contained in the FDRS and availability of onsite suppression resources. We anticipate that the pattern of observed fires (predominantly small fires on the lower terrace that supports the best sage sparrow habitat, and larger fires on the slopes) will continue. Based on historical fire patterns, we anticipate that no more than 10 ha (25 ac) of the medium quality sage sparrow habitat north of the runway will burn over the 5-year duration of the FMP. This area supports approximately 1-8 sage sparrows,

which represent less than 1 percent of the population. Low density habitat north of the runway has recently been documented as unoccupied by the sage sparrow; therefore, we don't expect sage sparrows to be harmed by fires in this area.

Sage sparrows occurring in areas that are burned could be killed or injured. If fires occur during the breeding season active nests could be destroyed or fail due to abandonment or loss of food resources. Adults that escape the fires could die or be injured due to increased predation risks and a shortage of available sheltering and foraging habitat. However, as noted above, sage sparrows that survive the fire could also re-occupy and defend territories within the burned habitat. Thus, even though some loss of individual birds and reduced reproduction in some years may occur, based on the observed patterns of sage sparrow habitat use north of the San Clemente Island runway, we anticipate that the demographic variables of sage sparrows that inhabit areas that have experienced patchy fires will remain comparable to that observed within areas that do not experience fires, and sage sparrow populations in areas subject to increased training activities will maintain their distribution on San Clemente Island.

Given the limited data available, the importance of the sage sparrow habitat in TARs 10, 17, and BTS 2, 3, and 4, and the uncertainty of future fire patterns within sage sparrow habitat on San Clemente Island, ongoing assessment of the effects of fires and the status of the sage sparrow population will be necessary to assure that our assumptions regarding fire frequency/patterns and conclusions regarding effects of small fires are correct. As part of their proposed action, the Navy has committed to develop and implement a monitoring plan to assess the incidental take of San Clemente sage sparrows within and adjacent to TARs 10 and 17 and incorporate the findings into the San Clemente Sage Sparrow Management Plan as recommendations for minimizing and avoiding incidental take of sage sparrows, to the extent practicable. The Navy will also address issues associated with habitat and sage sparrow survivorship as part of their INRMP update process with focus on habitat areas near Tars 10 and 17. These efforts should increase our knowledge and understanding of the impacts of fire and training activities on the sage sparrow.

The indirect effects of fires within sage sparrow habitat include the possibility of type conversion, from maritime desert scrubland to grassland, if fires occur repeatedly in the same area. One of the primary goals of the FMP is to prevent such type conversion by preventing ignitions and quickly suppressing fires. The highest likelihood for type conversion due to shortened fire return interval is within the boundaries of operational areas that sustain live fire and are subject to ignition. The Navy proposes to monitor these areas for invasive plant species and treat as necessary to promote recovery of native shrubs (outside of Impact Area II). We anticipate that ongoing operational use and resulting smaller more frequent fires within operational boundaries are likely to result in patchy habitat degradation within the boundaries of TAR 10, Tar 17, and BTS sites. However, we also expect that sage sparrows will continue to occur in these areas where suitable habitat remains.

Fire Containment and Suppression

The San Clemente FMP includes proposals to: (1) maintain existing roads to function as fuel breaks; (2) install fuel breaks using herbicides, retardants, or strip burns; and (3) suppress fires that occur using aerial or ground resources. While fire containment and suppression may protect sage sparrows and their habitat from escaped wild fires, these activities could adversely affect sage sparrows in the short term depending on the location of activities.

Several roads that lie within sage sparrow habitat are proposed for maintenance as fuel breaks. West Shore Road has historically been a poorly maintained route that was frequently not passable, resulting in very little traffic along the West Shore through contiguous high density sage sparrow habitat. With implementation of the Fire Management Plan, this road would be maintained in drivable condition to facilitate movement of fire fighting crews and to function as a fuel break. Maintenance of the road is expected to entail grading approximately once per year. This maintenance would not result in any direct impacts to sage sparrow habitat, but the increased noise and human activity along the road could disturb sage sparrows, particularly if maintenance occurred during the breeding season. The type of equipment proposed for use is comparable to small trucks on the island and would be passing over the road relatively quickly, which would limit the amount of time that individual sage sparrows were exposed to the noise/disturbance. Thus, we believe that nest abandonment or failure from annual maintenance of West Shore Road is unlikely.

Indirect effects of road maintenance that could affect sage sparrows include potential for establishment and spread of invasive plant species into high density sage sparrow habitat. Invasive plant species introduced or spread along the roadway could expand into sage sparrow habitat and result in eventual modification of habitat if unmanaged. The Navy has proposed to intensify control of invasive plant species on San Clemente Island, which is expected to reduce the potential for weed establishment along West Shore Road.

An improved roadway could also indirectly affect San Clemente sage sparrows if it results in a higher frequency and speed of general travel along this road. Sage sparrows fly low, from shrub to shrub if disturbed, and could easily be hit by passing vehicles along West Shore Road. Although no vehicle collisions with this species have been recorded to date with the baseline low level of use on this road or anywhere on the Island, they could occur if road use within high density sage sparrow habitat increases. Several spur roads lie perpendicular to West Shore Road and have been used predominantly for off-duty recreation in recent years. Four of these roads are identified as “roads to be maintained but not necessarily drivable” in the FMP. These sites had previously been identified as future sage sparrow and island night lizard habitat restoration sites. The proposal to keep these areas free from vegetation will preclude habitat restoration at these sites.

Fuelbreak installation is proposed in areas that include low density sage sparrow habitat within Impact Area II, and in low density sage sparrow habitat that lies uphill from Eel Point. Within Impact Area II, fuel breaks would be created through the use of Phos-Chek, herbicides, or

controlled burns. The use of Phos-Chek may result in a fertilizer effect that can favor non-native plant species over those native species adapted to nutrient poor soils. A strip burn is proposed uphill from Eel Point along a road segment “to be maintained but not necessarily drivable.” Since the boundaries of future fuel breaks have not yet been identified, we anticipate that the Navy will consult with the Service regarding any future plans to establish fuel breaks with the potential to impact sage sparrow. Thus, the impacts of new fuelbreaks on San Clemente sage sparrow are not considered in this analysis.

Fire suppression activities from air and ground support could impact nesting sage sparrows. Water dumped from helicopters or sprayed from trucks with high powered nozzles may knock nestlings or eggs out of the nest resulting in death or injury. The Navy intends to instruct firefighters in MIST techniques on an annual basis, which should minimize unnecessary impacts to sage sparrows and their habitat.

Air Traffic

Air traffic that occurs on the San Clemente Island airfield and air traffic that flies over sage sparrow habitat may affect sage sparrows. Air traffic on the airfield includes numerous touch and go operations to simulate carrier landing. Biological monitoring reports mention observations of sage sparrows disturbed by air traffic noise, but provide no explanation as to how this “disturbance” was assessed or correlated to the noise (Kaiser *et al.* 2007). UAVs and helicopters proposed for use on San Clemente Island may travel over sage sparrow habitat, although their travel routes are not specific. UAVs that travel over sage sparrow habitat are expected to produce little or no noise. Although sage sparrows may alter behavior in response to a UAV, the level of disturbance is not expected to result in a measurable effect to the species.

Helicopters may fly over San Clemente Island as they approach landing areas within VC-3, TARs, or BTS areas for fire suppression practice. Helicopters may also hover over sage sparrow habitat during insertion exercises into TARs or BTS sites. Low flying or hovering helicopters are expected to elicit a response from sage sparrows. Sage sparrows are likely to disperse by flying low to the ground and between shrubs to seek refuge. Rotorwash from helicopters can also produce significant turbulence, which could cause sage sparrows to react, particularly during nesting. Birds could flush from nests or otherwise react by temporarily altering their normal feeding and sheltering behaviors. The turbulence caused by rotorwash during the nesting season could damage nests or result in chick/egg displacement from nests.

Whether disturbance associated with air traffic would reach a level expected to harm sage sparrows, depends on the timing, location, and frequency of activities. Explicit information regarding anticipated air traffic patterns associated with proposed operations is unavailable, and no altitude restrictions over sage sparrow habitat are proposed. Based on the operations described, helicopter activity is likely to significantly increase on the island; however, most activity is expected to parallel Ridge Road as helicopters provide support and travel in conjunction with assault vehicles along the AVMA. Thus, we believe the potential effects of

increased air traffic on San Clemente Island sage sparrow could result in the direct loss of eggs or chicks from the rotorwash, but these instances will be rare.

Foot Traffic

The proposed action includes training activities that involve groups moving through sage sparrow habitat on foot. Foot traffic may result in disturbance or harm to sage sparrows, especially if conducted during the breeding season, and could also exacerbate soil compaction, erosion, or invasive plant proliferation in sage sparrow habitat depending on the intensity and timing of activities.

Many operations, such as land navigation, search and rescue, EOD sweeps, and activities at the TARs could occur in sage sparrow habitat and involve off-road foot traffic with up to 20-25 people walking over an area, sometimes more than once in a given operation. While they may move in response to foot traffic, impacts to the sage sparrow from this small number of personnel on foot are expected to be negligible outside of the breeding season.

No seasonal restrictions on operations are proposed, so operations could occur in sage sparrow habitat during the breeding season. Sage sparrows often place their nests in low brush or directly on the ground. Foot traffic through occupied sage sparrow habitat could result in trampling of nest shrubs or nests if such activity occurs during the breeding season. The maximum estimated density of sage sparrows in high density habitat is approximately one individual per acre. If up to 20-25 people travel through a sage sparrow territory off of existing roads and trails, the possibility of nest trampling exists, but it would likely occur infrequently. Disturbance associated with foot traffic could also cause adults to react and move, possibly alerting predators to their presence or the presence of their nests. Movement of sage sparrows in response to passing foot traffic would be more likely during daytime than at night; however, deleterious effects of sparrow movement would be more likely if birds were flushed from nests in the darkness. The presence of abundant cactus within sage sparrow habitat is expected to affect the ability of troops to move stealthily through habitat if travel occurs off of existing roads or trails. Consequently, it is likely that troops will adhere to existing roads or trails or be forced to step directly on the vegetation to avoid cactus spines. Since mission requirements reportedly necessitate stealthy travel that does not leave evidence, such as broken branches, it is expected that the majority of travel through sage sparrow habitat will occur on existing trails and roads and therefore result in little direct impacts to sage sparrows and their nests.

Larger scale foot traffic in sage sparrow habitat is anticipated during Battalion Sized Landings within the Infantry Operations Area, where it overlaps with the Old Rifle Range AVM Area and Old Rifle Range AMP within approximately 57 ha (142 ac) of low density sage sparrow habitat. This area is likely to be highly disturbed as a result of proposed off road vehicle activity, and additional disturbance associated with more intensive foot traffic would likely contribute to the degradation of an already degraded area. Thus, any harm to individual sparrows associated with foot traffic in these areas is expected to be rare.

Vehicle Traffic

The proposed action is likely to result in increased vehicle traffic on roads within sage sparrow habitat to support access to and fire management at proposed TARs and BTS sites. Proposed road maintenance of West Shore Road may result in disturbance, if conducted during the breeding season, and could lead to increased traffic or vehicle speed along this route. As a result, we anticipate that small number of sparrows will be hit with vehicles along this road at a rate of about 1 per year (also see Fire Containment and Suppression above).

The proposed action also includes off-road assault vehicle use within approximately 57 ha (142 ac) of low density sage sparrow habitat that lies within the boundaries of the proposed Old Rifle Range AVMA and the Old Rifle Range AMP. Off-road vehicles could crush active nests injuring or killing eggs and nestlings. Off-road vehicle use, such as that proposed within the AVMA is expected to significantly modify vegetation structure to the extent that it would no longer support sage sparrows. Off-road vehicle use is also expected to result in erosion and spread of invasive plants, which could degrade sage sparrow habitat downslope from the AVMA. Based upon the densities of sage sparrows recorded since 1999, about 1 percent of the low density habitat is likely to support approximately 2-20 adult individuals or about 1 percent of the population. However, because the low density habitat quality in the AVMA is more degraded than the surrounding low density habitat areas under baseline conditions, we expect that there is an even lower density of sage sparrows here that would be vulnerable to these impacts.

Conclusion

After reviewing the current status of San Clemente sage sparrow, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of San Clemente sage sparrow. We have reached this conclusion for the following reasons:

- (1) A significant percentage (*i.e.*, 84-93 percent) of the San Clemente sage sparrow population inhabits areas that are located outside of training operational areas;
- (2) Less than 10 percent of the available San Clemente sage sparrow habitat will be significantly modified due to direct and indirect effects of the proposed action;
- (3) Despite the potential for accidental fires to occur within sage sparrow habitat in and around training operational areas, analysis of sage sparrow use adjacent to training areas north of the San Clemente Island runway indicates that sage sparrows are likely to continue to use habitat that experiences small, patchy fires. Measures included within the FMP include onsite suppression resources that are likely to allow Naval Special Warfare personnel to extinguish fires immediately. The resulting pattern of burned areas is likely to include primarily small patchy fires similar to those observed in the area around TAR 4.

- (4) The number of sage sparrows, including adults, juveniles, eggs and nestlings, injured or killed will occur over time and not all actions that impact sparrows will occur every year; thus, the overall number of sparrows harmed, injured, or killed by the proposed action is expected to be low; this low level impact is not expected to result in an appreciable reduction in the numbers, reproduction, or distribution of the San Clemente sage sparrow population; and
- (5) We expect that the impacts anticipated as a result of operational activities will be offset by the Navy's ongoing efforts to promote recovery of the sage sparrow, which are included in their proposed action and/or identified in the San Clemente Sage Sparrow Management Plan.

Western Snowy Plover (*Charadrius alexandrinus nivosus*)

Status of the Species

Listing Status

The Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*) was listed as threatened under the Act on March 5, 1993 (58 FR 12864). At the time of listing the portion of the population in California was estimated to be approximately 1,386 based on a 1989 survey, with 30 adults reported in Oregon in 1992, and fewer than 30 nesting birds in Washington (58 FR 12870). Threats to the species identified at the time of listing included loss and modification of nesting habitat resulting from encroachment of European beachgrass, extensive human recreational use of nesting areas, and human development of the coast, with predation also cited as a significant threat to a number of nesting colonies (58 FR 12872).

Critical habitat was first designated for this population of western snowy plover on December 7, 1999 (64 FR 68508). Following a lawsuit filed against the Service by the Coos County Board of County Commissioners and others, the 1999 critical habitat designation was remanded and partially vacated (Coos County Board of County Commissioners *et al.* v. Department of the Interior *et al.* CV 02-6128). A revised final critical habitat designation was published in the *Federal Register* on September 29, 2005 (70 FR 56969). The 2005 revised final critical habitat designation does not include lands owned or managed by the Department of Defense on San Clemente Island.

On July 29, 2002, we received a petition from the Surf-Ocean Beach Commission of Lompoc, California to delist the Pacific coast population of the western snowy plover. A similar petition dated May 30, 2003, was received by us from the City of Morro Bay, California. In accordance with our 1996 Petition Management Guidance (61 FR 36075), we treated the two petitions as a single petition because the second petition was neither greater in scope nor did it broaden the area of review of the first petition. We published a 90-Day Finding on the 2002 petition on March 22, 2004 (69 FR 13326), indicating the petition presented substantial information the petitioned action may be warranted.

We completed our 12-Month Finding on the petition to delist the Pacific coast population of the western snowy plover on April 21, 2006 (71 FR 20607). In our 12-Month Finding we determined the Pacific coast population of the western snowy plover met the criteria for discreteness and significance as outlined in the Service's and National Marine Fisheries Service's 1996 Joint Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (61 FR 4722). At the time the 12-Month Finding was published in the *Federal Register*, the United States' portion of the Pacific Coast Distinct Population Segment (DPS) of the western snowy plover was estimated to be 2,300 (71 FR 20625). Furthermore, while we determined the DPS of the western snowy plover should remain classified as threatened under the Act, we also concluded that significant progress has been made toward recovery; therefore, concurrent with the publication of the 12-month finding we also published a proposed Special Rule Pursuant to Section 4(d) of the Act for the Pacific Coast DPS of the western snowy plover (71 FR 20625). The proposed 4(d) rule would remove the section 9 prohibitions of the Act for activities that occur in counties where a particular county has met its Breeding Bird Management Goal, as specified in Table 1 of the April 2006 proposed rule (71 FR 20631). A Notice extending the comment period on the proposed 4(d) rule was published in the *Federal Register* on August 21, 2006 (71 FR 35406). A final rule is still in development.

The Service completed a 5-Year Review of the Pacific coast DPS of the western snowy plover in May 2006 and published a notice announcing the completion of the review in the *Federal Register* on February 14, 2007 (72 FR 7064). The 5-Year Review, which used the 2006 12-Month Finding as the basis for the review, recommended no change in the status of the Pacific coast DPS of the western snowy plover.

A Notice Announcing the Availability of a *Final Recovery Plan for the Pacific Coast Population of the Western Snowy Plover* was published in the *Federal Register* on September 24, 2007 (72 FR 54279).

Species Description

The western snowy plover is a small shorebird in the family Charadriidae. Adults weigh from 34 to 58 g (1.2 to 2 oz) and range in length from 15 to 17 cm (6 to 7 in) (Page *et al.* 1995). Western snowy plovers are pale gray-brown above and white below, with a white hind neck collar and dark lateral breast patches, forehead bar, and eye patches. The bill and legs are black.

Distribution, Abundance and Habitat Affinity

The breeding range of the Pacific coast western snowy plover population extends along coastal beaches from the southern portion of Washington State to southern Baja California, Mexico. The Recovery Plan (Service 2007d) identified 159 current or historical western snowy plover breeding or wintering locations on the U.S. Pacific coast. These localities include 6 in Washington, 19 in Oregon, and 134 in California. In Baja California, breeding western snowy plovers concentrate at coastal wetland complexes as far south as Bahia Magdalena, Mexico

(Palacios *et al.* 1994). Western snowy plovers concentrate in suitable habitat, with the number of adults at coastal breeding locations ranging from 1 to 315, depending in part, on the size of the area. The largest number of breeding birds occurs from south San Francisco Bay to southern Baja California suggesting that the center of the plovers' coastal distribution lies closer to the southern boundary of California (Page and Stenzel 1981; Palacios *et al.* 1994).

The United States' portion of the Pacific coast population of western snowy plovers was estimated at 2,300 birds in 2005, and the estimated rangewide population estimate was 4,800 birds (71 FR 20610). Based on survey information between 2006 and 2008 (Ryan 2008 *in litt*), our estimate for the U.S. population increased in 2006 to an estimated 2,440 birds, which results in a rangewide estimate of 4,910 birds. In the subsequent 2 years, survey information documents declines in the U.S. population of Pacific coast western snowy plovers. Thus, our estimate for the U.S. population in 2007 is estimated at 1,998 birds with a rangewide population estimate of 4,468 birds, and in 2008 our estimate is 1,812 birds, which indicates a rangewide population of 4,282 birds.

Sand spits, dune-backed beaches, sparsely to unvegetated beach strands, open areas around estuaries, and beaches at river mouths are the preferred coastal nesting areas of the snowy plover (Page and Stenzel 1981; Wilson 1980; Powell *et al.* 1997). Other areas used by nesting snowy plovers include dredge spoil fill, dry salt evaporation ponds, airfield ovals, and salt pond levees (Widrig 1980; Wilson 1980; Page and Stenzel 1981). Nest sites typically occur in flat, open areas with sandy or saline substrates with little or no vegetation (Widrig 1980; Wilson 1980; Page and Stenzel 1981; Fancher 1998). Snowy plovers are sometimes found nesting in similar habitats as the least tern, such as occurs at Batiquitos Lagoon (Powell and Collier 2000) and MCBCP (Powell 1996) in San Diego County, California.

Life History

The breeding season of the western snowy plover typically extends from March 1 through September 15. During the breeding season, plovers congregate in loose concentrations with the number of adults at coastal breeding areas ranging from 2 to 318 (Page and Stenzel 1981). Both unpaired males and pairs defend territories against other plover species by posturing, chasing, or fighting. Unpaired males defend territories for up to 45 days before procuring a mate (Page *et al.* 1995). Paired birds use the territories for courtship, nest sites, and sometimes feeding (Page *et al.* 1995). Egg laying in southern California has been documented as early as February 19 (Copper pers. comm. 2002) but most often begins in mid-March and continues through late-July.

Generally, three (3) eggs are laid in a nest that consists of a shallow depression scraped in sandy or saline substrates. After the full clutch is laid, both males and females incubate the eggs for 27-33 days (Warriner *et al.* 1986). Chicks are mobile soon after hatching, and broods rarely remain within the nesting territory (Warriner *et al.* 1986). The male may lead the brood to a brood territory, which can range from 0.8 to 1.2 ha (2 to 3 ac) (Fancher *et al.* 2002). Birds are able to fly within approximately 31 days of hatching.

Snowy plover adults and young forage on invertebrates along intertidal areas, along beaches in wet sand and surf cast kelp, in foredune areas of dry sand above the high tide, on salt pans, and along the edges of salt marshes and salt ponds. Page and Stenzel (1981) observed snowy plovers moving between salt pans, tidal flats, and beaches indicating these areas function together in providing habitat for the species.

Snowy plovers clutches are frequently destroyed by predators, people, tides, or weather, but they re-nest readily after these losses- up to six times in some locations (Wilson 1980; Warriner *et al.* 1986; Page *et al.* 1995). Snowy plovers may also double or triple brood during favorable years. Re-nesting may occur in the same scrape (rarely), in proximity to the initial nest, or in a new location distant from the first attempt (Warriner *et al.* 1986; Powell and Collier 1994; Powell *et al.* 1997). Nests are rarely reused because weather typically destroys scrapes within days of hatching (Page *et al.* 1995).

Polygamy has been observed in snowy plovers along coastal California (Warriner *et al.* 1986). Snowy plover females may abandon chicks as young as 6 days old to find another mate leaving the male to care for the brood (Warriner *et al.* 1986). Males attend the young for 29-47 days (Warriner *et al.* 1986) and then may re-nest with a new partner if sufficient time remains in the season (Stenzel *et al.* 1994). This results in a serial polygamous breeding system in which males may double clutch and females may triple clutch.

While some western snowy plovers remain in their coastal breeding areas year-round, others migrate south or north for winter (Warriner *et al.* 1986; Page *et al.* 1995a; Powell *et al.* 1997). In Monterey Bay, California, 41 percent of nesting males and 24 percent of the females were consistent year-round residents (Warriner *et al.* 1986). At MCBCP in San Diego County, California, about 30 percent of nesting birds stayed during winter (Powell *et al.* 1994, 1996, 1997). The migrants vacate California coastal nesting areas primarily from late June to late October (Page *et al.* 1995a). There is evidence of a late-summer (August/September) influx of western snowy plovers into Washington; it is suspected that these wandering birds are migrants. Most western snowy plovers that nest inland migrate to the coast for the winter (Page *et al.* 1986, 1995). Thus, the flocks of non-breeding birds that begin forming along the U.S. Pacific coast in early July are a mixture of adult and hatching-year birds from both coastal and interior nesting areas. During migration and winter, these flocks range in size from a few individuals to up to 300 birds (Service 2007d).

Threats

Threats to the Pacific Coast population of the western snowy plover remain essentially the same as at the time of its listing in 1993. The magnitude of these threats has been reduced through active management afforded by protections under the Act and undertaken primarily by certain Federal, State, and County agencies (71 FR 20625). The most important threats are ongoing habitat loss and fragmentation; mortalities, injuries, and disturbance resulting from human activities; and lack of comprehensive State and local regulatory mechanisms throughout the

range of the Western snowy plover (71 FR 20607). Natural factors, such as inclement weather, have also affected the quality and quantity of western snowy plover habitat (Service 2007d).

Rangewide Conservation Needs

The goal to achieve the long-term survival and recovery of the Pacific coast snowy plover population, as identified in the Recovery Plan includes three criteria: (1) maintain for 10 years an average of 3,000 breeding adults distributed among six recovery units (2) maintain a 5-year productivity of at least one fledged chick per male in each recovery unit in the last 5 years prior to delisting; and (3) establish participation plans among cooperating agencies, landowners, and conservation organizations to assure protection and management of breeding, wintering, and migration areas.

While some positive contributions have been made to achieving each of these criteria, recovery actions are still needed (FR 71 20625). Conservation needs identified in the Recovery Plan include: monitoring; management of breeding and wintering habitat to reduce threats (*e.g.* disturbance, loss of natural coastal processes, predation, invasive vegetation); enhancement and creation of habitat; reduction of disturbances on nesting and wintering beaches; and public education.

Environmental Baseline

San Clemente Island is not currently used as a breeding site by western snowy plovers, although five sandy beaches on San Clemente Island (*i.e.*, West Cove, Pyramid Cove, China, Northwest Harbor, and Horse) provide primarily wintering habitat for western snowy plovers. These beaches range in size from the small dune backed beach at West Cove [approximately 150 m (492 ft) long x 30 m (98 ft) wide at low tide] to the largest beach on the island at Pyramid Cove [approximately 1,200 m (93,937 ft) long x 50 m (164 ft) wide at low tide].

Although western snowy plovers are observed foraging and roosting year round, including the breeding season (Lynn *et al.* 2005), nesting has only been documented on three occasions on San Clemente Island. Navy surveys revealed pronounced annual cyclic use of San Clemente Island by western snowy plovers, specifically this species is typically absent during the breeding season while wintering numbers are much higher (up to 41 individuals) (U.S. Navy 2008). Nesting was observed at West Cove Beach in 1989. West Cove Beach was formerly much wider; however, construction of the nearby airfield reduced the transport of sand to this beach (Foster and Copper 2003). At present, most of the beach is subject to inundation during early spring high tides, which reduces its suitability for nesting. Snowy plover nesting has been recorded twice at Horse Beach, once in 1996 and once in 1997 (Foster and Copper 2001). Other potential nesting beaches, including China Beach and Pyramid Cove Beach, are narrow and more likely to be inundated by high tides, reducing their suitability as nesting habitat.

The Recovery Plan identified these five beaches as important wintering habitat for western snowy plovers. Island-wide winter surveys observed a maximum day total of 41 plovers at these

beaches from 2000 to 2004 (U.S. Navy 2008). The maximum number of plovers observed during a survey at each beach from 2003 to 2005 is 28 at Pyramid Cove, 22 at Horse Beach, 19 at China Beach, 14 at Northwest Harbor Beach, and 11 at West Cove Beach (Lynn *et al.* 2004, 2005 and 2006). Plovers move regularly between nearby beaches, but the beaches at the northern end of the island (*i.e.*, West Cove Beach and Northwest Harbor) are separated by approximately 27 km (16.8 mi.) from the beaches at the southern end of the island (*i.e.*, Pyramid Beach, Horse Beach, and China Beach), and some movement has been detected between beaches located at the north and south ends (Lynn *et al.* 2005).

The five beaches used by western snowy plovers are some of the most frequently used areas of the island by the military because sandy beaches are required for many training activities that entail movement between land and water. Each of the beaches is included within one of the TARs under baseline conditions (Pyramid Beach-TAR 20, Horse Beach-TAR 21, China Beach-TAR 22, West Cove Beach-TAR 5, and Northwest Harbor-TAR 3). Western snowy plovers are subject to temporary disturbance from foot and vehicle traffic associated with military training. These activities may cause plovers to temporarily fly away and render all or part of the beach unusable by the plover until training is over. Pyramid Beach and China Beach are also within the boundaries of Impact Areas I and II, respectively, and ordnance craters are visible on China Beach (Lynn *et al.* 2005). Western snowy plovers are disturbed and exposed to risk of death or injury associated with ship-shore ordnance use on a regular basis under baseline conditions. However, potential impacts to plovers from training or ordnance use have not been addressed in previous consultations.

Beaches on San Clemente Island are also periodically disturbed for facilities maintenance projects. We previously consulted with the Navy on the potential effects of a hydrophone cable replacement project that entailed digging trenches on the West Cove Beach, which have been filled and returned to the original beach contours (Biological Opinion FWS 1-6-95-F-29). To minimize impacts to the plover, sand was transported to the upper reaches of West Cove Beach. However, this area has since been overgrown with native and non-native vegetation. In addition, informal Endangered Species Act, Section 7 Consultation was conducted with the Service in February 2005 on the Southern California Anti-Submarine Warfare Range (SOAR) Cable Repair at San Clemente Island. The Service issued a concurrence letter dated 20 April 2005 that the cable repair project was “not likely to adversely affect” the western snowy plover.

Native (*e.g.* island fox) and non-native (*e.g.* feral cats) predators likely affect the suitability of San Clemente Island beaches for western snowy plover nesting.

The Navy has conducted periodic western snowy plover monitoring on all San Clemente Island beaches to support the ongoing assessment of the plover’s status. In addition, the Navy conducts ongoing predator management to support recovery of the San Clemente loggerhead shrike, which may also benefit western snowy plovers by reducing island-wide cat abundance.

Effects of the Action

The proposed action includes increased frequency of training on the five San Clemente Island beaches inhabited by western snowy plovers and introduction of amphibious vehicle use at Horse Beach. Western snowy plovers will be subject to increased frequencies of temporary disturbance from foot and vehicle traffic associated with combined forces training operations (*e.g.* Battalion Sized Landings, other combined forces exercises). Training activities could occur both day and night on these beaches.

Plovers that are forced from beaches due to human activity are likely to disperse to the nearest available habitat. For larger beaches, such as Pyramid Beach, training activities will likely cause plovers to temporarily shift to undisturbed portions of the beach until training is over. Observations suggest plovers rapidly resume normal behavior after moving away from military training activities (Lynn *et al.* 2005). Thus, we assume that plovers using the larger beaches on San Clemente Island are likely to continue to use these beaches.

Training activities are likely to have the greatest impact on the smallest beach (*i.e.*, West Cove Beach), which will be subject to up to 44 Marine Corps amphibious vehicle operations and 50 NSW operations per year. These activities will subject plovers to movement at night when they are assumed to normally be resting. For smaller beaches, such as West Cove Beach, human and vehicular activity, noise or visual effects may render the entire beach unusable for foraging or resting by plovers until training is over, thus causing plovers to disperse to other areas; however, Navy survey data indicate that plovers roost above West Cove beach near the airfield as well, which is a short dispersal distance. Likewise, if training exercises commence in Impact Area II (China Beach), it is likely that plovers would attempt to fly to nearby habitat at Horse Beach or Pyramid Beach. Monitoring reports indicate that plovers may move readily between nearby beaches; however, the availability of a disturbance-free beach is likely to decrease as training intensity on San Clemente Island increases (*i.e.*, beaches suitable for foraging and resting on the same end of the island.) Thus, the duration of some of the operations and multiple sources of disturbance could cause plovers normally foraging and resting along San Clemente Island beaches to disperse and seek foraging habitat along mainland or other Channel Island beaches. This level of disturbance is not likely to result in injury or death to individual plovers as distances between suitable habitat along other Channel Island beaches and the mainland is well within the energy and physiological capabilities of these birds. Moreover, we expect that plovers will still take advantage of San Clemente Island beaches for foraging at times when training activities are low or absent.

Likelihood of direct injury or mortality to an individual plover from tracked or wheeled vehicle use on beaches is very low, but possible. Impacts to plovers from these types of vehicles would most likely occur at night if resting birds are surprised and fail to react quickly enough to flee the direct path of a vehicle. Such impacts are much less likely to occur during the day when the birds are actively foraging. To minimize potential impacts to plover, the Navy will direct tracked and wheeled vehicles to use the existing route for ingress and egress to/from the beach at West Cove and identify an ingress/egress and travel route at Horse Beach. With this measure in

place, we anticipate no more than one plover per year will be injured or killed due to training activities including the use of tracked and wheeled vehicles on San Clemente Island beaches.

Western snowy plovers are also increasingly likely to be disturbed, or possibly harmed, as a result of increased use of heavy ordnance over China Beach (Impact Area II) and Horse Beach and Pyramid Cove Beach (Impact Area I) due to the location of the beach directly in the path of the munitions used. Although targets in these Impact Areas are primarily placed away from the shore, rounds sometimes fall short as evidenced by craters on China Beach (Lynn *et al.* 2005). Plovers may fly from the beach, if disturbed by noise associated with training, but still face some risk of injury or fatality due to the location of their habitat within the Impact Areas. Thus, it is likely that some small number of plover(s) will be harmed or killed by ordnance as a result of training activities, but we anticipate that no more than one plover per year will be harmed or injured by ordnance on Horse Beach, China Beach, or Pyramid Beach on San Clemente Island.

The Navy has contributed to the range-wide efforts to monitor the western snowy plover and will continue annual breeding and non-breeding season surveys for the western snowy plover at West Cove and Northwest Harbor. However, new range management directives will be implemented as part of the proposed action. These directives will limit the ability of Navy resource personnel to monitor western snowy plover use of Horse Beach, China Beach, and Pyramid Cove Beach. The Navy will explore the feasibility of using remote sensing technology to monitor western snowy plover use of Pyramid Beach and China Beach.

Conclusion

After reviewing the current status of the western snowy plover, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the western snowy plover. We have reached this conclusion for the following reasons:

- (1) The Pacific coast western snowy plover population is widely distributed along the Pacific coast from Washington State to Baja California, Mexico. While populations fluctuate annually, range-wide population estimates have increased significantly since the species was listed in 1993 to an estimated 4,282 birds in 2008;
- (2) The death or injury of up to two plovers per year in association with the proposed training would remove less than 0.1 percent of the Pacific coast western snowy plover population within the U.S. annually;
- (3) San Clemente Island rarely supports breeding activity so the proposed action is unlikely to affect the species' reproduction;
- (4) The small number of birds injured or killed annually by training activities is not expected to result in an appreciable reduction in the numbers, reproduction, or distribution of the Pacific coast population of the western snowy plover; and

- (5) We assume that plovers using the larger beaches on San Clemente Island are likely to continue to use these beaches and that disturbance frequency from training activities will not reach a threshold that deters birds entirely from the island.

Reptile

Island night lizard (*Xantusia riversiana*)

Status of the Species

Listing Status

The island night lizard was listed as a threatened species on August 11, 1977 (Service 1977 (42 FR 40682)), primarily due to threats associated with habitat alterations caused by farming, fire, grazing by introduced animals, and invasion by exotic plants. The island night lizard is addressed in the Channel Islands Recovery Plan (Service 1984). Critical habitat has not been designated for the island night lizard.

We received a petition from the National Wilderness Institute, dated February 3, 1997 (Wilderness Institute 1997), to delist the island night lizard on the basis of data error. In a letter to the National Wilderness Institute dated June 29, 1998 (Service 1998), we indicated that due to low priority assigned to delisting activities in our 1997 Fiscal Year Listing Priority Guidance, we were not able to act on the petition at that time.

We received a petition dated March 22, 2004, from the U.S. Navy (U.S. Navy 2004), asserting that the island night lizard populations on Santa Barbara, San Clemente and San Nicolas islands each qualify as distinct vertebrate population segments, meeting the discreteness and significance criteria of the Service's and National Marine Fisheries Service's joint Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, published in the *Federal Register* on February 7, 1996 (Service 1996 (61 FR 4722)). The petitioners also requested the Service delist the distinct vertebrate population segments of the island night lizard on San Clemente and San Nicolas islands.

On August 22, 2006, we published a 90-day finding for both the 1997 and 2004 petitions to delist the island night lizard (Service 2006a (71 FR 48900)). In our 90-day finding, we determined the 1997 petition from the National Wilderness Institute did not provide substantial information indicating the petitioned action was warranted. However, we determined the 2004 petition from the U.S. Navy provided substantial information indicating the petitioned actions were warranted, and we commenced work on a 12-month finding.

In September 2006, we completed a 5-Year Review of the island night lizard and recommended delisting the San Clemente Island population of the island night lizard (Service 2006b). A preliminary analysis of island night lizard populations from the three islands on which it occurs

suggests that each may qualify as a Distinct Vertebrate Population; however, in our 5-Year Review, we indicated we would conduct a further evaluation during the course of the 12-month finding on the Navy's delisting petition (Service 2006b). We have not yet completed our 12-month finding.

Species Description

The island night lizard is a medium-sized lizard (adults 65 to 109 mm (2.6 to 4.3 in.) snout-vent length) (Mautz 2001). Its dorsal coloration is highly variable, and differs between islands, ranging from pale ash gray and beige, shades of brown, to varying amounts of black, with a pattern varying from uniform, mottled, to striped (Bezy *et al.* 1980, Fellers and Drost 1991).

Habitat Affinity

The island night lizard tends to confine its activity to areas with shelter, such as dense vegetation or rock. Therefore, suitable cover is an important habitat component, and appropriate vegetative cover can be a relative indicator of density (Mautz 2001). Vegetation composition and density on San Clemente, Santa Barbara, and San Nicolas Islands have been affected by the grazing history of the islands and by the resulting habitat changes on each island.

A number of habitat types provide the characteristics island night lizard appears to prefer. The island night lizard has been found in prickly pear cactus (*Opuntia oricola* and *O. littoralis*), maritime desert scrub, rocky outcrops and patches, and to a lesser extent, grasslands, and giant coreopsis (*Coreopsis gigantea*) stands (Mautz 2001). The densest populations of island night lizard have been detected in maritime desert scrub communities dominated by boxthorn. High densities also occur in prickly pear and rocky areas and crevices in clay soils.

Life History

The island night lizard is a slow-growing, late maturing and long-lived lizard with a low reproductive potential (Goldberg and Bezy 1974; Mautz 1993, 2001). Goldberg and Bezy (1974) suggested that the island night lizard does not reach sexual maturity until the spring of its 3rd or 4th year, and it begins breeding around March or April. The species is viviparous (gives birth to live young), and young are born around September (Goldberg and Bezy 1974; Fellers and Drost 1991; Mautz 1993). The island night lizard is unique for the genus *Xantusia* in having a brood size greater than two (Fellers and Drost 1991). Productivity differs between islands. Females on San Nicolas Island average 5.3 young per brood, and females on San Clemente and Santa Barbara Islands combined averaged 3.9 young per brood (Fellers and Drost 1991). Females demonstrate irregular intervals between reproduction, but they appear to approach a biennial cycle (Goldberg and Bezy 1974; Fellers and Drost 1991; Mautz 1993). Island night lizards can live up to 25 years (one individual record, Fellers 2005) and several individuals of 11 years or more have been recorded (Fellers *et al.* 1998; Fellers and Drost 1991; and Mautz 1993 as cited in Mautz 2001).

Like other members of *Xantusia*, these night lizards were originally assumed to be nocturnal because they were rarely observed during the day, and they have elliptical pupils. Island night lizards are actually primarily active during the day (Bezy 1988). The species eats a variety of insects, as well as the fruits, leaves, and flowers of boxthorn plants (*Lycium* sp.).

Distribution and Abundance

The island night lizard is endemic to three of the Channel Islands off the coast of southern California. The island night lizard occurs on San Clemente Island, San Nicolas Island, and Santa Barbara Island and a small islet (Sutil Island) 1.3 km (0.81 mi.) offshore from Santa Barbara Island (Bezy *et al.* 1980). San Clemente Island is the largest inhabited island. San Clemente Island and San Nicolas Island are managed by the U.S. Navy, and Santa Barbara Island is managed by the National Park Service as part of Channel Islands National Park (Fellers and Drost 1991; U.S. Navy 2002; Fellers *et al.* 1998).

At the time of listing in 1977, densities of island night lizard were not known. Measuring population numbers is challenging because of the secretive behavior of the animals. Nevertheless, abundance of the island night lizard has been estimated on the three islands of occurrence using similar techniques. The density of the species has been estimated on survey plots or transects within different habitat types or plant communities. The densities obtained have been extrapolated across each habitat type or plant community on each island to obtain an abundance estimate for each island (Mautz 2001).

The island night lizard occurs in extremely high densities within undisturbed patches of optimal habitat as well as lower densities in other habitat (Fellers and Drost 1991; Fellers *e al.* 1998; Mautz 2001). Mautz (2001) has postulated that the species may require an extremely dense population to be viable over the long-term due to its highly sedentary behavior. Although island night lizard densities in optimum habitat are comparable on the three islands where they occur, the islands differ in size and habitat availability, and the island night lizard populations vary accordingly.

The island night lizard is most abundant and widespread on San Clemente Island, which is the largest of the islands on which it occurs and contains the most maritime desert scrub habitat that is optimal for island night lizard. San Clemente Island has at least 2,351 ha (5,809 ac) of maritime desert scrub, and the number of island night lizards is estimated to be about 21.3 million (Mautz 2001). Because the action area includes all of San Clemente Island, details regarding the distribution of island night lizards and their habitat on San Clemente Island are provided in the Environmental Baseline section below.

San Nicolas Island supports less 65.8 ha (162.5 ac) of island night lizards habitat, including only 1.0 ha (2.5 ac) of the maritime desert scrub habitats that are optimal for island night lizard. Using data from a study extending from 1992 to 1995, Fellers *et al.* (1998) estimated that the population size on San Nicolas was about 15,350 individuals. On Santa Barbara Island, a study of island night lizard distribution and abundance in the mid 1980's yielded an estimate of only

about 6 ha (15 ac) of island night lizard habitat (Fellers and Drost 1991), but much of the habitat was high-quality and supported high numbers of island night lizards. The estimated population size for Santa Barbara Island was about 17,600 lizards (Fellers and Drost 1991). The population on Santa Barbara Island has not been intensively surveyed since the 1980's.

Genetics

A study of divergence in the island night lizard identified morphological differences between island populations but did not detect significant genetic distance values using electrophoretic analysis of proteins (Bezy *et al.* 1980). Morphological differences included significant differences in scalation patterns, color pattern, clutch size, and body size (not significant between San Clemente and Santa Barbara). More recently, another genetic analysis, using nuclear and mitochondrial DNA, suggests that lizards on the three islands are genetically different from one another, with San Nicolas Island being the most distinct. According to this study, the San Clemente Island and Santa Barbara Island populations are also distinct, but they have not been isolated as long as the San Nicolas population has (Sites *in litt.* 2006).

Threats

A general discussion of the threats faced by island night lizard and threats on Santa Barbara and San Nicolas islands is provided in this section. Because the action area includes all of San Clemente Island, details regarding threats to the island night lizard on San Clemente Island are provided in the Environmental Baseline section below.

Potential threats to this species have been substantially reduced with the removal of grazing animals that were affecting habitat on all three islands where they occur. Some potential threats remain, including habitat degradation by introduced annual grasses, predation by feral cats, and expansion of military training activities, which can degrade and eliminate habitat through activities such as off-road vehicle use, intensive ordnance use, and associated fires. The island night lizard populations on San Nicolas and Santa Barbara islands are more vulnerable to stochastic environmental disturbances because they are geographically restricted.

Non-native grasses may compete with California boxthorn or prickly-pear cactus (common cover species in optimal island night lizard habitat) for space or other resources such as light, water, and nutrients. The potential replacement of native shrub communities with annual grassland is a concern because areas invaded by non-native grasses support substantially fewer island night lizards than those with intact scrub communities (Mautz 2001; Fellers and Drost 1991). In addition, non-native grasses can alter ecological processes such as fire frequency that otherwise could affect the persistence of the island night lizard (U.S. Navy 2002). Since the removal of non-native grazing animals, some native plant species on San Clemente Island now exhibit signs of recovery, including seedling establishment, increases in plant cover, or observations of new occurrences of particular species (Fellers and Drost 1991; Junak and Wilken 1998; Tierra Data Systems 2005). However, vegetation monitoring on San Clemente Island and Santa Barbara

Island has shown no clear trend overall towards expansion of either the shrub communities preferred by island night lizards or non-native grasslands (U.S. Navy 2002; Tierra Data Systems 2005; Corry 2006). There is no current information on vegetation trends on San Nicolas Island. In summary, invasion by non-native grasses is a concern on all the islands, but by itself, we do not consider it a primary threat to any of the island night lizard populations.

Feral cats were introduced to San Clemente Island and San Nicolas Island during the ranching era of the late 1800's and early 1900's and have been documented eating substantial numbers of island night lizards (Cooper *et al.* 2005). Predator control has been conducted intermittently on San Clemente Island and on a more regular basis recently. Despite the threat posed by cats, island night lizards have maintained stable populations with ongoing predation by cats. Cats are also present on San Nicolas Island and have been observed in nearly all parts of the island (Fellers *et al.* 1998). On San Nicolas Island, the feral cat population has been subject to limited control. Therefore, the current cat population continues to be a threat to the population on San Nicolas Island.

A potential for fire exists on both San Nicolas Island and Santa Barbara Island due to human presence. However, based on historical records and current land use, high fire frequency is not likely. As with other Channel Islands, natural fires are infrequent. Human-caused ignition sources, while present, are not as prevalent as on San Clemente Island due to the absence of live-fire military training and the lower number of people present on each island. Ignitions on San Nicolas Island would be most likely to occur in the vicinity of two missile launch sites, which occur outside of documented island night lizard habitat (U.S. Navy 2003). Baseline conditions on San Clemente Island related to ongoing military use and associated risk of fires are discussed in more detail in the Environmental Baseline section below.

Rangewide Conservation Needs

The island night lizard is included as a target species in the 1984 Channel Islands Recovery Plan. The overarching goal of this plan is "to restore endangered and threatened species to non-listed status by restoring and protecting habitat that can support viable self-sustaining populations." Basic objectives of the recovery plan include: protection of resources from further degradation by herbivore removal, erosion control, and placement of military operations away from biologically sensitive areas; identification and avoidance of adverse impacts to listed species; restoration of native plant communities; monitoring population status; and responding to recovered populations by modification of listing status, when appropriate. Management of non-native grasses and other weedy species and control of the feral cat population are additional conservation needs. The size of a viable, self sustaining island night lizard population is not identified in the Channel Islands Recovery Plan.

Environmental Baseline*Distribution*

Island night lizards have been observed at varying densities on San Clemente Island in most plant communities. The principal vegetation communities that support island night lizards are marine succulent scrub (maritime desert scrub) communities (Mautz 2001). Island night lizards have been observed at high densities in maritime desert scrub and are present in other habitat types as well. As shown in Table 16, if the observed densities are extrapolated across the plant communities mapped on the island, over 20 million lizards are estimated to occur on San Clemente Island (Mautz 2001).

Table 16. Midpoint of Regression and Lincoln Index estimates of population density and population size of island night lizard on San Clemente Island

Habitat Type or Region	Habitat Area (ac / % of island)		Lizard Density (lizards/ac)	Lizard Numbers (millions)
	acres	percent of island		
Maritime Desert Scrub				
Lycium Phase	5,849	16.2	783	4.45
Prickly Pear Phase	7,337	20.3	1036	7.60
Cholla & Prickly Pear/Cholla	6,457	17.9	576	3.72
Grassland (upland plateau)	9,514	26.3	462	4.40
Scarp Grassland and Coastal Sage	2,703	7.5	375	1.01
Canyon Shrubland/Woodland	6,97	1.9	0	0
Active Sand Dunes	2,25	0.6	0	0
Unsampled Habitats	3,296	9.1		
Total	36,077	100		21.30

For habitats known to contain few or no lizards, population density is assumed to be zero. Adapted from Mautz (2001).

The estimates in the table above are based on trapping locations from a limited portion of the island, so the actual numbers of lizards on the island may be substantially different. However, there is clearly a large, dense population of island night lizards on San Clemente Island.

The area that supports the highest densities of island night lizards is believed to have escaped the intensive sheep grazing on the island (U.S. Navy 2002). Optimum habitat on San Clemente Island is primarily distributed in a band along the western marine terraces of the island, although lizards are found at lower densities in many parts of the island (Mautz 2001). The Navy has recognized an INLMA in this area since 1997 (U.S. Fish and Wildlife Service 1997e), which includes approximately 4,500 ha (11,100 ac), where Mautz estimates that approximately half of the island population is found (Mautz 2001).

Threats

Like the other Channel Islands, San Clemente Island has experienced a history of ongoing habitat modification due to grazing and browsing of non-native goats, sheep, deer, pigs, and cattle introduced by people. Erosion, reduced shrub cover, and changes in soil composition that resulted from overgrazing (Schwartz 1994; Halvorson 1994; U.S. Navy 2002) are all evident on San Clemente Island, as well as the vegetation recovery following the removal of these animals (Tierra Data, Inc. 2008).

There are a variety of non-native grasses present on San Clemente Island (U.S. Navy 2002), but although individual annual grass species may have expanded their distribution at a specific location over a specific time period, there is little evidence that non-native annual grasses are expanding their distribution throughout the island over time (Tierra Data, Inc. 2008). Thus, non-native invasive species are a concern and could become a more substantial threat if disturbance from fire or other sources increased significantly, but we do not consider them a primary threat to island night lizards at this time.

Feral cat populations persist on San Clemente Island, despite intermittent control efforts that began in 1986 and ongoing year-round efforts that began in 1998. Despite the persistence of the cat population on San Clemente Island and documentation of predation, the island night lizard density has remained very high on sample plots, and the population appears stable (Mautz 2001). Therefore, we do not consider cats to be a substantial threat to island night lizard on San Clemente Island at this time. However, if the cat population was left unchecked, it could become a more substantial threat (Mautz 2001).

Disturbances and habitat modification associated with: (1) baseline levels of training and resulting wildfires (Biological Opinion FWS 1-6-97-F-21; FWS-2808); (2) construction and baseline levels of training at TARs 4 and 16 (Biological Opinion FWS 1-6-00-F-19); and (3) impacts associated with the paving of San Clemente Island Ridge Road and construction of the AVMA from West Cove to the SHOBA gate (Biological Opinion FWS 1-6-97-F-58 and FWS 1-6-04-F-3934.1) have affected baseline habitat of the island night lizard. These past biological opinions anticipated impacts totaling 2,099 ha (5,186 ac) of night lizard habitat in association with creation of fuelbreaks and increased risk of fire throughout Impact Areas I and II. Night lizards were anticipated to remain in Impact Areas I and II, but mortality was anticipated to increase. The baseline conditions, therefore, include the existing threat of fire in Impact Areas I and II based on current activity levels. A previous biological opinion also anticipated impacts to island night lizards occupying 85 ha (209.5 ac) of maritime desert scrub north of the runway and 225 ha (556 ac) at or around TAR 16 due to habitat loss, training-related impacts, and increased fire frequency. Again, night lizards were anticipated to remain in most of the affected habitat, but mortality was anticipated to increase. Finally, a programmatic biological opinion (Biological Opinion FWS 1-6-97-F-58) addressed the loss of 85 ha (210 ac) of grassland, 15 ha (37 ac) of maritime desert scrub, and 299 ha (740 ac) of previously disturbed habitat associated with a variety of construction and training-related impacts. Of these anticipated impacts, only 21 ha (51 ac) of grassland, 13 ha (33 ac) of maritime desert scrub, and 41 ha (102 ac) of previously

disturbed habitat potentially occupied by night lizards have been impacted by projects. Despite the effects of human activities, including military training on this species, in optimal habitat the island night lizard persists at extremely high densities on San Clemente Island.

Conservation Actions

The Navy is implementing the San Clemente Island INRMP (U.S. Navy 2002), which addresses the island night lizard. Under the INRMP, the species is managed by limiting the amount of surface disturbance that occurs within optimal habitat, implementing best management practices to reduce surface disturbance associated with construction projects, enhancement of degraded habitat, and population monitoring every 5 years. Additional conservation actions outlined in the INRMP that likely benefit the island night lizard include ongoing efforts at invasive plant species control and non-native predator management (*i.e.*, feral cat removal).

The INLMA was created in 1997 to provide a focus area for island night lizard management activities, including habitat restoration (Biological Opinion FWS 1-6-97-F-58) and to offset the effects of surface disturbing construction projects that occurred during the same time period (Biological Opinions FWS -1-6-97-F-18, FWS 1-6-97-F-42, and FWS 1-6-97-F-58). The area supports approximately half of the island population (Mautz 2001). Few active management activities to benefit the island night lizard have occurred within the designation of the INLMA. However, the primary conservation measure that would benefit this species, avoidance of disturbance, has been the primary benefit of its continued recognition. The 5-year duration of the INLMA proposed by the Navy has passed, and although the INLMA is mapped and included within the 2002 INRMP, the Navy does not propose to carry this designation forward in future revisions of the INRMP. The Navy intends to include a more comprehensive and up-to-date management framework to support this species in future revisions of the INRMP.

Effects of the Action

The proposed action includes operations and activities that are likely to adversely affect the island night lizard, including increased use of areas that have, to date experienced little human use. Fire, ordnance use, foot travel and vehicular travel in the Impact Areas I and II, IOA, AVMR, AVMA's (Old Rifle Range and VC-3), AMPs, AFPs, TAR 10, TAR 17, and BTS sites may result in habitat modification and death or injury of individual lizards. Because island night lizards are afforded protection under rocks and soil, we expect many of the thousands of lizards that inhabit existing and proposed operations areas to persist despite ongoing and intensified operational use of San Clemente Island. Within operational areas, island night lizards and their habitat would be most affected by surface disturbing activities and changes in habitat that may occur due to repeated fires or invasive species introduction and spread. In addition, construction of range buildings and gates are proposed in island night lizard habitat. The acreage of island night lizard habitat that is found within operational areas that are likely to experience direct and indirect effects is provided in Table 17, and the estimated number of night lizards and percent of the population in these areas is provided in Table 18.

Table 17. Island night lizard habitat (acres and percent of habitat type) within project footprint

Operational Area	MDS* Prickly Pear Phase		MDS* Lycium Phase		MDS* Cholla and Prickly Pear/Cholla		Grassland (Upland Plateau)	
	acres	percent	acres	percent	acres	percent	acres	percent
Old Rifle Range AVMA	0	0	137.2	2.4	0	0	0.5	0.005
VC-3 AVMA	0	0	0	0	2.6	0.04	275.5	2.9
AFP 6	0	0	0	0	0	0	123.3	1.3
AFP 1	0	0	0	0	34.1	0.5	0	0
Impact Area I	0	0	511.6	8.8	397.8	6.2	1.0	0.01
Impact Area II	28.0	0.4	572.0	9.8	0	0	0	0
AMP, "Self Help"	0	0	0	0	0	0	3.4	0.04
TAR 10	0	0	25.3	0.4	0	0	0	0
TAR 17	0	0	7.2	0.1	0	0	0	0
BTS Sites	0	0	3.0	0.05	1.0	0.02	0	0
Totals	28.0	0.4	1256.3	21.5	435.5	6.7	403.7	4.2

*MDS: Maritime desert scrub

Table 18. Estimated number of island night lizards (number / percent of population) within the project footprint from habitat-based density estimates in Table 16 (Mautz 2001)

Operational Area	MDS* Prickly Pear Phase		MDS* Lycium Phase		MDS* Cholla and Prickly Pear/Cholla		Grassland (Upland Plateau)		Total	
	lizards	percent	lizards	percent	lizards	percent	lizards	percent	lizards	percent
Old Rifle Range AVMA	0	0	107,428	0.5	0	0.00	231	0.001	107,659	0.5
VC-3 AVMA	0	0	0	0.00	1,498	0.01	127,281	0.6	128,779	0.6
AFP 6	0	0	0	0.00	0	0.00	56,965	0.3	56,965	0.3
AFP 1	0	0	0	0.00	19,642	0.09	0	0	19,642	0.1
Impact Area I	0	0	400,583	1.9	229,133	1.1	462	0.002	630,178	3.0
Impact Area II	28,980	0.1	447,876	2.1	0	0.00	0	0.00	476,856	2.2
AMP, "Self Help"	0	0	0	0.00	0	0.00	1,571	0.01	1,571	0.01
TAR 10	0	0	19,810	0.09	0	0.00	0	0.00	19,810	0.1
TAR 17	0	0	5,638	0.03	0	0.00	0	0.00	5,638	0.03
BTS Sites	0	0	2,349	0.01	576	0.00	0	0.00	2,925	0.01
Totals	28,980	0.1	983,683	4.6	250,848	1.2	186,509	0.9	1,450,020	6.8

*MDS: Maritime desert scrub

Ordnance Use

Training exercises that entail heavy ordnance use are likely to disturb island night lizards and could injure or kill lizards that are directly hit or suffer a near miss. The sedentary habit of island night lizards make it unlikely that lizards would move from an area in response to ordnance impact, and the relatively high density of this species increases the potential for lizards to be killed or injured during ordnance use. Impact Areas I and II, where significant impacts from heavy ordnance use are most likely to occur, contain about 611 ha (1,509 ac) of habitat mapped as maritime desert scrub (including prickly pear, California boxthorn, and cholla and prickly pear/cholla phases), 0.4 ha (1.0 ac) of grassland, and an estimated 5.2 percent of the island night lizard population on the island. However, as described above, these Impact Areas have been exposed to heavy ordnance use on an ongoing basis, so a substantial portion of the habitat has been degraded and may not support as many lizards as estimated based on vegetation mapping. Increased use as proposed is likely to further degrade island night lizard habitat within these areas due to damage and destruction of shrubs and increased risk of fire (described above). In addition, increased use of heavy ordnance is likely to increase the rate at which lizards are killed and injured as a result of these projectiles. However, certain locations within the Impact Areas tend to be targeted, and there are substantial portions of the Impact Areas that will likely continue to support island night lizards and high-quality habitat.

Small arms fire at targets, demolition explosions and other forms of ordnance use also have the potential to injure or kill individual island night lizards within TAR 10 and 17 and BTS sites, which encompass approximately 15 ha (36 ac) of maritime desert scrub habitat. The risks associated with injury or fatality at these sites is less, since the footprint of ordnance is smaller. We anticipate that island night lizards that inhabit these sites will be exposed to increased risks associated with small arms and demolitions use, although the most intensive use within the TARs is likely to occur within a much smaller acreage.

The effects of exposure of island night lizards to noise from small arms and other sources are not known but are not expected to be substantial given the persistence of island night lizards in the areas having a history of bombardment, noise, and habitat alteration.

Fire

Fires may injure or kill island night lizards and may indirectly result in mortality due to reduced food availability after a fire or increased exposure to predators. Fires are likely to occur within island night lizard habitat as a result of the proposed action, particularly in habitat within Impact Areas I and II. Together, the two impact areas include a total of 611 ha (1,509 ac) of habitat mapped as maritime desert scrub (including prickly pear, California boxthorn, and cholla and prickly pear/cholla phases), 0.4 ha (1 ac) of grassland, and an estimated 5.2 percent of the island night lizard population on the island. Impact Areas I and II contain about 76 percent of the estimated number of lizards within the proposed action's project footprint based on habitat mapping. However, Impact Areas I and II have been subjected to a high level of ordnance use on an ongoing basis and have experienced up to three fires in the last 25 years. Therefore,

portions of the existing habitat are degraded and likely support fewer island night lizards. The proposed project will increase the frequency of ordnance use in the impact area (*e.g.*, NSFS (11 percent), EFEX (33 percent), and Bombing Exercises (23 percent)) and therefore increase the risk of fire occurring within the impact area.

The creation and/or expansion of a variety of operational areas (AVMAs, AMPs, AFPs, TARs 10 and 17, and BTS sites) will all increase the potential for increased fire frequency in the surrounding environment. Of these operational areas, the off-road vehicle areas (AVMAs, AMPs, and AFPs) include the greatest estimated number of lizards (estimated 1.5 percent of the island population), but TARs 10 and 17 and the BTS sites are within the area along the West Shore that has been largely unexposed to fire and contains the best-quality habitat for island night lizard. The increase in frequency associated with the increased training activities is not known with any precision, but implementation of the FDRS is anticipated to minimize the fire frequency, and more detail on the frequency and extent of fires is anticipated to emerge over time.

Habitat that supports high densities of island night lizards along the West Shore broadly overlaps with “high density” and “moderate density” San Clemente sage sparrow habitat. Implementation of the FDRS entails precautionary measures that are expected to reduce the size and frequency of fires that might otherwise occur within this habitat. We expect that the precautionary measures, including implementation of the FDRS, annual reviews of fires and fire management, and re-evaluation of the status of sage sparrows and fire management effectiveness if fires exceed thresholds will also reduce the impact of fires on the island night lizard population on San Clemente Island. Based on implementation of the FDRS, we anticipate that most fires along the West Shore will be small and located within or adjacent to TAR 10, TAR 17, and BTS sites.

Despite the potential for fires to adversely affect this species, island night lizards persist within previously burned areas on San Clemente Island. An unpublished study by the Navy at one locale within SHOBA (summarized in a petition to delist the island night lizard, U.S. Navy 2004), indicates that the island night lizard population within the burned area retained a stable age class distribution. Many individual island night lizards were observed to survive fire unharmed under loose rocks and stones as well as in crevices. Similarly, Cunningham *et al.* (2002) reported minimal long-term effects on populations of other lizard species following a catastrophic wildfire in Arizona. Because island night lizards are common and widely distributed on San Clemente Island, burned areas are expected to be re-colonized by individuals that survive fires and by lizards that inhabit adjacent unburned areas, once the vegetation and prey populations begin to recover. Alteration of habitat that results from short fire return intervals within impact areas, however, may result in locally reduced island night lizard populations.

In summary, despite an increase in the risk of fire, at least some habitat and lizards are anticipated to remain within the impact areas. Since Impact Areas I and II under baseline conditions support only a small percentage of the estimated island night lizard population (*i.e.*, likely less than the 5.2 percent estimated from habitat mapping), loss of a portion of these

animals from increased fires within the impact areas is not expected to have a significant effect on the island-wide population of this species. More importantly, fuelbreaks and suppression measures outlined within the FDRS are anticipated to prevent a significant increase in fire frequency outside Impact Areas, where the majority of the optimal island night lizard habitat occurs. Therefore, only a limited number of lizards are anticipated to be killed or injured by fires starting within Impact Areas I and II and spreading to other areas on the island, and if burned these areas are anticipated to be recolonized by lizards.

Fire Management and Suppression

Fire management may entail future creation of fuelbreaks in areas that support island night lizard. No specific fuelbreak locations have been proposed in the vicinity of this species to date. If fuelbreaks are created using Phos-Chek or herbicide, as proposed within the project description, island night lizards within the fuelbreak footprint could be destroyed. The use of Phos-Chek may also favor the expansion of non-native species due to the fertilizing effect of this retardant. Since the boundaries of future fuelbreaks have not yet been identified, we anticipate that the Navy will consult with the Service regarding any future plans to establish fuel breaks with the potential to impact island night lizards. Thus, the impacts of new fuelbreaks on island night lizard are not considered in this analysis.

Vehicle Traffic

Approximately 56 ha (139 ac) of maritime desert scrub and 163 ha (403 ac) of grassland occur within the boundaries of proposed AVMAs, AMPs, AFPs. Together these areas, which are the only areas where off-road vehicle traffic is anticipated to occur, include an estimated 1.5 percent of the population on the island. Based on information provided by the Navy, the level of vehicle use anticipated in the area will substantially degrade the habitat in these areas. Over time, much of the vegetation will be crushed and denuded by the vehicles, and remaining patches of vegetation will consist primarily of non-natives grasses and other weedy species. In addition, lizard mortality will be high as vehicles will crush lizards hiding under rocks and crevices in the soil. Although a few island night lizards may survive within the areas heavily impacted by vehicle use, because of the high mortality and substantial habitat degradation, the area is not anticipated to contribute functionally to the population. Denuding much of the vegetation within the AVMAs, AMPs, and AFPs will create the potential for substantial erosion and additional habitat loss within the surrounding area. However, the Navy has committed to the development and implementation of an erosion control plan, which is anticipated to minimize loss of habitat due to erosion in the surrounding environment.

Foot traffic

Island night lizards are not expected to be directly affected by foot traffic, even when such traffic occurs at increased levels as anticipated as part of the Battalion-sized landing. Because island night lizards use microhabitats under rocks, vegetation, or debris, they are expected to be shielded from potential harm or disturbance associated with foot traffic. Island night lizards

may, however, be indirectly affected if foot traffic results in expanded distribution of invasive plants that could alter island night lizard habitat.

Significant increases in foot traffic within island night lizard habitat in the IOA and TARs is anticipated as a result of implementation of the proposed action. Foot traffic is unlikely to result in direct harm to island night lizards, since the lizards remain in soil cracks, under rocks, and under heavy shrub cover.

Invasive Plants

The significant increases in off road vehicle anticipated as part of the proposed action are expected to result in increased distribution and abundance of invasive plant species on San Clemente Island, particularly within the AVMC. Changes in the plant community are most likely to adversely affect island night lizards if annual grasses or other invasive species alter the composition of plant communities along the West Shore, in optimal island night lizard habitat in a manner that increases the potential for repeated fires and type conversion in this area. The Navy proposes to address the potential for invasive species proliferation by continuing to conduct invasive plant species control efforts on San Clemente Island.

Construction of Range Buildings and Gates

Range buildings and gates are proposed for construction within island night lizard habitat at TARs 10 and 17 and Impact Area I. The cumulative acreage of construction disturbance is expected to be less than seven acres. The habitat type within the project footprints is not known, but even if the impacted habitat is the highest-quality habitat for island night lizards, this aspect of the project will impact only about 0.03 percent of the population on the island. Construction activities are likely to result in death or injury of island night lizards that lie in the path of surface moving equipment.

Conclusion

After reviewing the current status of the island night lizard, the environmental baseline, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the island night lizard. We have reached this conclusion for the following reasons:

- (1) The status of the island night lizard has significantly improved since its listing in 1977 because the primary threat to the species was eliminated with removal of non-native grazers on San Clemente, San Nicolas, and Santa Barbara islands. The San Clemente Island population of night lizard appears to be large and stable despite the presence of non-native grasses, feral cats, and ongoing military activities on the island. The ongoing and proposed conservation and minimization measures for San Clemente Island, including non-native weed removal and feral cat removal and implementation of the fire management plan and erosion control plans are anticipated

to maintain the suitability of island night lizard habitat on this island over the long term. Thus, the Service recommended delisting of the San Clemente Island population of the island night lizard in our 2006 5-Year Review based on its recovery;

- (2) Using habitat-based density analysis, the proposed project is anticipated to impact roughly 2.5 percent of the island night lizard population on San Clemente Island. Although the project will impact a large number of lizards (roughly 536,968; see take statement below), this impact is not expected to result in an appreciable reduction in the numbers, reproduction, or distribution of the rangewide population of the island night lizard because the great majority of the lizard population (an estimated 97.5 percent) is expected to be sustained in suitable habitat on San Clemente Island and rangewide.
- (3) Island night lizards are largely sedentary, so lizards outside the impacted areas are not anticipated to be affected by the loss of habitat in the impacted areas. The Navy will continue to conduct its ongoing monitoring to ensure that island night lizard populations remain stable.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulations issued pursuant to section 4(d) of the Act, prohibit take of endangered and threatened species without a special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that actually kills or injures a listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an action that creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), such incidental taking is not considered to be a prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The following levels of incidental take are based on current information concerning listed animal species' population levels on San Clemente Island. The Service recognizes that the ongoing recovery efforts of the Navy may increase the baseline population numbers of these species. Because this programmatic biological opinion is expected to be in effect for an extended timeframe, it may be necessary, and appropriate, for the Service to review and revise the levels of incidental take below as new information concerning listed species population levels becomes available.

AMOUNT OR EXTENT OF TAKE

Brown pelican

- We anticipate that up to 3 California brown pelicans will be killed or injured each year in association with the U.S. Navy's San Clemente Island Military Training Program.

San Clemente Loggerhead Shrike

- We anticipate that increases in ordnance use are likely to result in noise and disturbance that will result in lowered reproductive success or death of 1 pair of shrikes per year;
- We anticipate that fires could result in loss 1 active nest and 2 adult per year;
- We anticipate that up to 2 shrikes per year may be struck and injured or killed by vehicles as a result of increased use of roads and the AVMA; and
- We anticipate that 1 active nest per year may be destroyed or otherwise fail as a result of training operations conducted within the IOA.

San Clemente Sage Sparrow

Estimating the number of San Clemente sage sparrows that may be taken as a result of the proposed action is difficult due to: (1) uncertainties regarding the acreage and location of habitat that may be affected by future fires and dispersed activities; (2) variability in the size of the sage sparrow population; and (3) the suite of potential responses of sage sparrows to noise, disturbance, fire, and incremental habitat modification. In addition, incidental take of individuals, nests, or pairs is likely to go undetected since monitoring of all individual birds surrounding all proposed training areas is not feasible. Nonetheless, we have estimated the amount and type of sage sparrow habitat we expect to be modified or degraded and the number of birds potentially impacted by these and other impacts associated with the proposed action. Take thresholds are set by habitat acreages burned for instances where we believe it will be difficult to monitor the actual number of individual sparrows taken.

Take levels are estimated for the San Clemente Island Sage sparrow as follows:

Fire and Fire Suppression

The proposed action is anticipated to modify or degrade sage sparrow habitat due to fire within and adjacent to operational areas that will result in death and injury to sage sparrow adults, juveniles, eggs, and nestlings and result in lowered sage sparrow reproduction in some years following fires over the life of the project.

- The proposed action is anticipated to modify or degrade sage sparrow habitat due to fire within and adjacent to operational areas. As described in the FMP, a maximum of 18 ha (45 ac) of high density sage sparrow habitat as mapped in Figure 1 could be cumulatively burned in single fire events less than 2 ha (5 ac) during a 5-year period. From a habitat-based density analysis, this will result in a maximum loss of 32 adult sage sparrows and a low number of eggs and nestlings, which we anticipate to be from no more than two nests per breeding season;
- We anticipate a maximum of 8 ha (20 ac) of medium density habitat south of the runway as mapped in Figure 1 will burn over a 5-year period. From a habitat-based density analysis, this will result in a maximum loss of 6 adult sage sparrows and a low number of eggs and nestlings, which we anticipate to be from no more than one nest per breeding season;
- We anticipate a maximum of 16 ha (40 ac) of low density habitat as mapped in Figure 1 will burn over a 5-year period. From a habitat-based density analysis, this will result in a maximum loss of 6 adult sage sparrows and a low number of eggs and nestlings, which we anticipate to be from no more than one nest per breeding season;
- We anticipate a maximum of 10 ha (25 ac) of medium density sage sparrow habitat north of the runway will burn over a 5-year period. From a habitat-based density analysis, this will result in a maximum loss of 8 adult sage sparrows and a low number of eggs and nestlings, which we anticipate to be from no more than one nest per breeding season;

Fire Suppression

- We anticipate fire suppression activities (*i.e.*, water sprayed from a truck or dropped by a helicopter) will result in death or injury to eggs and/or nestlings; we anticipate that no more than one nest will be impacted per year from such activities;

Air, Foot, and Vehicle Traffic

- We anticipate that eggs and/or nestlings will be blown out of nests from rotorwash resulting in death or injury; the take threshold will be met if more than two such events are documented during any 3-year period;
- We anticipate that eggs and/or nestlings will be trampled and crushed by troops resulting in death or injury; the take threshold will be met if monitoring documents that trampling is suspected in the loss of more than one nest per year;
- We anticipate that 1 individual sage sparrow will be killed per year by vehicle strikes; and

- We expect that nests containing eggs and/or nestlings will be crushed by vehicles within the AVMA/AMP; the take threshold will be met if monitoring documents that more than one nest per year is destroyed by such an event.

Ordnance and Demolition Use

- We anticipate that no more than 1 adult and the eggs and/or nestlings from one nest will be killed or injured by projectiles within operational areas and within 305 m (1,000 ft) of operational areas during any 5-year period.

No take is anticipated from construction of new buildings and related facilities and maintenance or installation of fuel breaks, and none is authorized.

Western Snowy Plover

- We anticipate that 1 western snowy plover per year will be killed or injured by exposure to ordnance within the Impact Areas.
- We anticipate that 1 western snowy plover will be killed or injured each year during training activities that use tracked or wheeled assault vehicles on Horse Beach and West Cove Beach.

Island night lizard

- We anticipate that all island night lizards within the AVMAs, AFPs, and AMP and within the footprint of new buildings and other structures in TARs 10 and 17 and Impact Area I will be killed over time. Based on a habitat-based density analysis, this will result in the loss of an estimated 1.5 percent of the population on San Clemente Island or about 321,868 lizards.
- Mortality rate due to ordnance use and fire is likely to increase within Impact Areas I and II, which contain an estimated 5.2 percent of the population based on habitat mapping or about 1,107,034 island night lizards. However, the actual number of night lizards in Impact Areas I and II is likely already lower due to past ordnance use in the area, and we believe that much of the habitat and lizards can be sustained over time in these impact areas despite the increased risks for fire-related injury and death; thus, we anticipate that roughly 213,000 lizards or about 1 percent of the population on San Clemente Island will be killed or injured over time in Impact Areas I and II;
- Outside the Impact Areas, there is a potential for increased fire, but implementation of the FDRS is anticipated to limit the size and frequency of fires. In addition, a large portion of the island night lizard population appears to be able to survive fires by sheltering in rocks or cracks in the ground. Thus, we anticipate that a relatively small number of

lizards (2000 lizards or 0.01 percent of the population on San Clemente Island) will be injured or killed annually as a result of fires outside Impact Areas I and II; and

- An even smaller number of lizards (100 lizards or 0.0005 percent of the population on San Clemente Island) are also likely to be killed or injured annually during routine training activities in the other operational areas (TAR 10, TAR 17, and BTS sites);

EFFECT OF THE TAKE

In the accompanying biological opinion, we determined that the level of anticipated incidental take of brown pelicans, loggerhead shrikes, sage sparrows, western snowy plovers, and island night lizards is not likely to result in jeopardy to these species.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize and monitor the impacts of this incidental take of brown pelican, San Clemente loggerhead shrike, San Clemente sage sparrow, and San Clemente Island night lizard.

Brown pelican

1. The incidental take of brown pelicans will be difficult to detect since it is likely to occur in open ocean waters or within active training areas. The Navy shall, however, report any observed incidental take to the Service annually;
2. The Navy shall minimize unnecessary disturbance to roosting pelicans at Castle Rock and Bird Rock; and

San Clemente Loggerhead Shrike

3. The Navy will ensure adequate access to the SHOBA and along China and Horse Beach Canyon Roads (excluding Impact Areas I and II) in continuing its successful recovery program to minimize impacts from training activities on the San Clemente loggerhead shrike; and
4. The Navy will report any incidental take of San Clemente loggerhead shrike to the Service.

San Clemente Sage Sparrow

5. The Navy will report any incidental take of sage sparrows and/or loss of its habitat as a result of fire and training activities to the CFWO.
6. The Navy will minimize incidental take of sage sparrows.

Western Snowy Plover

7. The incidental take of western snowy plovers will be difficult to detect since it is likely to occur in active training areas. The Navy shall, however, monitor West Cove Beach after amphibious vehicle use on this beach to determine whether plovers continue to use beaches after training events and to determine whether plovers have been injured or killed as a result of these activities.
8. The Navy shall reduce the potential for incidental take of western snowy plovers from wheeled or tracked vehicles on West Cove Beach.
9. The incidental take of island night will difficult to detect since island night lizards shelter under rocks or in the soil, so lizards that have been killed due to fire, vehicle traffic, and ordnance use will seldom be visible. The Navy shall, however, report any incidental take observed during population monitoring and habitat evaluations to the Service.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, your agency must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

Brown pelican

The following terms and conditions implement reasonable and prudent measures 1 and 2:

- 1.1 The Navy shall submit a yearly report that summarizes whether any dead or injured brown pelicans were found or observed on San Clemente Island or in the nearshore waters surrounding the island. The annual report shall include the following information about any pelican detected: Date found; general location; cause of death or injury, if known; condition of the bird; and additional measures taken, if necessary to prevent additional pelican injury or fatalities;
- 2.1 Helicopters and boats will be routed away from Castle Rock to the maximum extent consistent with training;
- 2.2 A minimum distance of 100 m (328 ft) for helicopters and 25 m (82 ft) for vessels from Castle Rock will be maintained when transporting people from shore.

San Clement Loggerhead Shrike

The following terms and conditions implement reasonable and prudent measures 3 and 4:

- 3.1. The Navy will submit annual reports to the Service documenting actions taken to minimize impacts of their training and fire management activities on the loggerhead shrike;
- 4.1 The Navy will notify the Service within 48 hours of discovering any dead or injured San Clemente loggerhead shrike. The notification will include the following information about any dead or injured shrikes detected: date found; general location; cause of death or injury, if known; condition of the animal. In addition, the Navy will summarize information regarding death or injury of San Clemente loggerhead shrikes in an annual report submitted to the Service.

San Clemente Sage Sparrow

The following terms and conditions implement reasonable and prudent measures 5 and 6:

- 5.1 A summary of all fire-related incidental take and/or loss of sage sparrow habitat will be reported annually to the Service's CFWO. Included in the report will be acres of each sage sparrow habitat type burned (high, medium, or low density), mapping of the location of each fire, and a classification of intensity for each fire. The report will be due by March 1 of each year. If and when the fire/burn threshold of 18 ha (45 ac) in high density habitat, 8 ha (20 ac) in medium density habitat south of the runway, 10 ha (25 ac) in medium density sage sparrow habitat north of the runway, or 16 ha (40 ac) in low density habitat is reached, take authorization has been met and the CFWO will be notified immediately. Further, if a single fire event burns 5 or more acres in high density habitat, the CFWO should be notified within 1 day.
- 5.2 The Navy will notify the Service's CFWO within 48 hours of discovering any dead or injured San Clemente sage sparrows. The notification will include the following information about any dead or injured sparrows detected: date found; general location; cause of death or injury, if known; condition of the animal. In addition, the Navy will summarize information regarding death or injury of San Clemente sage sparrow in an annual report submitted to the CFWO.
- 6.1 The Navy will evaluate post-fire habitat recovery in sage sparrow habitat that burns along the West Shore (*i.e.*, from the airfield to Seal Cove) outside TAR boundaries. If habitat is not recovering, the Navy will implement restoration activities that may include erosion control, focused weed control, outplanting and/or seeding.
- 6.2 Fast-Rope exercises should be conducted over disturbed areas rather than sage sparrow habitat to the extent feasible to minimize rotorwash over active nests during the breeding season.

- 6.3 Low-elevation helicopter activity over the area between Eel Point and the dunes should be avoided to the maximum extent consistent with training activities.
- 6.4 Timing activities at TAR 10 and 17 should be conducted outside the peak period of the sage sparrow breeding season (usually March/April) to the maximum extent consistent with training activities.
- 6.5 The footprint of the construction areas for the new building and parking lot within TAR 10, which are slated for construction outside the breeding season, will be marked to avoid habitat areas in coordination with the San Clemente Island natural resources program. Anti-perch devices will be installed on the structures.

Western Snowy

The following terms and conditions implement reasonable and prudent measures 7 and 8:

- 7.1 The Navy shall submit a yearly report that summarizes western snowy plover use of monitored beaches on San Clemente Island and any incidental take that is observed.
- 8.1 The Navy shall enhance the upland portions of West Cove beach to provide additional resting areas for the western snowy plover by controlling non-native plants in the vicinity of West Cove Beach to the extent feasible and by ensuring man-made materials do not accumulate on the beach.

San Clemente Island night lizard

The following terms and conditions implement reasonable and prudent measure 9:

- 9.1 The Navy shall submit an annual report that summarizes whether any dead or injured island night lizards were found or observed on San Clemente Island. The annual report shall include the following information about any lizards detected: date found; general location; cause of death or injury, if known; condition of the animal.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the Navy's responsibility for these species, pursuant to section 7(a)(1) of the Act.

1. We recommend that the Navy, in coordination with the Service, develop management strategies that specifically address each of the listed plant species on San Clemente Island. The listed plants on the island are identified as Management Focus Species in the INRMP and benefit from general efforts to prevent the spread of invasive species. Our understanding of the genetics of each species has been improved by the ongoing genetics research supported by the Navy. However, little management specifically addressing each species has occurred. Specific recommendations pertaining to each species are provided within the Service's 5-Year Reviews and are included within the description of each plant species in this biological opinion. We recommend that the Navy include the Service's 5-Year Review recommendations, as appropriate, in the upcoming revision of the INRMP. We recommend that, for species that remain narrowly distributed on the island or located close to operational areas, carefully managed propagation and outplanting (in consideration of genetic studies) be accomplished to provide a mechanism for accelerating increases in distribution and abundance, reducing risks to the species, and increasing flexibility for training.
2. We recommend that the Navy collect bush mallow cuttings and/or seeds from Horse Beach Canyon that will allow propagation and outplanting (in consideration of genetic studies) in areas that are not at risk from military training.
3. We recommend that the Navy, in coordination with the Service, build upon the existing population modeling efforts for the San Clemente sage sparrow and the San Clemente loggerhead shrike to better understand the future viability of these populations. We also recommend that comments from reviewers of the sage sparrow PVA be evaluated and included in future population modeling efforts.
4. We recommend that the Navy continue to recognize the Island Night Lizard Management Area as an important area for impact minimization in future planning documents, including the San Clemente Island INRMP.

REINITIATION NOTICE

This concludes formal consultation on the proposed action. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. Because this biological opinion is programmatic in nature covering multiple actions encompassed by military training and fire management activities over an extended timeframe, we anticipate ongoing coordination will be necessary and appropriate as the proposed action is

implemented. In addition, we anticipate that certain future actions discussed generally under the umbrella of this programmatic biological opinion may require subsequent consultations on a case by case basis (*e.g.*, fuel break establishment, controlled burns, erosion control measures) as additional project-specific details become available. Specifically, annual fire management plans and/or erosion control plans may require project-level consultation for specific actions if listed species may be affected by fire or erosion control management activities where project-specific details were not available to provide adequate analysis and/or incidental take exemptions within this programmatic biological opinion. For example, if listed species lie within or adjacent to a proposed fuelbreak footprint, and this impact was not described in the FMP BA or project description, project-level consultation may be warranted. Because conservation measures that minimize potential effects to listed species will be included in annual fire management and erosion control plans as they are developed, these project-level consultations may only require informal consultation and, in the event that formal consultation is necessary, may be streamlined.

Beyond any streamlined consultations that are tiered off of this programmatic consultation, reinitiation of consultation on certain aspects of the programmatic consultation may be required in instances as described in 1-4 above. Specifically, certain assumptions and predictions were made in this biological opinion using data collected over many years on San Clemente Island under different training and fire management regimes. If monitoring reveals that the effects on listed species from training are greater or that the FMP and other conservation measures are not having the intended effect of minimizing these impacts on listed species, reinitiation of consultation may be warranted.

Finally, because the FMP will shape fire-related policy, management, and decisions on San Clemente Island for 5 years (2009-2014) and then may continue or be updated for fire management activities conducted beyond 2014, consultation with the Service may be warranted if future updates are modified in a manner that causes an effect to listed species or critical habitat not considered in this biological opinion.

We appreciate the Navy's efforts to improve the status of the endangered and threatened species on San Clemente Island while implementing its military mission. We would like to recognize the Navy's Natural Resources Office for their extensive support in supplying the information needed to complete this consultation. Their knowledge of the natural resources on San Clemente and understanding of military training activities made a significant contribution to this biological opinion. We look forward to working with the Navy in our partnership to conserve the natural resources on San Clemente Island.

If you have any questions or comments concerning this biological opinion, please feel free to contact us. Future coordination efforts to implement this programmatic biological opinion should be directed to David Zoutendyk or Sandy Vissman of my staff at (760) 431-9440.

Sincerely,

A handwritten signature in black ink, reading "Karen A. Goebel". The signature is written in a cursive style with a large, looping "K" and a distinct "A".

Karen A. Goebel
Assistant Field Supervisor

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Personal Communications: The following people were contacted for relevant information. These people provided a range of expertise based on their involvement with specific survey efforts, scientific studies and/or management of San Clemente Island biological resources.

Ames, Chelsea. Plant Propagator, Rancho Santa Ana Botanic Garden, Claremont, California. August 3 and 9, 2006, electronic mail communications to William B. Miller of the Carlsbad Fish and Wildlife Office.

Booker, M. U.S. Navy Wildlife Biologist for San Clemente Island. November 17, 2008, personal communication with Sandy Vissman of Carlsbad Fish and Wildlife Office.

Brock, Kelly. U.S. Navy Wildlife Biologist. March 26, 2006, telephone communication with Sandy Vissman of Carlsbad Fish and Wildlife Office.

Chess, Katie. U.S. Geological Survey, Western Ecological Research Center, Channel Islands Field Station, Ventura, California. April 24, 2006, personal communication with William Miller of the Carlsbad Fish and Wildlife Office.

Copper, Elizabeth. Contracted biologist to the U.S. Navy. 2002, telephone conversation with Martin Kenney, Service biologist.

- Dunn, Jonathan. Botanical Conservation Manager at the San Diego Zoological Society Conservation and Research for Endangered Species, Applied Conservation Division, Escondido, California. April 11, 2006, telephone conversation with William Miller of the Carlsbad Fish and Wildlife Office.
- Helenurm, K. 2006. Associate Professor, University of South Dakota, Vermillion, South Dakota. April 12, 2006, telephone conversation with William Miller of the Carlsbad Fish and Wildlife Office.
- Hudgens, Brian. Institute for Wildlife Studies. September 21, 2008, telephone communication with Sandy Vissman of Carlsbad Fish and Wildlife Office.
- Jett, S. Director of Horticulture at the Rancho Santa Ana Botanic Garden, Claremont, California. July 28, 2006, telephone conversation with William B. Miller of the Carlsbad Fish and Wildlife Office.
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O'Connor, K. Botanist, U.S. Department of the Navy, Southwest, San Diego, California.

Multiple communications with William Miller of the Carlsbad Fish and Wildlife Office as follows: March 27, 2006, telephone conversation; April 10, 2006, telephone conversation; May 8, 2006, telephone conversation;

O'Connor, K. Botanist, U.S. Department of the Navy, Southwest, San Diego, California.

October 28, 2008, communication with Sandy Vissman of the Carlsbad Fish and Wildlife Office.

Wall, M. Curator/Manager Seed Program, Rancho Santa Ana Botanic Garden, Claremont, California. Telephone conversation and email communications with William Miller of the Carlsbad Fish and Wildlife Office on April 24, 2006, and August 15, 2006.