SOUTHERN CALIFORNIA RANGE COMPLEX

COASTAL CONSISTENCY DETERMINATION

Department of the Navy

United States Pacific Fleet

AUGUST 2008

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ACRONYMS AND ABBREVIATIONS

A-A	Air-to-Air
AAV	Amphibious Assault Vehicle
AAW	Anti-Aircraft Warfare
ACM	Air Combat Maneuvers
ADEX	Air Defense Exercise
AFP	Artillery Firing Point
agl	above ground level
ALMDS	Airborne Laser Mine Detection System
AMNS	Airborne Mine Neutralization System
AMP	Artillery Maneuver Point
ARPA	Advance Research Projects Agency
A-S	Air-to-Surface
ASBS	Area of Special Biological Significance
ASUW	Anti-Surface Warfare
ASW	Anti-Submarine Warfare
BAT	Ballistic Aerial Target
BMP	Best Management Practices
BUD/S	Basic Underwater Demolition/SEALs
cal	caliber
CCA	California Coastal Act
CD	Consistency Determination
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CFR	Code of Federal Regulations
cm	centimeter
CO	Commanding Officer
CPAAA	Camp Pendleton Amphibious Assault Area
CPAVA	Camp Pendleton Amphibious Vehicle Area
CRRC	Combat Rubber Raiding Craft
CSAR	Combat Search and Rescue
CSG	Carrier Strike Group
CZ	coastal zone
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Plan
DACT	Dissimilar Air Combat Training
dB	decibel
DDG	Guided Missile Destroyer
Demo	Demolition
DoD	Department of Defense
DoN	Department of the Navy
EER	Extended Echo Ranging
EFEX	Expeditionary Fires Exercise
EFH	Essential Fish Habitat
EFV	Expeditionary Fighting Vehicle
EIS	Environmental Impact Statement
EMATT	Expendable Mobile ASW Training Target
ENETA	Encinitas Naval Electronic Test Area
ESA	Endangered Species Act
ESF	Expeditionary Strike Force
ESG	Expeditionary Strike Group
EOD	Explosive Ordnance Disposal
EW	Electronic Warfare
EXTORP	Exercise Torpedo
FAA	Federal Aviation Administration
FIREX	Firing Exercise
FLETA	Fleet Training Area
FLEETEX	Fleet Training Exercise
FMP	Fishery Management Plan
FR	Federal Register
FRTP	Fleet Response Training Plan
FSA	Fire Support Area
ft	feet or foot
ft^2	square foot or feet
GBU	Glide Bomb Unit
GUNEX	Gunnery Exercise
HCOTA	Helicopter Offshore Training Area
HFM3	High-Frequency Marine Mammal Monitoring
HMMWV	High Mobility Multi-purpose Wheeled Vehicle
Hz	Hertz
IAC	Integrated ASW Course
I/E	Insertion and Extraction
IEER	Improved Extended Echo Ranging
ISE	Independent Steaming Exercise
JSOW	Joint Standoff Weapon
kg	kilogram
kHz	kilo-Hertz
km	kilometer
km^2	square kilometer
KTR	Kingfisher Training Range
lb	pound
LAV	Light Attack Vehicle
LPD	Landing Platform, Dock
LCAC	Landing Craft, Air Cushion
LCS	Littoral Combat Ship
LCU	Landing Craft, Utility
LFA	low-frequency active
LGTR	Laser Guided Training Round
LIDAR	Light Detection and Ranging
LMRS	Long-term Mine Reconnaissance System
LTR	Laser Training Range
m	meter
m^2	meters, squared
mm	millimeter
MCM	Mine Countermeasures
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
MFAS	Mid-Frequency Active Sonar
MINEX	Mining Exercise
MIR	Missile Impact Range
MISR	Missile Range
MISSILEX	Missile Exercise
MIW	Mine Interdiction Warfare
MMPA	Marine Mammal Protection Act
MOA	Military Operations Area
MPA	Maritime Patrol Aircraft
MPRSA	Marine Protection, Research, and Sanctuaries Act
μPa^2-s	micro-Pascals squared-second
MSAT	Marine Species Awareness Training
msec	meter-second
MSL	mean sea level (above)
MSMP	Multi-Species Monitoring Plan
MTR	Mine Training Range
NALF	Naval Auxiliary Landing Field
NAOPA	Northern Air Operating Area
NAS	Naval Air Station
Navy	Department of the Navy

NBC	Naval Base Coronado
NDE	National Defense Exemption
NEPA	National Environmental Policy Act
n.e.w.	net explosive weight
nm	nautical mile
nm^2	square nautical mile
NAVEDTRA	Naval Education and Training Command
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOTMAR	Notice to Mariners
NOTAM	Notice to Airmen
NOTS	Naval Ordnance Transfer Station
NSFS	Naval Surface Fire Support
NSW	Naval Special Warfare
NUWC	Naval Undersea Warfare Center
OAMCM	Organic Airborne Mine Countermeasures
OASIS	Organic Airborne Surface Influence Sweep
OCE	Officer in Charge of the Exercise
OOD	Officer of the Day
OPAREA	Operating Area
PMAR	Primary Mission Area
PMSR	Point Mugu Sea Range
psi	pounds per square inch
PTS	Permanent Threshold Shift
QA/QC	Quality Assurance / Quality Control
RAMICS	Rapid Airborne Mine Clearance System
RC	Range Complex
RDT&E	Research, Development, Testing and Evaluation
REXTORP	Recoverable Exercise Torpedo
ROC	Range Operations Center
ROV	Remotely Operated Vehicle
RMS	Remote Minehunting System
RPV	Remotely Piloted Vehicle
S-A	Surface-to-Air
SBI	Santa Barbara Island
SCI	San Clemente Island
SCIRC	San Clemente Island Range Complex
SCIUR	San Clemente Island Underwater Range
SCORE	Southern California Offshore Range
SEAL	Sea, Air, and Land
SHOBA	Shore Bombardment Area
SINKEX	Sinking Exercise
SNI	San Nicholas Island
SOAR	Southern California Anti-Submarine Warfare Range
SOCAL	southern California
SPCOA	San Pedro Channel Operating Area
S-S	Surface-to-Surface
SWAT	Special Warfare Training Area
SUA	Special Use Airspace
SURTASS	Surveillance Towed Array Sensor System
SUW	Surface Warfare
SWTR	Shallow Water Training Range
TAR	Training Areas and Ranges
TL	transmission loss
TLAM	Tomahawk Land Attack Missile
TM	tympanic membrane
TMA	Tactical Maneuvering Areas
TORPEX	Torpedo Exercise
TRACKEX	Tracking Exercise
TTS	Temporary Threshold Shift
UAV	Unmanned Aerial Vehicle
U.S.	United States
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USMC	U.S. Marine Corps
UUV	Unmanned Underwater Vehicle
VDS	Variable Depth Sonar
W-291	Warning Area 291
WS	Withering Syndrome
WSCOA	Western San Clemente Operating Area
XO	Executive Officer

1 INTRODUCTION

This Coastal Consistency Determination (CD) was prepared in compliance with Section 307 (Title 16 United States [U.S.] Code, Section [§] 1456) of the Coastal Zone Management Act (CZMA), which states that federal actions must be consistent to the maximum extent practicable with the enforceable policies of approved state coastal management programs. The purpose of this submission is to fulfill the requirements of the CZMA's Federal Consistency regulations pursuant to 16 U.S. Code § 1456). As documented in this CD the Navy has determined that the proposed activities are consistent to the maximum extent practicable with the enforceable policy of California's Coastal Management Program[1].

This CD addresses all ongoing Navy training and test activities in SOCAL Range Complex (see Section 1.3), as well as new activities described under the proposed activities (see Section 1.4).

In addition to preparing this CD, the Navy has prepared a Draft Environmental Impact Statement (EIS) / Overseas EIS for SOCAL Range Complex, which has been provided to the California Coastal Commission, has applied to National Marine Fisheries Service (NMFS) for a Letter of Authorization (LOA) for marine mammal takes, and is consulting with both NMFS and U.S. Fish and Wildlife Service (USFWS) under Section 7 of the federal Endangered Species Act (ESA).

In October 2006 the Navy completed a CD for the Joint Task Force Training Exercises (JTFEX) and Composite Training Unit Exercises (COMPTUEX) to be conducted in Southern California. The scope of that COMPTUEX/JTFEX CD included 14 pre-deployment exercises to be conducted from February 2007 to January 2009. The continuation of these exercises beyond that time period is included as part of the proposed activities in the SOCAL Range CD.

1.1 BACKGROUND

1.1.1 Purpose

The goal of the Navy is to ensure the freedom and safety of all Americans, both at home and abroad. The Navy's mission is to organize, train, equip, and maintain combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. This mission is mandated by federal law (Title 10 U.S. Code § 5062), which charges the Chief of Naval Operations (CNO) with responsibility for ensuring the readiness of the Nation's naval forces.[2] The CNO meets that directive, in part, by establishing and executing training programs, including at-sea training and exercises, and ensuring naval forces have access to the ranges, ocean Operating Areas (OPAREAs), and airspace needed to develop and maintain skills for the conduct of naval operations. In furtherance of this mandate, and in support of the Navy's Fleet Readiness Training Plan (FRTP), the Navy, U.S. Marine Corps, and U.S. Coast Guard regularly conduct military training and testing activities in Southern California (SOCAL) Range Complex, which includes the offshore SOCAL OPAREAs and San Clemente Island (SCI).

The purpose of the proposed activities is to achieve and maintain Fleet readiness using SOCAL Range Complex to support and conduct current, emerging, and future training and Research, Development, Test, and Evaluation (RDT&E) activities, while enhancing training resources through investment on the ranges. The proposed activities would enable the Navy to meet its statutory responsibility to organize, train, equip, and maintain combat-ready naval forces and to

[1] CFR § 930.32 Consistent to the maximum extent practicable. (a)(1) The term "consistent to the maximum extent practicable" means fully consistent with the enforceable policies of management programs unless full consistency is prohibited by existing law applicable to the Federal agency."

[2] Title 10 Section 5062 of the U.S. Code provides: "The Navy shall be organized, trained, and equipped primarily for prompt and sustained combat incident to operations at sea. It is responsible for the preparation of Naval forces necessary for the effective prosecution of war except as otherwise assigned and, in accordance with Integrated Joint Mobilization Plans, for the expansion of the peacetime components of the Navy to meet the needs of war."

successfully fulfill its current and future global mission of winning wars, deterring aggression, and maintaining freedom of the seas. Activities involving RDT&E for naval systems are an integral part of this readiness mandate.

The existing SOCAL Range Complex plays a vital part in the execution of this naval readiness mandate. The region of San Diego, California is home to the largest concentration of U.S. naval forces in the world, and SOCAL Range Complex is the most capable and heavily used Navy range complex in the eastern Pacific region. The Navy's proposed activities are a step toward ensuring the continued vitality of this essential naval training resource. SOCAL Range Complex is the only viable location for the proposed activities for several reasons (see Section 1.1.2).

Given the vital importance of SOCAL Range Complex to the readiness of naval forces, its unique training environment, and the shortfalls that affect the quality of training, the Navy proposes to:

- Increase training and RDT&E activities from current levels to support the FRTP, achieving and maintaining Fleet readiness using SOCAL Range Complex to support and conduct current, emerging, and future training and RDT&E activities;
- Accommodate mission requirements associated with force structure changes and introduction of new weapons and systems to the Fleet, expanding warfare missions supported by SOCAL Range Complex; and
- Implement enhanced range complex capabilities, upgrading and modernizing existing range capabilities to address shortfalls and deficiencies in current training ranges (see discussion of shortfalls in Section 1.3.4)..

The proposed activities would result in selectively focused but critical enhancements and increases in training activities and levels that are necessary if the Navy and Marine Corps are to maintain a state of military readiness commensurate with the national defense mission. This CD assesses the effects on the coastal zone associated with current and proposed training activities, changes in force structure (to include new weapons systems and platforms), and investments in the Range Complex.

1.1.2 Need

1.1.2.1 Why the Navy Trains

The Navy has been training and operating in the area now defined as SOCAL Range Complex for over 70 years. The land, air, and sea space of the Range Complex have provided, and continue to provide, a safe and realistic training and testing environment for naval forces charged with defense of the Nation.

The U.S. military is maintained to ensure the freedom and safety of all Americans, both at home and abroad. To do so, Title 10, U.S.C. Section 113 requires the Navy to "maintain, train and equip combat-ready naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas". Modern war and security operations are complex. Modern weaponry has brought both unprecedented opportunity and innumerable challenges to the Navy. Smart weapons, used properly, are very accurate and actually allow the Armed Forces to accomplish their missions with greater precision and far less destruction than in past conflicts. But these modern smart weapons are very complex to use. U.S. military personnel must train regularly with them to understand their capabilities, limitations, and operation. Modern military actions require teamwork between hundreds or thousands of people, and their various equipment, vehicles, ships, and aircraft, all working individually and as a coordinated unit across multiple warfare areas simultaneously to achieve success. Navy training addresses all aspects of the team, from the individual to joint and foreign militaries. To do this, the Navy employs a building block approach to training. Training doctrine and procedures are based on operational requirements for deployment of naval forces. Training proceeds on a continuum, from teaching basic and specialized individual military skills, to intermediate skills or small unit training, to advanced, integrated training events, culminating in multi-service (Joint) exercises or pre-deployment certification events.

To provide the experience so important to success and survival, training must be as realistic as possible. Live training in a realistic environment is vital to success. This live training requires sufficient sea and airspace to maneuver tactically, realistic targets and objectives, simulated opposition that creates a realistic enemy, and instrumentation to objectively monitor the events and learn to correct errors.

Range complexes provide a controlled and safe environment with threat representative targets that enable military units to conduct realistic combat-like training as they undergo all phases of the graduated buildup needed for combat ready deployment. The Navy's ranges and OPAREAs provide the space necessary to conduct controlled and safe training scenarios representative of those that its personnel would face in actual combat. Range complexes are designed to provide the most realistic training in the most relevant environments, replicating to the best extent possible the operational stresses of warfare. The integration of undersea ranges and OPAREAs with land training ranges, safety landing fields, and amphibious landing sites is critical to this realism, allowing execution of multi-dimensional exercises in complex scenarios. Ranges also provide instrumentation that captures the performance of tactics and equipment to provide the feedback and assessment that is essential for constructive criticism of personnel and equipment. The live-fire phase of training facilitates assessment of the Navy's ability to place weapons on target with the required level of precision while operating in a stressful environment. Live training, most of it accomplished in the waters off the nation's East and West Coasts and the Caribbean Sea, will remain the cornerstone of readiness as the Navy transforms its military forces for a security environment characterized by uncertainty and surprise.

Navy training activities focus on achieving proficiency in each of several functional areas encompassed by Navy activities. These functional areas, known as Primary Mission Areas (PMARs), are: Anti-Air Warfare (AAW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Submarine Warfare (ASW), Mine Warfare (MIW), Strike Warfare (STW), Electronic Combat (EC), and Naval Special Warfare (NSW). Each training event addressed in the CD is categorized under one of the PMARs.

SOCAL Range Complex is used for training of operational forces, RDT&E of military equipment, and other military activities. As with each Navy range complex, the primary mission of SOCAL Range Complex is to provide a realistic training environment for naval forces to ensure that they have the capabilities and high state of readiness required to accomplish assigned missions.

Training is focused on preparing for worldwide deployment. Naval forces generally deploy in specially organized units called Strike Groups. A Strike Group may be organized around one or more aircraft carriers, together with several surface combatant ships and submarines, collectively known as a Carrier Strike Group (CSG). A naval force known as a Surface Strike Group (SSG) consists of three or more surface combatant ships. A Strike Group may also be organized around a Marine Expeditionary Unit (MEU)[3] embarked on amphibious ships accompanied by surface combatant ships and submarines, known as an Expeditionary Strike Group (ESG). The Navy and Marine Corps deploy CSGs, SSGs, and ESGs on a continuous basis. The number and

[3] The MEU is a task-organized unit known as a Marine Air Ground Task Force (MAGTF). MAGTFs consist of ground combat, aviation combat, combat logistics, and command and control elements, and vary in size depending on the nature of the intended mission. The MEU is typically certified as Special Operations Capable (SOC), and is then referred to as a MEU SOC.

composition of Strike Groups deployed, and the schedule for deployment, are determined based on the worldwide requirements and commitments.

Pre-deployment training is governed by the Navy's FRTP, which sets a deployment cycle (see Figure 1-1) for the Strike Groups composed of three phases: (1) basic, intermediate (or integrated), and advanced pre-deployment training and certification (or pre-deployment sustainment), (2) deployment, and (3) post-deployment sustainment, training, and maintenance. While several Strike Groups are always deployed to provide a global naval presence, Strike Groups must also be ready to "surge" on short notice in response to directives from the National Command Authority[4]. One objective of the FRTP is to provide this surge capability. The FRTP calls for the ability to train and deploy six CSGs in a very short period, and two more in stages soon thereafter. Established in 2003, the FRTP provided the Fleet with greater flexibility, including acceleration of the cycle for more rapid deployment of forces during crises while ensuring that, even if they are not deployed after training, Strike Groups maintain a high state of readiness for eventual deployment when required. Deployment schedules are not fixed, but must remain flexible and responsive to the Nation's security needs. The capability and capacity of ranges such as SOCAL Range Complex to support the entire training continuum must be available when and as needed.

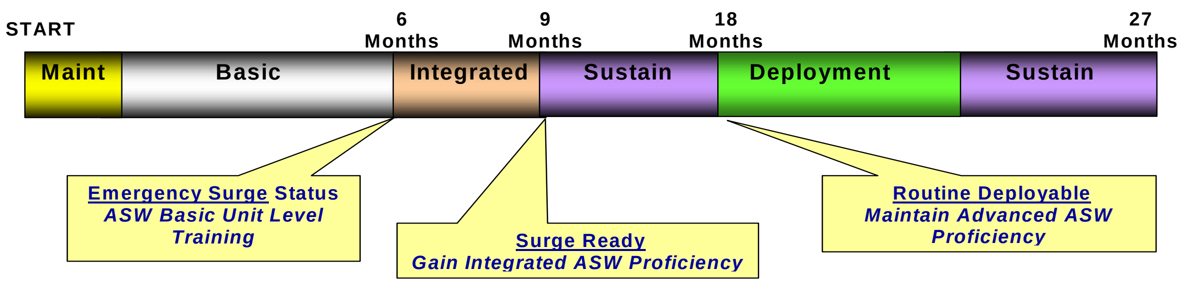

Figure 1-1. Standard Notional Training Cycle of the Navy Fleet Response Plan

1.1.2.2 The Strategic Importance of the Existing SOCAL Range Complex

SOCAL Range Complex (see Figures 1-2 and 1-3) is the principal Navy training venue in the eastern Pacific, with the unique capability and capacity to support required current, emerging, and future training. SOCAL Range Complex is characterized by a unique combination of attributes that make it a strategically important range complex for the Navy. These attributes include:

- *Proximity to the Homeport of San Diego*. Southern California is home to the Nation's largest concentration of naval forces. One-third of the U.S. Pacific Fleet makes its homeport in San Diego, including two aircraft carriers, over seventy surface combatant ships, amphibious ships, and submarines; several aviation squadrons; and their officers and crews. Major commands in the San Diego area include: Commander, U.S. THIRD Fleet; Commander, Strike Force Training Pacific; CSG-7 and CSG-11 (when not deployed); Amphibious Group 3, which includes four ESGs (at least one of which is always deployed); Naval Mine and Anti-Submarine Warfare Command; Commander, Naval Air Forces; Commander, Naval Surface Forces; Commander, Submarine Squadron 11; Naval Special Warfare Command; and Commander, Navy Region Southwest. Several formal Navy training schools also are located

[4] **National Command Authority** is a term used by the United States military to refer to the ultimate lawful source of military orders. The term refers collectively to the President of the United States (as Commander-In-Chief) and the United States Secretary of Defense.

in the San Diego region, including the Expeditionary Warfare Training Group Pacific, the Naval Special Warfare entry-level school, and the Afloat Training Group. Marine Corps Base Camp Pendleton and Marine Corps Air Station Miramar, both in San Diego County, are home to the Marines and Sailors of I Marine Expeditionary Force (I MEF). These forces, from which is drawn the Marine component of the ESGs, require ready access to SOCAL Range Complex to conduct required training. Camp Pendleton also is home to formal military schools, including the Assault Amphibian Vehicle School. CSGs and ESGs continuously use SOCAL Range Complex in their pre-deployment certification training. Moreover, the component elements of these war fighting organizations and the formal military schools continuously use the Range Complex for their basic, intermediate, or advanced training events. Proximity of these forces and commands to the training resources of SOCAL Range Complex is vital to efficient execution of each phase of the training continuum. The proximity of SOCAL Range Complex to naval facilities in San Diego supports non-training efficiencies as well, such as access to ship and aircraft maintenance functions and access to alternate airfields when circumstances preclude carrier landings of aircraft at sea.

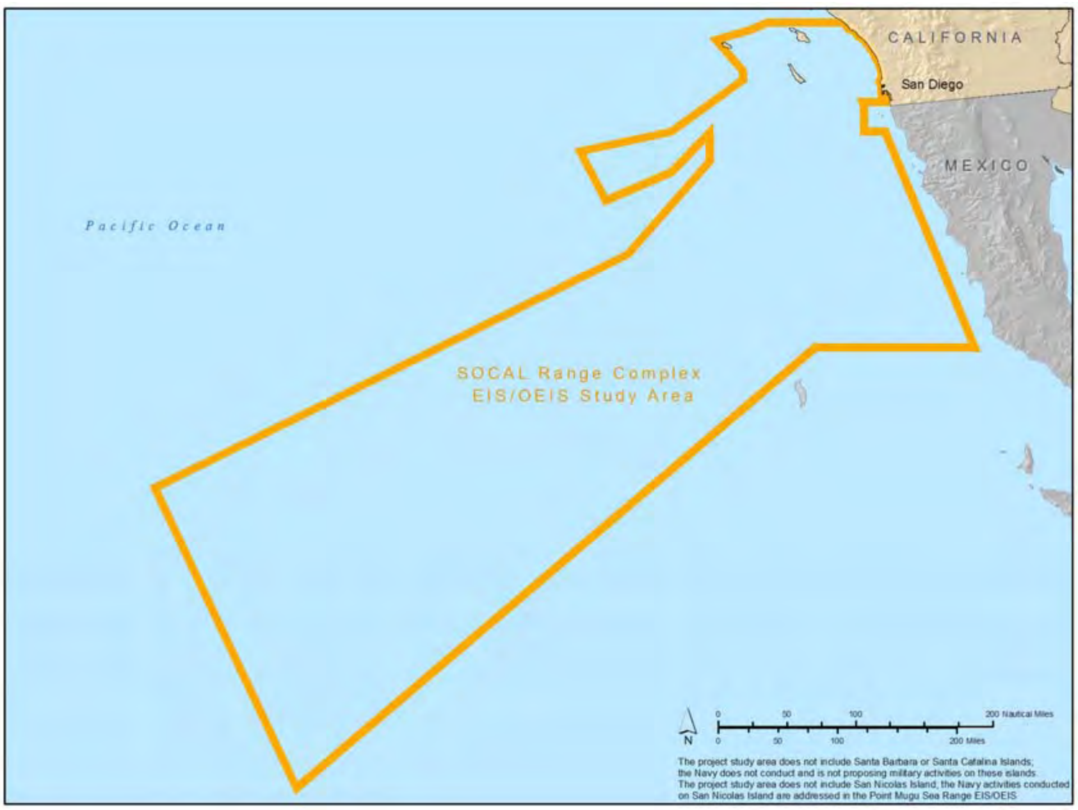

Figure 1-2: SOCAL Range Complex

- *Proximity to Military Families*. The San Diego region is home to thousands of military families. The Navy and Marine Corps strive, and in many cases are required by law, to track and where possible limit "personnel tempo," meaning the amount of time Sailors and Marines spend deployed away from home. Personnel tempo is an important factor in family readiness, morale, and retention. The availability of SOCAL Range Complex as a "backyard" training range is critical to Navy efforts in these areas.

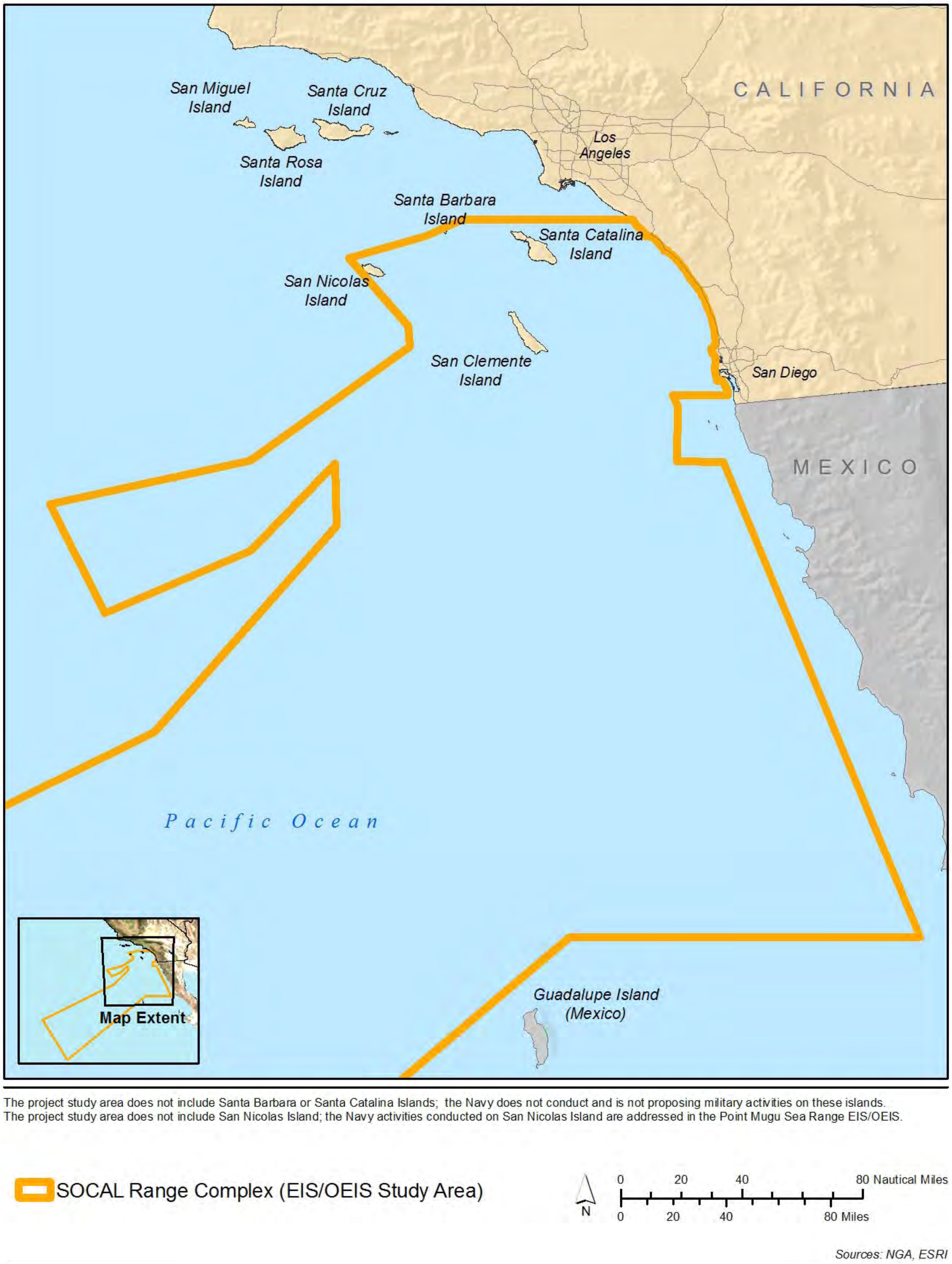

Figure 1-3: Detail of SOCAL Range Complex

- *Proximity to Other Training Ranges in the Southwest*. SOCAL Range Complex is the ocean and island portion of a unique national military training capability in the southwestern U.S., including the National Training Center, Fort Irwin, California; Nevada Test and Training Range; Marine Corps Air Ground Combat Center, 29 Palms, California; the Bob Stump Training Range Complex in California and Nevada; Camp Pendleton, California; China Lake Range Complex, California; and Fallon Range Complex, Nevada.
- *Training Terrain*. SOCAL Range Complex provides a diversity of training opportunities and access to inland ranges, as well as access to SCI (the only offshore live fire range in the eastern Pacific Ocean for naval surface fire support), that present opportunities for realistic training unequaled by any other Navy range complex. Combined, the features provide an ideal naval training environment that is not replicated elsewhere in the U.S. range inventory.

Crucial to Navy deployment preparations is the ability to train in bathymetry that includes both littoral areas and deep water. Figures 1-4 and 1-5 show the underwater topography (bathymetry) of SOCAL Range Complex. This diverse bathymetry is essential to Navy training in ASW. SOCAL Range Complex provides precisely the type of area needed by the Navy to train with mid-frequency active sonar (MFAS).

This uneven bathymetry includes offshore shallow-waters (e.g., Tanner Bank and Cortes Bank (Figure 1-4). Sound propagates differently in shallow water, which provides an extremely “noisy” and hence complex marine training environment. In a real world event, modern diesel-electric submarines would be expected, to operate and hide in the noise of shallow[5] waters. Without the critical training near shore that ASW exercises provide, crews will not have the experience needed to operate sonar successfully in these types of waters, impacting vital military readiness. The SOCAL Range Complex also is located near shore support facilities that provide airfields for safety and land ranges for training in air strikes and amphibious assaults.

The terrain of SOCAL Range Complex also is critical to Strike Group certification, which involves the multi-dimensional coordination of air, surface, subsurface, and amphibious activities. To be effective, Strike Group training must be integrated; training effectiveness is compromised significantly if exercises are not closely coordinated in a single training area. ESGs conduct vital training between SCI and Camp Pendleton (where the landing beaches and training ranges to support amphibious assaults are located). CSG training and certification also demands access to the littoral areas and bathymetry of the SOCAL Range Complex. CSGs transit near SCI to simulate a strait transit, which enables training to deal with coastal defense cruise missiles (simulated by emitters on SCI), small boat attacks, adversary submarines, and aircraft defense in restricted waters..

SOCAL Range Complex provides terrain that is uniquely suited to the Navy’s training requirements. The SOCAL OPAREAs replicate geographic conditions observed in the Arabian Gulf when approaching the Strait of Hormuz and East China Sea (see Figure 1-6), which are characterized by shallow water, steep ocean bottom topography, underwater ridges, and challenging acoustics requiring active sonar.

[5] In the context of naval operations, specifically submarine operations, the term “shallow water” is a relative term, denoting depths of 100 to 400 fathoms (or 600 to 2,400 ft), which are considered “shallow” compared to the depth of the ocean.

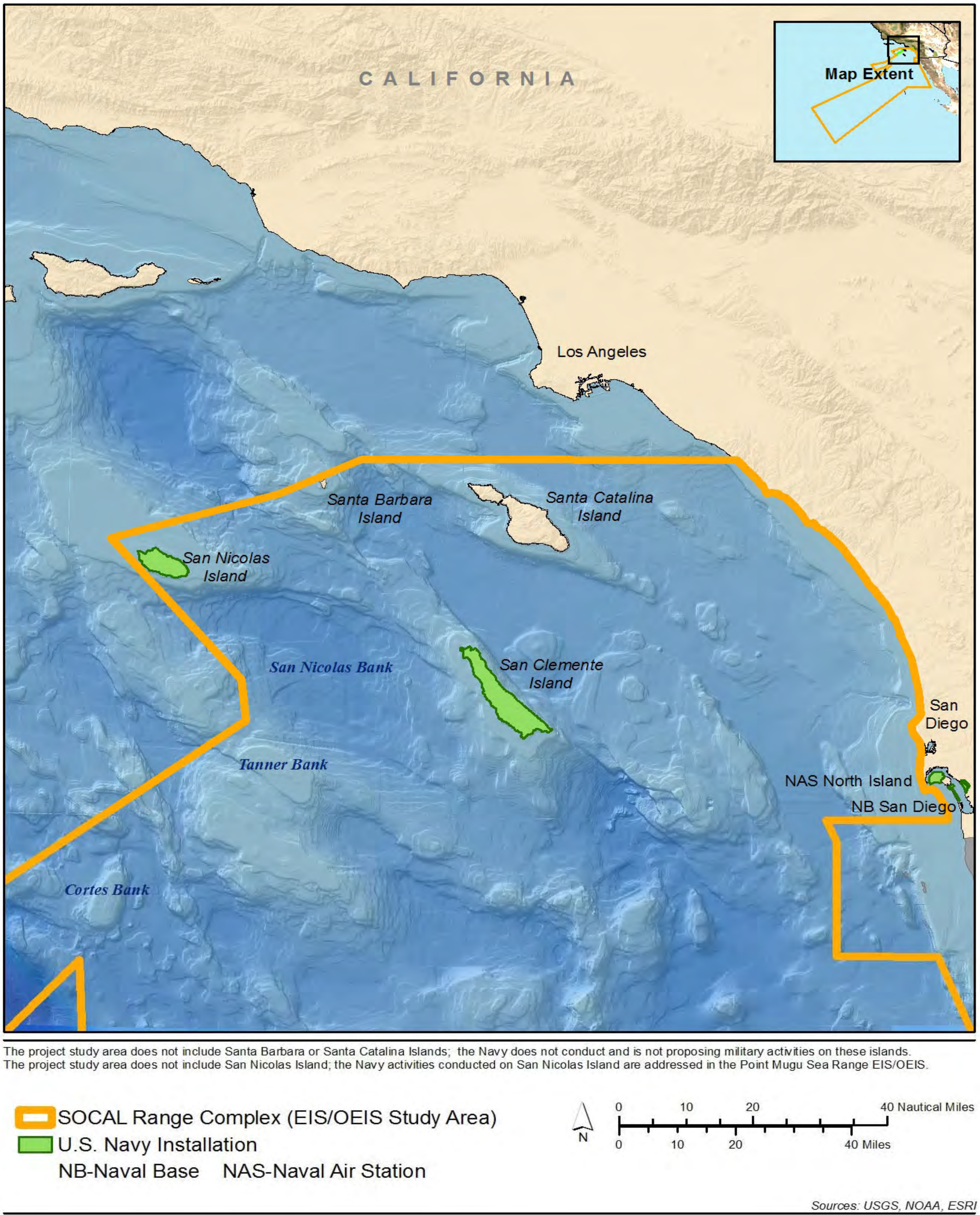

Figure 1-4: Bathymetry and Topography of the SOCAL Range Complex (Northeastern Portion)

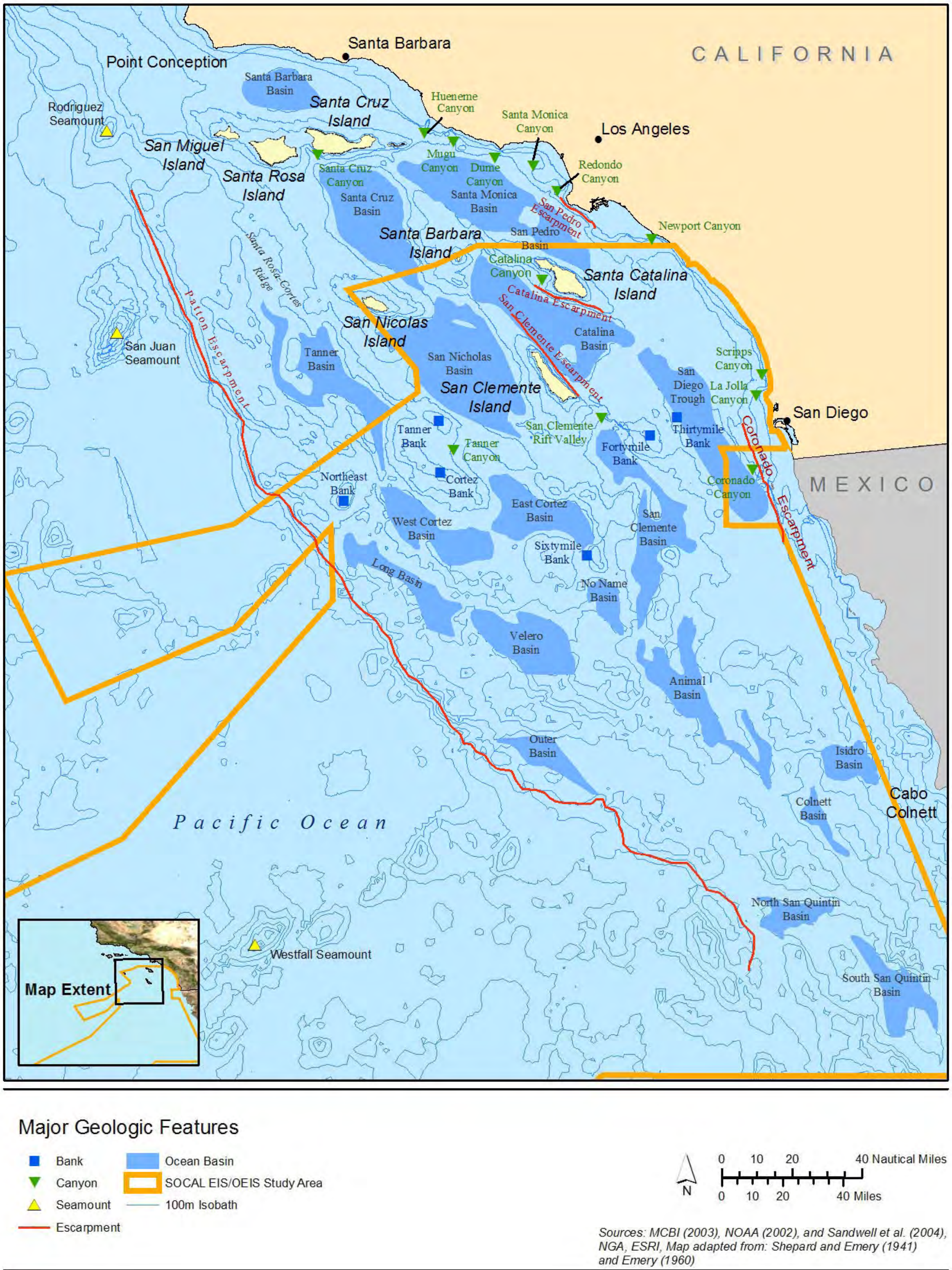

Figure 1-5: Detailed Bathymetry and Topography of the SOCAL Range Complex

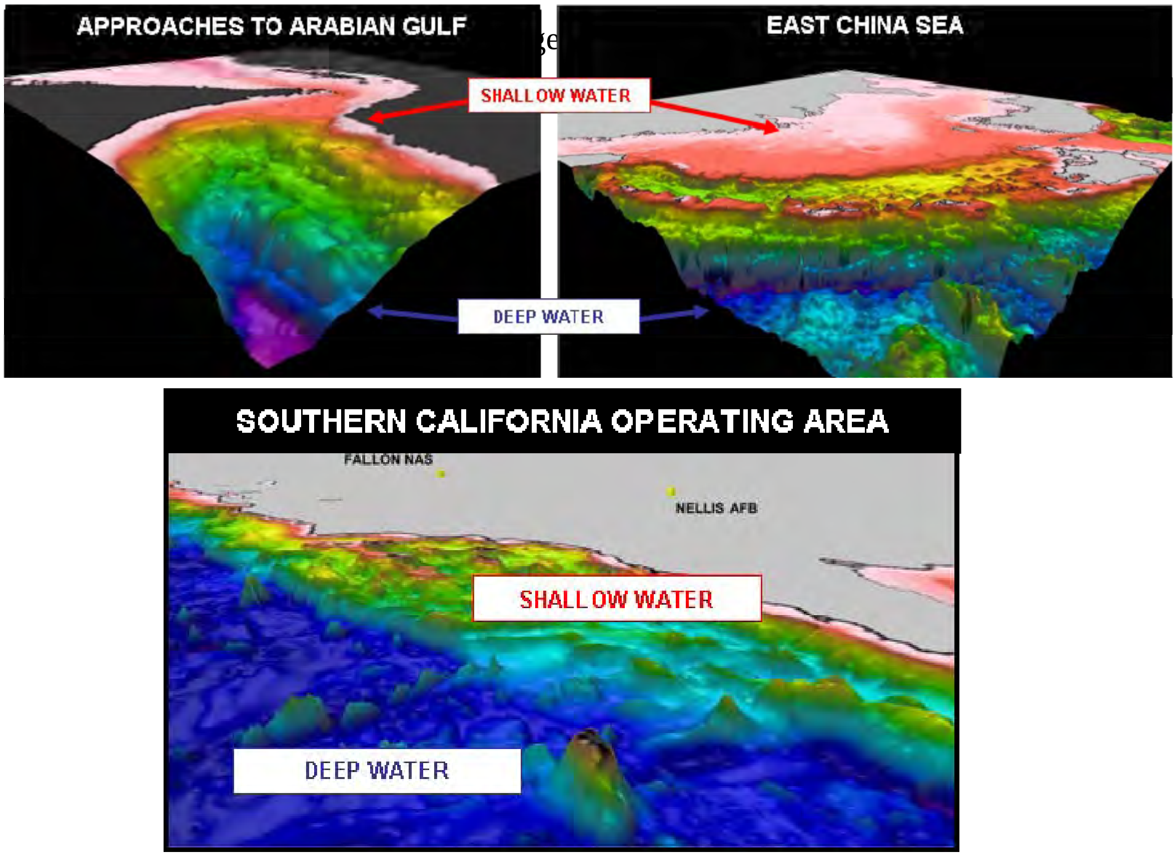

Figure 1-6. Comparisons of SOCAL Range Complex with potential overseas operating areas

SCI land areas are an integral component of SOCAL Range Complex training environment. SCI provides numerous dedicated live-fire range capabilities away from inhabited areas, extensive range instrumentation, and landing beaches. SCI is the only location on the west coast of the U.S. that supports live naval gunfire training coordinated with amphibious landings. SCI is particularly critical to training of NSW forces. Every SEAL[6] receives basic training on SCI. SCI is the only training venue on the west coast that supports live-fire, over-the-beach events critical to NSW training and live-fire from water onto land in training of Special Boat Teams.

The weather of southern California also is an important consideration in assessing the suitability of the training environment. Prevailing weather and ocean surface (sea state) conditions are conducive to year-round flight operations and operational safety.

1.1.2.3 Shortfalls of the SOCAL Range Complex

SOCAL Range Complex provides strategically vital training attributes (see Section 1.2.3). Nevertheless, certain correctable shortfalls in the capabilities of the Range Complex constrain the Navy's ability to support required training. There are numerous identified deficiencies at this range that adversely affect the quantity and quality of training activities. Current shortfalls include a limited number of effective targets, instrumentation, and training systems for the

[6] NSW personnel designated as "SEALs" take their name from the elements in and from which they operate (Sea-Air-Land) Their methods of operation allow them to conduct multiple missions requiring specialized training against targets that other forces cannot approach undetected.

conduct of submarine, ASW, and MIW training. Correcting these shortfalls by implementing the proposed activities would provide the enhanced training environment required by the naval forces that use the Range Complex. The capabilities of SOCAL Range Complex would be sustained, upgraded, and modernized to address these deficiencies under the proposed activities. Moreover, the Navy would have the flexibility to adapt and transform the training environment as new weapons systems are introduced, new threat capabilities emerge, and new technologies offer improved training opportunities.

Training capacity, meaning adequate space to train on the land, sea, and in the air is an ongoing concern throughout the Navy. Training capacity concerns are particularly acute for SCI, which provides a unique training venue for live-fire training of Navy and Marine Corps forces. Preserving and enhancing access to training space on SCI and throughout the Range Complex is critical to maintaining adequate training capacity on SOCAL Range Complex.

1.1.2.4 Summary

The proposed activities are needed to provide a training environment consisting of ranges, training areas, and range instrumentation with the capacity and capabilities to support fully the required training tasks for operational units and military schools.

In this regard, SOCAL Range Complex furthers the Navy's execution of its roles and responsibilities under Title 10. To comply with its Title 10 mandate, the Navy needs to:

- Maintain current levels of military readiness by training in SOCAL Range Complex;
- Accommodate future increases in training tempo in SOCAL Range Complex and support the rapid deployment of naval units or Strike Groups;
- Achieve and sustain readiness of ships and squadrons using SOCAL Range Complex so that the Navy can quickly surge significant combat power in the event of a national crisis or contingency operation;
- Support the acquisition and implementation into the Fleet of advanced military technology using SOCAL Range Complex to conduct RDT&E and implementation of training events for new platforms and associated weapons systems (Littoral Combat Ship [LCS], MV-22 Osprey aircraft, EA-18G Growler aircraft, P-8 aircraft, MH-60R/S Seahawk helicopter, Landing Platform-Dock (LPD) 17 amphibious assault ship, and the Guided Missile Destroyer (DDG) 1000 (Zumwalt Class) destroyer;
- Identify shortfalls in range capabilities, particularly training infrastructure and instrumentation, and address through range investments and enhancements; and
- Maintain the long-term viability of SOCAL Range Complex as a premiere Navy training and testing area while protecting human health and the environment, and enhancing the capabilities and safety of the SOCAL Range Complex.

1.2 OVERVIEW OF THE SOCAL RANGE COMPLEX

1.2.1 Mission

The mission of SOCAL Range Complex is to serve as the principal Navy training venue in the eastern Pacific, with the unique capability and capacity to support required current, emerging, and future training.

1.2.2 Primary Components

SOCAL Range Complex has three primary components: SOCAL OPAREAs, Special Use Airspace (SUA), and SCI. The Range Complex is situated between Dana Point and Baja California, and extends more than 600 nautical miles (nm) (1,111 kilometers [km]) southwest into the Pacific Ocean (see Figure 1-3). The components of SOCAL Range Complex encompass sea space, SUA, and land on SCI; no other land areas are included in proposed activities. To facilitate range management and scheduling, SOCAL Range Complex is divided into numerous sub-component ranges and training areas, which are described below.

1.2.2.1 SOCAL OPAREAs

SOCAL Range Complex includes 120,000 square nm (nm2) (411,600 square km [km2]) of surface and subsurface SOCAL OPAREAs extending generally southwest from the coastline of southern California for approximately 600 nm into international waters to the west of the coast of Baja California, Mexico. The SOCAL OPAREAs parallel the coast for about 288 nm (533 km). They include Warning Area (W) 291 and portions of W-289 and W-290. Portions of the SOCAL Range Complex lie within the CZ as described in Section 2.1.2 (per previous version)

Warning Area 291 (W-291) is the Federal Aviation Administration (FAA) designation for the SUA included in SOCAL Range Complex. This SUA extends from the ocean surface to 80,000 feet (ft) (24,384 meters [m]) above mean sea level (MSL), and encompasses 113,000 nm^2 (387,600 km^2) of airspace. The 113,000 nm^2 (387,600 km^2) of open ocean underlying W-291 forms most of the SOCAL OPAREAs, and extends to the sea floor.

Within the area defined by the horizontal boundaries of W-291, the Range Complex encompasses special air, surface, and undersea ranges. Depending on their intended use, these ranges may encompass only airspace, or may extend from the sea floor to 80,000 ft above MSL. Ranges designated for helicopter training in ASW or submarine missile launches, for example, extend from the ocean floor to 80,000 ft (24,384 m) MSL. The W-291 airspace and associated OPAREAs, including special ranges, are described in Table 1-1 and depicted in Figures 1-7 and 1-8.

Table 1-1: W-291 and Associated OPAREAs

Designation	Description
Warning Area (W-291)	W-291 is the largest component of SUA in the Navy inventory. It encompasses 113,000 nm^2 (387,600 km^2) located off of the southern California coastline (Figure 1-1), extending from the ocean surface to 80,000 ft (24,384 m) above MSL. W-291 supports aviation training and RDT&E conducted by all aircraft in the Navy and Marine Corps inventories. Conventional ordnance use is permitted.
Tactical Maneuvering Areas (TMA) (Papa 1-8)	W-291 airspace includes eight TMAs (designated Papa 1-8) extending from 5,000 to 40,000 ft (1,524 to 12,192 m) MSL. Exercises conducted include Air Combat Maneuvers (ACM), air intercept control, Air-to-Air (A-A) gunnery, and Surface-to-Air (S-A) gunnery. Conventional ordnance use is permitted.
Air Refueling Areas	W-291 airspace includes 3 areas designated for aerial refueling.
Class “E” airspace (Area Foxtrot)	W-291 includes Class "E" airspace designated as Area Foxtrot, which is activated by the FAA for commercial aviation use as needed (such as in inclement weather or when Lindbergh Field International Airport is using Runway 09).
Fleet Training Area Hot (FLETA HOT)	FLETA HOT is an open-ocean area that extends from the ocean bottom to 80,000 ft (24,384 m). The area is used for hazardous activities, primarily S-A and A-A ordnance. Types of exercises conducted include AAW, ASW, underway training, and Independent Steaming Exercises (ISE). Conventional ordnance use is permitted.
Over-water parachute drop zones	Three parachute drop zones used by Navy and Marine Corps units are designated within the SOCAL Range Complex. Two of these (Neptune and Saint) lie within the bounds of W-291. One (Leon) lies between W-291 and the Naval Amphibious Base (NAB) sub-installation of Naval Base Coronado (NBC).

Table 1-1: W-291 and Associated OPAREAs (continued)

Designation	Description
Missile Range 1 and 2 (MISR-1/MISR-2)	MISR-1 and MISR-2 are located about 60 nm (111 km) south and southwest of the NAB sub-installation of NBC, and extend from the ocean bottom up to 80,000 ft (24,384 m) MSL. Exercises conducted include rocket and missile firing, ASW, carrier, and submarine activities, fleet training, ISE, and surface and air gunnery. Conventional ordnance use is permitted.
Northern Air Operating Area (NAOPA)	The NAOPA is located east of SCI and approximately 90 nm (167 km) west of the NAB sub-installation of NBC. It extends from the ocean bottom to 80,000 ft (24,384 m). Exercises in NAOPA include fleet training, multi-unit exercises, and individual unit training. Conventional ordnance is use is permitted.
Electronic Warfare (EW) Range	The EW Range uses advanced technology to simulate electronic attacks on naval systems from sites on SCI. The range is not defined as a designated location. Rather it is defined by the electronic nature and extent of the training support it provides. The EW Range supports 50 types of EW training events for ships and aircraft in W-291 airspace and throughout the OPAREAs.
Kingfisher Training Range (KTR)	KTR is a 1-by-2 nm (1.85 x 3.7 km) area in the waters approximately 1 nm (1.85 km) offshore of SCI. The range provides training to surface warfare units in mine detection and avoidance. The range consists of mine-like shapes moored to the ocean bottom by cables.
Laser Training Range (LTR)	LTRs 1 and 2 are offshore water ranges northwest and southwest of SCI, established to conduct over-the-water laser training and testing of the laser-guided Hellfire missile.
Mine Training Range (MTR)	Two MTRs and two mine-laying areas are established in the nearshore areas of SCI. MTR-1 is the Castle Rock Mining Range off the northwestern coast of SCI. MTR-2 is the Eel Point Mining Range off the southwestern side. Mining training also takes place off China Point, off the southwestern point of SCI, and in the Pyramid Head area, off SCI's southeastern tip. These ranges are used to train aircrews in offensive mine laying by delivery of inert mine shapes (no explosives) from aircraft.
OPAREA 3803	OPAREA 3803 is an area adjacent to SCI extending from the sea floor to 80,000 ft (24,384 m). Activities in OPAREA 3803 include aviation and submarine training events. SCI Underwater Range lies within OPAREA 3803.
San Clemente Island Underwater Range (SCIUR)	SCIUR is a 25-nm^2 (92-km^2) area northeast of SCI. The range is used for ASW training and RDT&E of undersea systems. The range contains six hydrophone arrays mounted on the sea floor that produce acoustic target signals.
Southern California ASW Range (SOAR)	SOAR is located off the western side of SCI. This underwater tracking range covers over 670 nm^2 (2,300 km^2), and consists of seven subareas. SOAR can track submarines, practice weapons, and targets under water in three dimensions with 84 hydrophones located on the sea floor. Communication with submarines is possible via an underwater telephone. SOAR supports various ASW training scenarios for air, surface, and subsurface units.
SOAR Variable Depth Sonar (VDS) No-Notice Area	VDS is an unscheduled and no-notice area for training with surface ships' sonar devices. Its vertical dimensions are from the surface to a depth of 400 ft (122 m). VDS overlaps portions of SOAR and the Mining Exercise (MINEX) training range.
SOCAL Missile Range	SOCAL Missile Range is not a permanently designated area, but is invoked by the designation of portions of the ocean OPAREAs and W-291 airspace, as necessary, to support Fleet live-fire training missile exercises. The areas invoked vary, depending on the nature of the exercise, but generally are extensive areas over water south/southwest of SCI.
Fire Support Areas (FSAs) I and II.	FSAs are designated locations offshore of SCI for the maneuvering of naval surface ships firing guns into impact areas located on SCI. The offshore FSAs and onshore impact areas, together, are designated as the SHOBA.

Some SOCAL OPAREAs do not lie under W-291. These OPAREAs, listed in Table 1-2 and depicted in Figure 1-9, are used for ocean surface and subsurface training. Military aviation activities may be conducted in Range Complex airspace that is not designated as SUA. These aviation activities do not include use of live or inert ordnance. For example, amphibious activities involving helicopters and carrier aircraft flights occur in that portion of the Range Complex outside of W-291.

ASW training conducted in the course of major range events occurs across the boundaries of the SOCAL Range Complex into the Point Mugu Sea Range (PMSR). These cross-boundary events are addressed in this CD. Training and test activities occurring on the PMSR are addressed in a separate CD, which does not, however, address such cross-boundary ASW training.

1.2.2.2 Special Use Airspace (SUA)

SOCAL Range Complex includes military airspace designated as W-291 (described above in Section 2.2.2). W-291 is SUA that generally overlies the SOCAL OPAREAs and SCI, extending to the southwest from approximately 12 nm (22 km) off the coast to approximately 600 nm (1,111 km). W-291 is the largest component of SUA in the Navy's range inventory.

Table 1-2: SOCAL OPAREAs Outside of W-291

Ocean Area	Description
Advance Research Projects Agency (ARPA) Training Minefield	ARPA Training Minefield in Encinitas Naval Electronic Test Area (ENETA) extends from the ocean bottom to the surface. Mine detection and avoidance exercises are conducted. Ordnance use is not permitted.
Encinitas Naval Electronic Test Area (ENETA)	ENETA is located about 20 nm (37 km) northwest of the NAB sub-installation of NBC. The area extends from the ocean bottom up to 700 ft (213 m) MSL. Exercises conducted include fleet training and ISE.
Helicopter Offshore Training Area (HCOTA)	Located in the ocean off of the Silver Strand Training Complex - South portion of NBC, HCOTA is divided into five “dipping areas” (designated A/B/C/D/E), and extends from the ocean bottom to 1,000 ft (305 m) MSL. This area is designed for ASW training for helicopters with dipping sonar.
San Pedro Channel Operating Area (SPCOA)	SPCOA is an open-ocean area about 60 nm (111 km) northwest of the NAB sub-installation of NBC, extending almost to Santa Catalina Island, from the ocean floor to 1,000 ft (305 m) MSL. Exercises conducted here include fleet training, mining, mine countermeasures, and ISE.
Western San Clemente Operating Area (WSCOA)	WSCOA is located about 180 nm (333 km) west of the NAB sub-installation of NBC. It extends from the ocean floor to 5,000 ft (1,524 m) MSL. Exercises conducted include ISE and various fleet training events.
Camp Pendleton Amphibious Assault Area (CPAAA) and Amphibious Vehicle Training Area (CPAVA)	CPAAA is an open ocean area located approximately 40 nm (74 km) northwest of the NAB sub-installation of NBC, used for amphibious activities. No live or inert ordnance is authorized. CPAVA is an ocean area adjacent to the shoreline of Camp Pendleton used for near-shore amphibious vehicle and landing craft training.
Extension Area into Point Mugu Sea Range.	The extension area consists of 1,000 nm^2 (3,430 km^2) of surface and subsurface sea space. While this area encompasses two Channel Islands (Santa Barbara and San Nicolas), training events addressed in this CD occur only at sea. Ordnance use is not permitted.

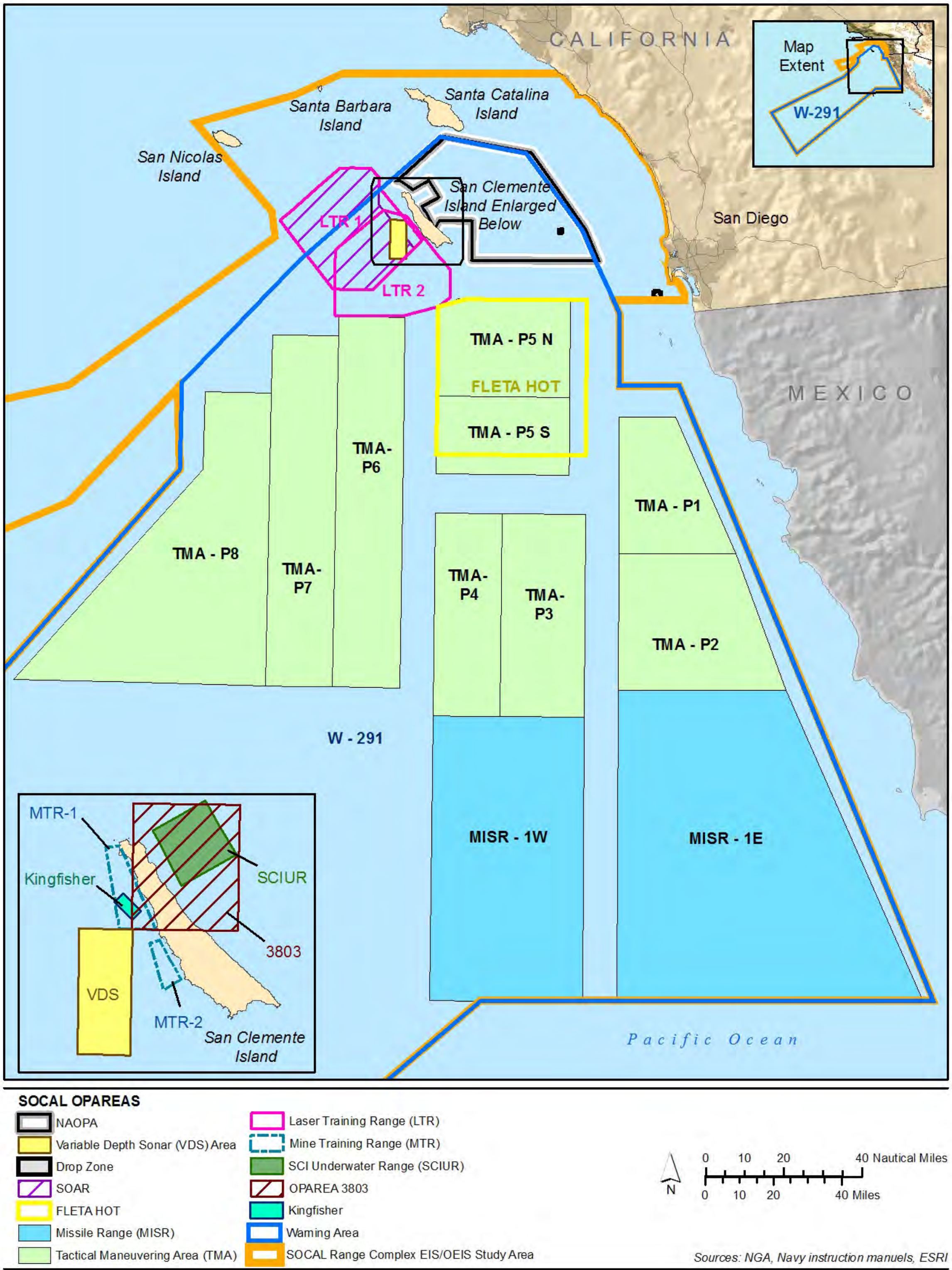

Figure 1-7: SOCAL Range Complex (San Clemente Island, W-291, and Ocean OPAREAs)

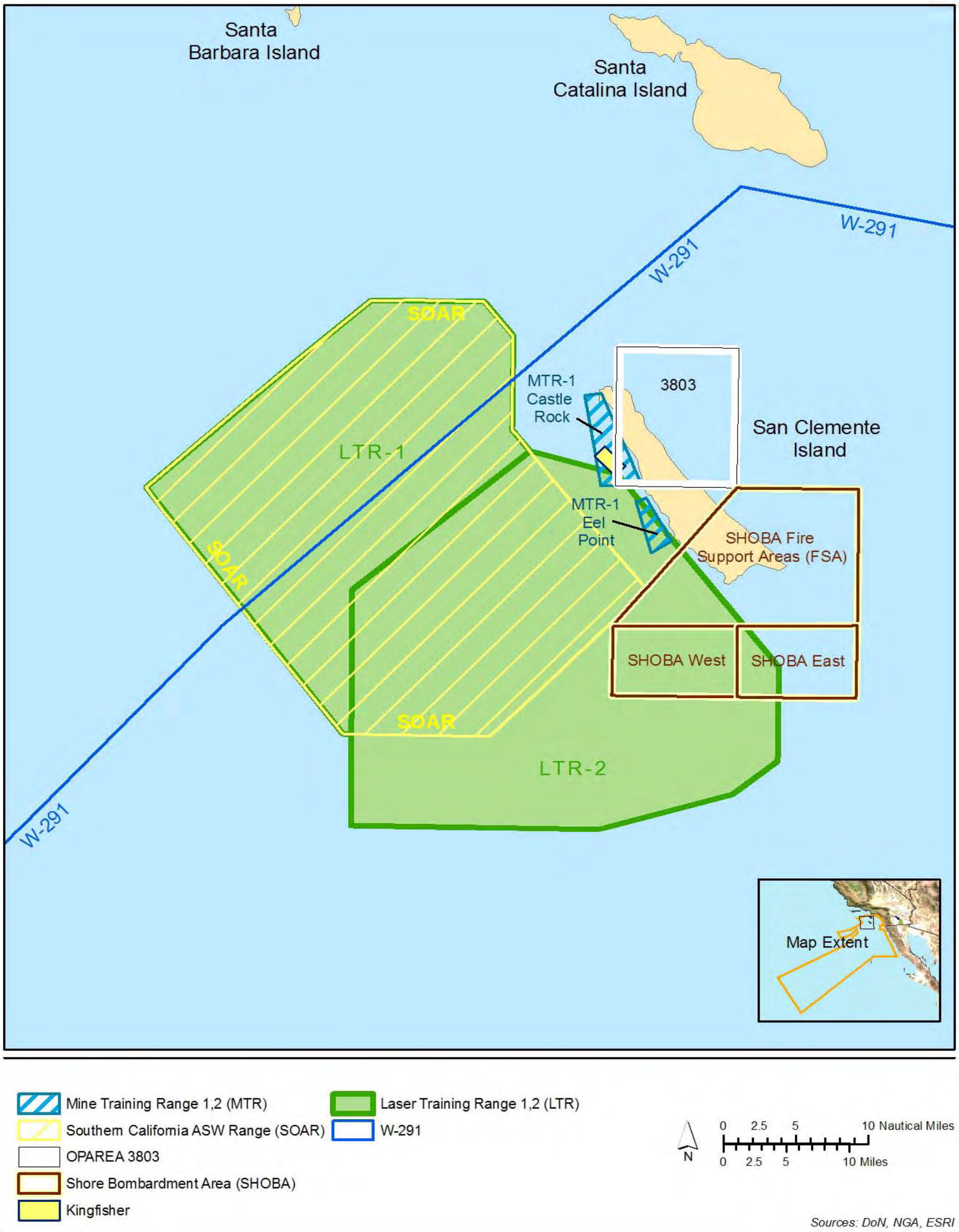

Figure 1-8: San Clemente Island Nearshore Range Areas

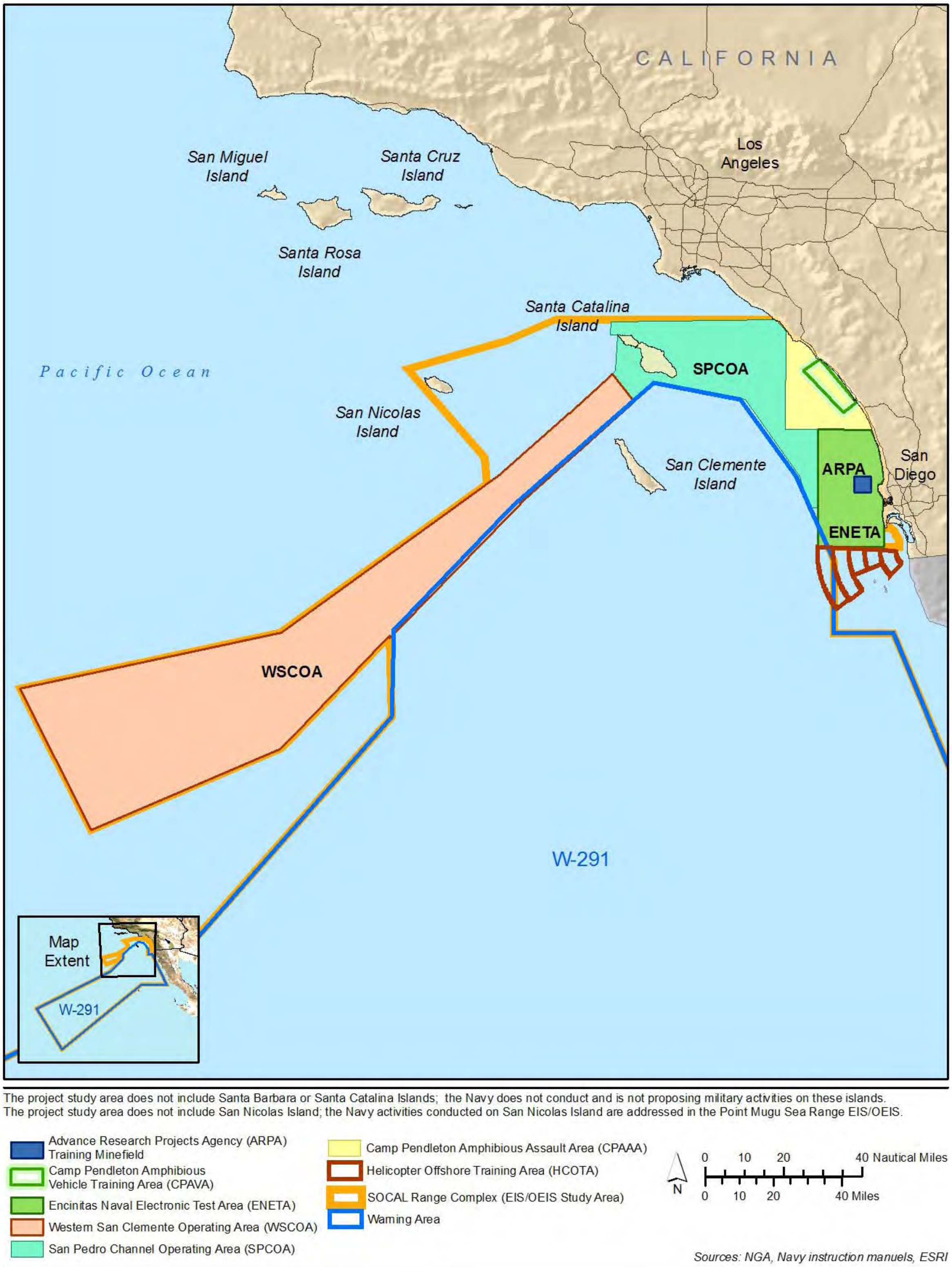

Figure 1-9: Ocean OPAREAs Outside W-291

1.2.2.3 San Clemente Island

With over 42 nm^2 (144 km^2) of land area, SCI provides an extensive suite of range capabilities for tactical training. SCI includes the Shore Bombardment Area (SHOBA), landing beaches, several live-fire training areas and ranges (TARs) for small arms, maneuver areas, and other dedicated ranges for training in all PMARs. SCI also contains an airfield and other infrastructure for training and logistical support. SCI is owned by the Navy down to the mean high tide mark, pursuant to 16 U.S. Code §1453, and thus is outside of the CZ. The beaches of SCI are not accessible to the public. Some offshore waters around SCI are designated by federal regulations as Security, Danger, Restricted, or Safety Zones (see Figure 1-10 and Table 1-3). These designations have been in place for over 10 years, and will not be changed by the proposed activities.

Table 1-3: San Clemente Island Exclusive Use, Security, and Danger Zones

Area		Description
Wilson Cove	Exclusive Use Zone (33 C.F.R. 110.218)	Located immediately offshore of Wilson Cove and used extensively by Navy ships for anchorage adjacent to the port facilities at Wilson Cove.
	Security Zone (33 C.F.R. 165.1131)	Extends northeast from the Wilson Cove area for approximately 2 nm (4 km) from the coast and 3 nm (6 nm) to the southeast along the coast.
	Southeast Restricted Area (33 C.F.R. 334.920)	Ocean areas near Naval Ordnance Transfer Station (NOTS) Pier, extending offshore for about 2 nm (4 km).
West Cove	Restricted Area (33 C.F.R. 334.921)	Extends to sea about 5 nm (9 km) to the southwest of West Cove, over the area where underwater cables are laid to the acoustic sensors on the SOAR range.
	Danger Zone (33 C.F.R. 334.960)	An approximately 1 nm by 3 nm (2 km by 6 km) rectangle for intermittent firing events, located 0.5 nm (0.9 km) offshore south of West Cove.
Other	Northwest Danger Zone (33 C.F.R. 334.961)	Extensive firing and demolition activities occur in this zone, located approximately 3 nm (6 km) off the northwestern end of the island.
	SHOBA Danger Zone (33 C.F.R. 334.950)	Activities include naval gunfire, air-to-ground munitions delivery, and laser employment. Covers the entire southern third of the island on both coasts.

A component of SOCAL Range Complex, SCI's training areas are integral to training of Pacific Fleet air, surface, and subsurface units; I MEF units; NSW units; and selected formal schools. SCI provides instrumented ranges, operating areas, and associated facilities to conduct and evaluate a wide range of exercises within the scope of naval warfare. SCI also provides ranges and services for RDT&E activities.

SCI provides robust opposing force simulation and targets for use in land, sea-based, and air live-fire training. Over 20 Navy and Marine Corps commands conduct training and testing activities on SCI. Due to its unique capabilities, SCI supports multiple training activities from every Navy PMAR, and provides critical training resources for ESG, CSG, and MEU certification exercises. SCI land ranges are described in Table 1-4 and depicted in Figures 1-11 and 1-12.

1.2.3 Relationship to Point Mugu Sea Range

SOCAL Range Complex, with its ocean areas, airspace, and SCI ranges, lies generally south of, and adjacent to, a separate and distinct Navy range complex, Point Mugu Sea Range (PMSR) (see Figure 1-13). PMSR is comprised of ocean areas, including surface and subsurface area, and military airspace covering 27,278 nm^2 (93,560 km^2). PMSR includes sophisticated range instrumentation centered on San Nicolas Island, a Channel Island owned by the Navy, and not part of the CZ. PMSR also includes extended, over-ocean range areas that are used for specialized RDT&E activities. These extended ocean areas cover approximately 221,000 nm^2 (758,000 km^2).

Source: 33 C.F.R.

Figure 1-10: SCI Exclusive Use, Security, and Danger Zones

Figure 1-11: SCI Ranges: SWATs, TARs, and SHOBA Impact Areas

Figure 1-12: San Clemente Island: Roads, Artillery Firing Points, Infrastructure

Table 1-4: SCI Range Areas

SCI Ranges	Description
SHOBA Impact Areas	SHOBA is the only range in the United States for naval surface fire support training with ground spotters and surveyed targets. The southern one-third of SCI contains Impact Areas I and II, which comprise the onshore portion of SHOBA. (The offshore component provides designated locations [FSAs] for firing ships to maneuver.) The main training activities in SHOBA are naval gun firing, artillery, and air-to-ground bombing. A variety of munitions, both live and inert, are expended in SHOBA. NSW activities also occur in this area.
Naval Special Warfare Training Areas (SWATs)	SCI contains six SWATs. Each includes contiguous land and water areas. The land areas range in size from 100 to 4,400 acres [ac] (.4 to 18 km^2) and are used as ingress and egress to specific TARs. Basic and advanced special activities training is conducted within these areas by Navy and Marine Corps units.
NSW Training Areas and Ranges (TARs)	TARs are littoral OPAREAs that support demolition, over-the-beach, and tactical ingress and egress training for NSW personnel. Identification of TARs and SWATs facilitates range scheduling and management.
Artillery Firing Points (AFP)	An AFP is a location from which artillery weapons such as the 155mm 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.
Old Airfield (VC-3)	The Old Airfield, VC-3 in TAR 15, is approximately 6 nm (11 km) from the northern end of the island. The presence of a number of buildings allows for training of forces in a semi-urban environment. It is suitable for small unit training by NSW and Marine Corps forces.
Missile Impact Range (MIR)	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 is 3,200 by 1,000 ft (305 by 975 m) at an elevation of 1,000 ft (305 m) MSL. The MIR contains fixed targets, and is equipped with sophisticated instruments for recording the flight, impacts, and detonations of weapons. Weapons expended on the MIR include the Joint Standoff Weapon (JSOW) and the Tomahawk Land Attack Missile (TLAM).
Naval Auxiliary Landing Field (NALF)	The NALF, located at the northern end of the island, has a single runway of 9,300 ft (2,835 m) equipped with aircraft arresting gear.

A separate CD was prepared for PMSR (Department of the Navy [DoN] 2001). The PMSR CD addresses both the RDT&E activities and Fleet training activities that occur on PMSR. Sonar activities occurring on the southern portion of PMSR are not, however, addressed in the PMSR CD. Specifically, ASW training that occurs or would occur as part of the proposed activities in the southern portion of PMSR near the boundary with SOCAL Range Complex is not addressed in the PMSR CD. Such training is therefore addressed in this SOCAL Range Complex CD. Figure 1-13 depicts the "overlap" area into which such training extends from SOCAL Range Complex into PMSR. This area of approximately 1,000 nm^2 (3,430 km^2) is identified in this CD for the limited purpose of analyzing ASW training occurring there.[7]

1.3 Current Training and Testing Programs in SOCAL Range Complex

The Navy has been operating in SOCAL Range Complex for over 70 years. Activities currently conducted in SOCAL Range Complex are described below. Table 1-6 provides additional detail about activities conducted on SOCAL Range Complex, including a summary of the activity and the location within the Range Complex where the activity is conducted. Descriptions of activities are provided herein only to explain the intent of each exercise and to facilitate an assessment of the overall effects of SOCAL Range Complex activities. Training exercises and tests exhibit an inherent variability. From command to command and exercise to exercise, training and test logistics will vary (i.e., number of personnel and craft, types of equipment used), based on the needs of the operational community and the needs overseas. However, the activities comprising the training and test exercises are fairly constant.

[7] With the inclusion of the portion of PMSR addressed in this CD, the study area encompasses 121,000 nm^2 (SOCAL Range Complex: 120,000 nm^2, Point Mugu extension: 1,000 nm^2).

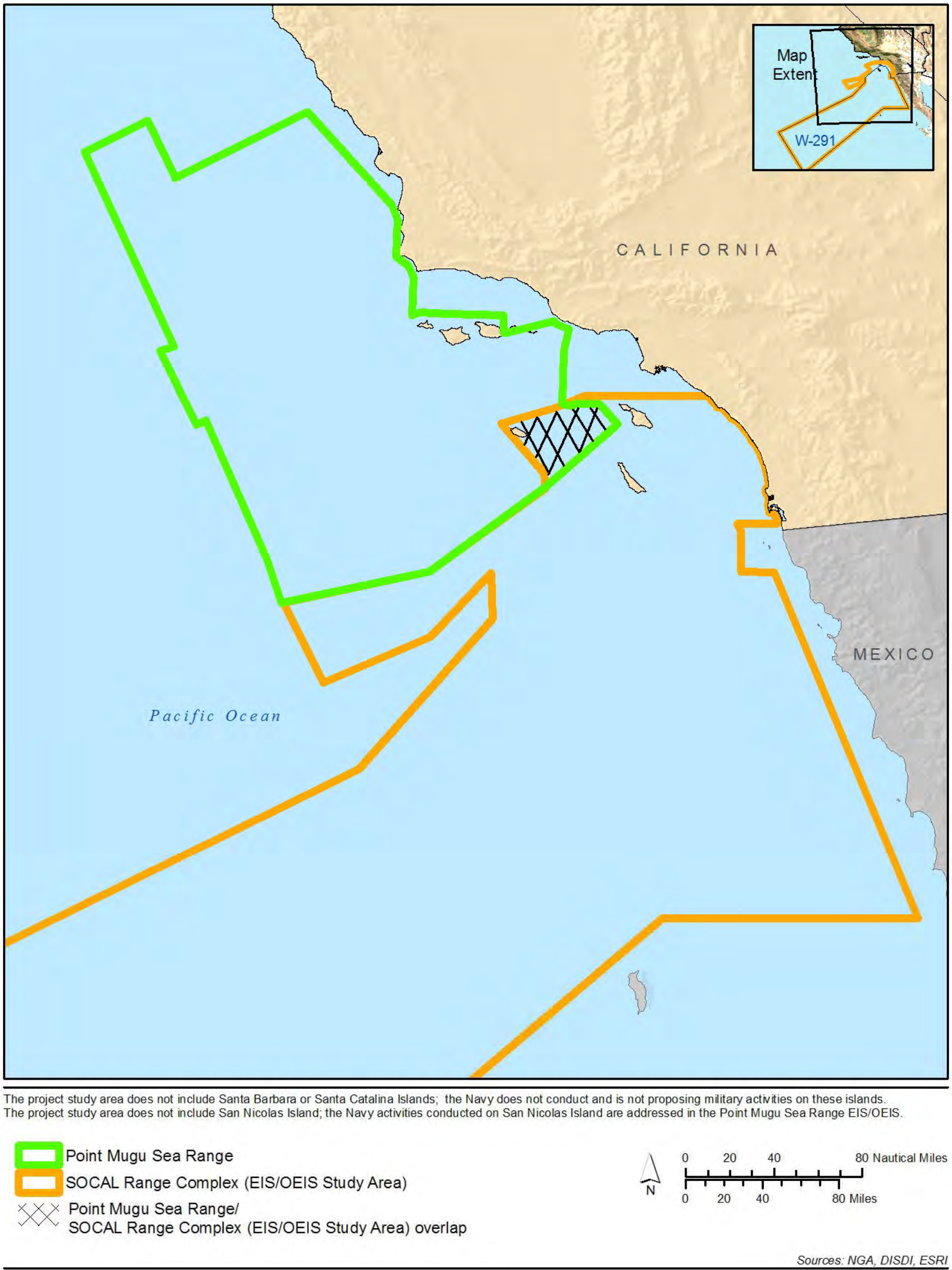

Figure 1-13: SOCAL Range Complex and Point Mugu Sea Range

Each military training activity described in this CD meets a requirement that ultimately can be traced to requirements from the National Command Authority. Training activities in SOCAL Range Complex vary from basic individual or unit level events of relatively short duration involving few participants to integrated major range training events, such as COMPTUEX/JTFEX, which may involve thousands of participants over several weeks.

Over the years, the tempo and types of activities have fluctuated within SOCAL Range Complex due to changing requirements, the dynamic nature of international events, the introduction of advances in warfighting doctrine and procedures, and force structure changes. Such developments have influenced the frequency, duration, intensity, and location of required training. The factors influencing tempo and types of activities are fluid in nature, and will continue to cause fluctuations in training activities within SOCAL Range Complex. Accordingly, operational data used throughout this CD are representative levels for evaluating impacts that may result from the proposed training activities under the proposed activities.

1.3.1 Training Activities

For purposes of analysis, training and test activities addressed in this CD are organized into seven PMARs. Summary descriptions of current training activities conducted in SOCAL Range Complex are provided in the following subsections. Table 1-6 contains summary data about these activities. Appendix A provides a more-detailed summary of each of the training activities, including platforms involved, ordnance expended, and duration of the event.

1.3.1.1 Anti-Air Warfare (AAW) Training

AAW is the PMAR that addresses combat activities by air and surface forces against hostile aircraft and missiles. Navy ships contain an array of modern anti-aircraft weapon systems, including naval guns linked to radar-directed fire-control systems, surface-to-air missile systems, and radar-controlled cannon for close-in point defense. Strike/fighter aircraft carry anti-aircraft weapons, including air-to-air missiles and aircraft cannon. AAW training encompasses events and exercises to train ship and aircraft crews in employment of these weapons systems against simulated threat aircraft or targets. AAW training includes surface-to-air gunnery, surface-to-air and air-to-air missile exercises, and aircraft force-on-force combat maneuvers.

1.3.1.2 Anti-Submarine Warfare (ASW) Training

ASW involves helicopter and sea control aircraft, ships, and submarines, alone or in combination, locating, tracking, and neutralizing submarines. Controlling the undersea battlespace is a unique naval capability and a vital aspect of sea control. Undersea battlespace dominance requires proficiency in ASW. Every deploying strike group and individual surface combatant must develop and demonstrate this capability.

Various types of active and passive sonars are used by the Navy to determine water depth, locate mines, and identify, track, and target submarines. Passive sonar “listens” for sound waves by using underwater microphones, called hydrophones, which receive, amplify, and process underwater sounds. No sound is introduced into the water when using passive sonar. Passive sonar can indicate the presence, character, and movement of a submarine, to the extent that the submarine generates noise. However, as newer and quieter submarines are built and exported to many nations, the effectiveness of passive detection has been reduced. In addition, passive sonar provides only a bearing (direction) to a sound-emitting source; it does not provide an accurate range (distance) to the source. Active sonar is needed to locate objects because active sonar provides both bearing and range to the detected contact (such as an enemy submarine), and because it is not dependent on the source noise of the contact.

Active sonar transmits pulses of sound that travel through the water, reflect off objects, and return to a receiver. By knowing the speed of sound in water and the time taken for the sound wave to travel to the object and back, active sonar systems can quickly calculate direction and distance from the sonar platform to the underwater object, which is essential to U.S. ship survivability. There are three types of active sonar: low frequency, mid-frequency, and high-frequency.

Low-frequency sonar operates below 1 kilohertz (kHz), and is designed to detect extremely quiet diesel-electric submarines at ranges far beyond the capabilities of mid-frequency active sonars. The use of low-frequency active sonar is not contemplated in the proposed activities.

High-frequency active sonar operates at frequencies greater than 10 kHz. At higher acoustic frequencies, sound rapidly dissipates in the ocean environment, resulting in short detection ranges, typically less than five nm. High-frequency sonar is used primarily for determining water depth, hunting mines and guiding torpedoes.

MFAS operates between 1 and 10 kHz. MFAS is the Navy’s primary tool for conducting ASW. Many ASW experiments and exercises have demonstrated that this improved capability for long range detection of adversary submarines before they are able to conduct an attack is essential to U.S. ship survivability. Today, ASW is a critical war-fighting priority. Navies across the world use modern, quiet, diesel-electric submarines that pose the primary threat to the Navy’s ability to perform a number of critically necessary missions. Extensive training is necessary if Sailors, ships, and strike groups are to gain proficiency in using MFAS sonar. If a strike group does not demonstrate MFAS proficiency, it cannot be certified as combat-ready.

The Navy’s ASW training plan, including the use of active sonar in at-sea training scenarios, includes multiple levels of training. Individual-level ASW training addresses basic skills such as detection and classification of contacts, and distinguishing discrete acoustic signatures including those of ships, submarines, and marine life. More advanced, integrated ASW training exercises involving active sonar are conducted in coordinated, at-sea activities during multi-dimensional training events involving submarines, ships, aircraft, and helicopters. This training integrates the full anti-submarine warfare continuum from detecting and tracking a submarine to attacking a target using either exercise torpedoes or simulated weapons. Training events include detection and tracking exercises (TRACKEX) against “enemy” submarine contacts; torpedo employment exercises (TORPEX) against the target; and exercising command and control tasks in a multi-dimensional battlespace.

ASW sonar systems are deployed from certain classes of surface ships, submarines, helicopters, and fixed-wing Maritime Patrol Aircraft (MPA) (Table 1-5). The surface ships used are typically equipped with hull-mounted sonars (passive and active) to detect submarines. Helicopters equipped with dipping sonar or sonobuoys are used to locate suspect submarines or submarine targets within the training area. In addition, fixed-wing MPA are used to deploy both active and passive sonobuoys to assist in locating and tracking submarines during the exercise. Submarines are equipped with hull-mounted sonars sometimes used to locate and prosecute other submarines or surface ships during the exercise. The types of tactical sonar sources employed during ASW sonar training exercises are identified in Table 1-5.

1.3.1.3 Anti-Surface Warfare (ASUW) Training

ASUW is a type of naval warfare in which aircraft, surface ships, and submarines employ weapons, sensors, and activities directed against enemy surface ships or boats. Aircraft-to-surface ASUW is conducted by long-range attacks using air-launched cruise missiles or other precision guided munitions, or using aircraft cannon. ASUW also is conducted by warships employing torpedoes, naval guns, and surface-to-surface missiles. Submarines attack surface ships using torpedoes or submarine-launched, anti-ship cruise missiles. Training in ASUW includes surface-to-surface gunnery and missile exercises, air-to-surface gunnery and missile exercises, and submarine missile or torpedo launch events. Training generally involves expenditure of ordnance against a towed target. A sinking exercise (SINKEX) is a special training event that provides an opportunity for ship, submarine, and aircraft crews to deliver live ordnance on a deactivated vessel that has been cleaned and environmentally remediated. The vessel is targeted until sunk using multiple weapons systems.

Table 1-5: ASW Sonar Systems and Platforms

System	*Frequency*	*Associated Platform*
AN/SQS-53	MF	DDG and CG hull-mounted sonar
AN/AQS-13 or AN/AQS-22*	MF	Helicopter dipping sonar
AN/SQS-56	MF	FFG hull-mounted sonar
MK-48 Torpedo	HF	Submarine-fired exercise torpedo
MK-46 Torpedo	HF	Surface ship and aircraft-fired exercise torpedo
AN/SLQ-25 (NIXIE)	MF	DDG, CG, and FFG towed array
AN/BQQ-10	MF	Submarine hull-mounted sonar
Tonal sonobuoy (DICASS) (AN/SSQ-62)	MF	Helicopter and MPA deployed
Notes: CG – Guided Missile Cruiser; DDG – Guided Missile Destroyer; DICASS – Directional Command-Activated Sonobuoy System; FFG – Fast Frigate; HF – High-Frequency; MF – Mid-Frequency.		

ASUW also encompasses maritime interdiction, that is, the interception of a suspect surface ship by a Navy ship for the purpose of boarding-party inspection or the seizure of the suspect ship. Training in these tasks is conducted in Visit, Board, Search, and Seizure exercises.

1.3.1.4 Amphibious Warfare (AMW) Training

AMW is a type of naval warfare involving the use of naval firepower and logistics, and Marine Corps landing forces to project military power ashore. AMW encompasses a broad spectrum of activities involving maneuver from the sea to objectives ashore, ranging from reconnaissance or raid missions involving a small unit, to large-scale amphibious activities involving over one 1,000 Marines and Sailors, and multiple ships and aircraft embarked in a Strike Group.

AMW training includes tasks at increasing levels of complexity, from individual, crew, and small unit events to large task force exercises. Individual and crew training include the operation of amphibious vehicles and naval gunfire support training. Small-unit training activities include events leading to the certification of a MEU as “Special Operations Capable”. Such training includes shore assaults, boat raids, airfield or port seizures, and reconnaissance. Larger-scale amphibious exercises involve ship-to-shore maneuver, shore bombardment and other naval fire support, and air strike and close air support training.

1.3.1.5 Electronic Combat (EC) Training

EC is the mission area of naval warfare that aims to control use of the electromagnetic spectrum and to deny its use by an adversary. Typical EC activities include threat avoidance training, signals analysis for intelligence purposes, and use of airborne and surface electronic jamming devices to defeat tracking systems.

1.3.1.6 Mine Warfare (MIW) Training

MIW is the naval warfare area involving the detection, avoidance, and neutralization of mines to protect Navy ships and submarines, and offensive mine laying in naval operations. A naval mine is a self-contained explosive device placed in water to destroy ships or submarines. Naval mines are deposited and left in place until either triggered by the approach of or a contact with a ship, or are destroyed or removed. Naval mines can be laid by purpose-built minelayers, other ships, submarines, or airplanes. MIW training includes Mine Countermeasures (MCM) Exercises and Mine Laying Exercises (MINEX).

1.3.1.7 Naval Special Warfare (NSW) Training

NSW forces (SEALs and Special Boat Units [SBUs]) train to conduct military operations in five Special Operations mission areas: unconventional warfare, direct action, special reconnaissance, foreign internal defense, and counterterrorism. NSW training involves special tactics, techniques, and procedures, employed in training events that include: insertion/extraction activities using parachutes, rubber boats, or helicopters; boat-to-shore and boat-to-boat gunnery; demolition training on land or underwater; reconnaissance; and small arms training.

1.3.1.8 Strike Warfare (STW) Training

STW activities include training of fixed-wing fighter/attack aircraft in delivery of precision guided munitions, non-guided munitions, rockets, and other ordnance against land targets in all weather and light conditions. Training events typically involve a simulated strike mission with a flight of four or more aircraft. The strike mission may simulate attacks on “deep targets” (i.e., those geographically distant from friendly ground forces), or may simulate close air support of targets within close range of friendly ground forces. Laser designators from aircraft or ground personnel may be employed for delivery of precision guided munitions. Some strike missions involve no-drop events in which prosecution of targets is simulated, but video footage is often obtained by onboard sensors.

Combat Search and Rescue (CSAR) is a strike warfare activity with the purpose of training aircrews to locate, protect, and evacuate downed aviation crew members from hostile territory. The activity can include reconnaissance aircraft to find the downed aircrew, helicopters to conduct the rescue, and fighter aircraft to perform close air support to protect both the downed aircrews and the rescue helicopters.

1.3.1.9 Explosive Ordnance Disposal (EOD) Activities

The EOD mission area involves employment of skills, tactics, and equipment designed to safely render unexploded ordnance (UXO). EOD personnel are highly trained, and serve in both tactical and administrative capacities. Tactical missions include safe disposal of improvised explosive devices. Administrative missions include range clearance and ordnance safety in support of operational forces.

1.3.1.10 U.S. Coast Guard Training

Coast Guard Sector San Diego, a shore command within the Coast Guard 11th District, carries out its mission to serve, protect, and defend the American public, maritime infrastructure and the environment. The Sector San Diego Area of Responsibility extends southward from the Dana Point harbor to the border with Mexico. Equipment used by the Coast Guard includes 25-ft response boats, 41-ft utility boats and 87-ft patrol boats, as well as HH-60 helicopters. Training events include: search and rescue, maritime patrol training, boat handling, and helicopter and surface vessel live-fire training with small arms.

1.3.2 Naval Auxiliary Landing Field (NALF) SCI Airfield Activities

NALF SCI provides opportunities for aviation training and aircraft access to SCI. The airfield is restricted to military aircraft and authorized contract flights. There are no permanently assigned aircraft, and aviation support is limited essentially to refueling. NALF SCI has the primary mission of training Naval Air Force Pacific aircrews in Field Carrier Landing Practice (FCLP). FCLP involves landing on a simulated aircraft carrier deck painted on the surface of the runway near its eastern end. Other military activities include visual and instrument approaches and departures, aircraft equipment calibration, survey and photo missions, range support, exercise training, RDT&E test support, medical evacuation, and supply and personnel flights.

1.3.3 Research, Development, Test, and Evaluation (RDT&E) Events

The Navy conducts RDT&E, engineering, and fleet support for command, control, and communications systems and ocean surveillance. The Navy's tests on SCI include a wide variety of ocean engineering, missile firings, torpedo testing, manned and unmanned submersibles, unmanned aerial vehicles (UAVs), EC, and other Navy weapons systems. Specific events include:

- Ship Tracking and Torpedo Tests;
- Unmanned Underwater Vehicle (UUV) Tests;
- Sonobuoy Quality Assurance (QA)/Quality Control (QC) Tests;
- Ocean Engineering Tests;
- Marine Mammal Mine Shape Location and Research; and
- Missile Flight Tests;

The San Diego Division of the Naval Undersea Warfare Center (NUWC) is a Naval Sea Systems Command (NAVSEA) organization supporting the Pacific Fleet. NUWC operates and maintains the SCIUR. NUWC conducts tests, analysis, and evaluation of submarine undersea warfare exercises and test programs. NUWC also provides engineering and technical support for Undersea Warfare programs and exercises, designs cognizance of underwater weapons acoustic and tracking ranges and associated range equipment, and provides proof testing and evaluation for underwater weapons, weapons systems, and components.

1.3.4 Naval Force Structure

The Navy has established policy governing the composition and required mission capabilities of deployable naval units, focused on maintaining flexibility in the organization and training of forces. Central to this policy is the ability of naval forces of any size to operate independently or to merge into a larger naval formation to confront a diverse array of challenges. Thus, individual units may combine to form a Strike Group, and Strike Groups may combine to form a Strike Force. Composition of the Strike Groups and Strike Forces is discussed below, in Section 1.3.4.1.

Navy policy defines the “baseline” composition of deployable naval forces. The baseline is intended as an adaptable structure to be tailored to meet specific requirements. Thus, while the baseline composition of a CSG calls for a specified number of ships, aviation assets, and other forces, a given CSG may include more or fewer units, depending on the dictates of the mission. The baseline naval force structures established by Navy policy are described below.

1.3.4.1 Carrier Strike Group Baseline

- One Aircraft Carrier
- One Carrier Air Wing
  - Four Strike Fighter Squadrons
  - One Electronic Combat Squadron
  - Two Combat Helicopter Squadrons
  - Two logistics aircraft
- Five Surface Combatant Ships
  - "Surface Combatant" refers to guided missile cruisers, destroyers, and frigates, and future DDG 1000 platform.
- One attack submarine
- One logistic support ship
- Over 7,000 personnel

1.3.4.2 Expeditionary Strike Group Baseline

- Five Surface Combatant Ships
  - "Surface Combatant" refers to guided missile cruisers, destroyers, and frigates, and future DDG 1000 and LCS platforms.
- Three Amphibious Ships
  - Landing Craft Units
- Three Surface Combatant Ships
- Three Combat Helicopter Detachments
- One attack submarine
- One Marine Expeditionary Unit (Special Operations Capable) of 2,200 Marines
  - Ground Combat and Combat Logistics Elements
  - Composite aviation squadron of fixed wing aircraft and helicopters
- Over 5,000 personnel

1.3.4.3 Surface Strike Group Baseline

- Three Surface Ships
  - Surface Combatants (see above)
  - Amphibious Ships (see above)
- One Combat Helicopter Detachment
- One attack submarine

1.3.4.4 Expeditionary Strike Force (ESF)

- Combined forces of more than one CSG, ESG, or SSG

1.3.5 Integrated, Multi-Dimensional Training

The Navy must execute training involving ships, aircraft, submarines, and Marine Corps forces operating in multiple dimensions (at sea, undersea, in the air, and on land) to ensure the readiness of naval forces. Unit training proceeds on a continuum, ranging from events involving single units; to small numbers of personnel, ships, submarines, or aircraft engaged in training tailored to specific tasks; to large-scale pre-deployment or readiness exercises involving Strike Groups. Exercises involving an entire Strike Group are referred to as major range events, described in Section 1.3.5.1. Smaller, unit-level integrated exercises are described in Section 1.3.5.2.

To facilitate analysis, this CD examines the individual activities of each integrated unit-level training event or major range event, rather than examining the exercise as a whole. Given the complexity of these exercises, particularly major range events, analyzing potential impacts over numerous resource areas requires the exercises to be broken down into temporally and spatially manageable components. Moreover, exercise design may differ from event to event, depending on factors such as the composition of the force to be trained and the expected mission of that force. For these reasons, and to ensure consistency, the tables of activities that follow throughout this CD include the individual activities that are conducted as part of a larger event.

1.3.5.1 Major Range Events

The Navy conducts large-scale exercises, also called major ranges events, in SOCAL Range Complex that involve the integration of all warfare areas simultaneously. These exercises are required for pre-deployment certification of naval formations. Major range events bring together the component elements of a Strike Group or Strike Force (that is, all of the various ships, submarines, aircraft, and Marine Corps forces) to train in complex command, control, coordination, and logistics functions. The composition of the force to be trained and the nature of its mission upon deployment determine the scope of the exercise. The Navy conducts as many as 14 major range events per year.

Major range events require vast areas of sea space and airspace for the exercise of realistic training, as well as land areas for conducting land attack training events. The training space required for these events is a function of naval warfighting doctrine, which favors widely dispersed units capable of projecting forces and firepower at high speeds across distances of up to several hundred miles in a coordinated fashion, to concentrate on an objective. The three-dimensional space required to conduct a major range event involving a CSG or ESG is a complicated polygon covering an area as large as 50,000 nm^2. The space required to exercise an ESF is correspondingly larger.

A major range event is comprised of several "unit level" range activities conducted by several units operating together while commanded and controlled by a single commander. These exercises typically employ an exercise scenario developed to train and evaluate the Strike Group/Force in required naval tactical tasks. In a major range event, most of the activities being directed and coordinated by the Strike Group commander are identical in nature to the activities conducted in the course of individual, crew, and smaller-unit training events. In a major range event, however, these disparate training tasks are conducted in concert, rather than in isolation.

For example, within a single exercise scenario a CSG could conduct a coordinated ASW activity in which several ships and aircraft work together to find and "destroy" an "enemy" submarine, while Marine forces, surface combatant ships, and aircraft conduct a coordinated air and amphibious strike against objectives ashore. While exercise scenarios for different major range events would be similar in some or many respects, they would not be identical. Activities are chosen to be included in a given major range event based on the anticipated operational missions that would be performed during the Strike Group's deployment, and other factors such as the commander’s assessment of the participating units’ state of readiness.

Major range events include:

- Composite Training Unit Exercise (COMPTUEX). The COMPTUEX is an Integration Phase, at-sea, major range event. For the CSG, this exercise integrates the aircraft carrier and carrier air wing with surface and submarine units in a challenging operational environment. For the ESG, this exercise integrates amphibious ships with their associated air wing, surface ships, submarines, and MEU. Live-fire activities that may take place during COMPTUEX include long-range air strikes, Naval Surface Fire Support (NSFS), and surface-to-air, surface-to-surface, and air-to-surface missile exercises. The MEU also conducts realistic training based on anticipated operational requirements and to develop further the required coordination between Navy and Marine Corps forces. Special Operations training may also be integrated with the exercise scenario. The COMPTUEX is typically 21 days in length. The exercise is conducted in accordance with a schedule of events, which may include two 1-day, scenario-driven, "mini" battle problems, culminating with a scenario-driven free-play (as opposed to scripted) 3-day Final Battle Problem where the strike group is required to response to dynamic maneuvers. COMPTUEX occurs three to four times per year.

- Joint Task Force Training Exercises (JTFEX). The JTFEX is a dynamic and complex major range event that is the culminating exercise in the Sustainment Phase training - and certification event - for the CSGs and ESGs. For an ESG, the exercise incorporates an Amphibious Ready Group Certification Exercise for the amphibious ships and a Special Operations Capable Certification for the MEU. The JTFEX for an ESG and CSG may be conducted concurrently (i.e., together). JTFEX emphasizes mission planning and effective execution by all primary and support warfare commanders, including command and control, surveillance, intelligence, and logistics support. JTFEXs are more complex than COMPTUEXs and are scenario-driven exercises that evaluate a strike group in all warfare areas. JTFEX is mostly a free-play (as opposed to scripted) event, normally 10 days long, not including a 3-day in-port Force Protection Exercise, and is the final at-sea exercise for the CSG or ESG prior to deployment. JTFEX occurs three to four times per year.

1.3.5.2 Integrated Unit-Level Training Events

Integrated unit-level training events, which pursue tailored training objectives for components of a Strike Group, include:

- Ship ASW Readiness and Evaluation Measuring (SHAREM). SHAREM is a CNO chartered program with the overall objective to collect and analyze high-quality data to "assess" quantitatively the surface ship ASW readiness and effectiveness. The SHAREM will typically involve multiple ships, submarines, and aircraft in several coordinated events over a period of a week or less. A SHAREM may take place once per year in SOCAL.

- Sustainment Exercise. Included in the FRTP is a requirement to conduct post-deployment sustainment, training, and maintenance. This requirement ensures that the components of a Strike Group maintain an acceptable level of readiness after returning from deployment. A sustainment exercise is designed to challenge the Strike Group in all warfare areas. This exercise is similar to a COMPTUEX, but shorter in duration. One to two sustainment exercises may occur each year in SOCAL.

- Integrated ASW Course (IAC) Phase II.[8] IAC exercises are combined aircraft and surface ship events. The IAC Phase II consists of two 12-hour events conducted primarily on SOAR over a 2-day period. The typical participants include four helicopters, two P-3 aircraft, two adversary submarines, and two Mk 30 or Mk 39 targets. Four IAC Phase II exercises may occur per year.

[8] IAC is designed to improve ASW warfighting skills. IAC Phase I training is conducted entirely in a classroom environment.

Table 1-6 identifies typical training activities in SOCAL Range Complex, categorized by PMAR. This table also groups activities according to the location within the Range Complex where the operation is generally conducted. For descriptions and locations of the OPAREA, range areas, and airspace within SOCAL Range Complex, refer to Tables 1-1, 1-2, and 1-4.

1.4 PROPOSED ACTIVITIES

The Navy proposes to implement actions within the SOCAL Range Complex to:

- Increase training and RDT&E activities from current levels as necessary to support the FRTP;
- Accommodate mission requirements associated with force structure changes and introduction of new weapons and systems to the Fleet; and
- Implement enhanced range complex capabilities.

The proposed activities would result in selectively focused but critical increases in training, and range enhancements to address test and training resource shortfalls, as necessary to ensure that SOCAL Range Complex supports Navy and Marine Corps training and readiness objectives.

Actions to support current, emerging, and future training and RDT&E activities in the SOCAL Range Complex, including implementation of range enhancements, include:

- Increasing numbers of training activities of the types currently being conducted in the SOCAL Range Complex.
- Expanding the size and scope of amphibious landing training exercises in the SOCAL OPAREAs and at SCI to include a battalion landing of 1,500+ Marines with weapons and equipment (to be conducted as many as two times per year).
- Expanding the size and scope of NSW training activities in TARs, SWATs, and nearshore waters of SCI.
- Installing a shallow water training range (SWTR), a proposed extension into shallow water[9] of the existing instrumented deepwater ASW range (known as "SOAR").
- Conducting activities on the SWTR.
- Increasing Commercial Air Services support for Fleet Opposition Forces (OPFOR) and Electronic Warfare (EW) Threat Training.
- Constructing a Shallow Water Mine Field at depths of 40 to 420 ft (76-128 m) in offshore and nearshore areas near SCI.
- Conducting activities on the Shallow Water Minefield.
- Conducting Mine Neutralization Exercises.
- Supporting training for new systems and platforms, specifically, LCS, MV-22 Osprey aircraft, the EA-18G Growler aircraft, the SH-60R/S Seahawk Multi-mission Helicopter, the P-8 Multi-mission Maritime Aircraft, the Landing Platform-Dock [LPD] 17 amphibious assault ship, the DDG 1000 [Zumwalt Class] destroyer, and an additional aircraft carrier, USS CARL VINSON, proposed for homeporting in San Diego.

[9] In the context of naval operations, specifically submarine operations, the term "shallow water" is a relative term, denoting depths of 100 to 400 fathoms (or 600 to 2,400 ft), which are considered "shallow" compared to the depth of the ocean.

Table 1-6: SOCAL Range Complex- Activities by Warfare Area and Location

Warfare Area	No.	Operation Type	Summary	Location of Activity
Anti-Air Warfare	**1**	Air Combat Maneuvers	Trains fighter crews in basic flight maneuvers and advanced air combat tactics. Participants are from two or four aircraft. No weapons are fired.	W-291 (PAPA Areas)
	2	Air Defense Exercise	Coordinated activities involving surface ships and aircraft, training in radar detection, and simulated airborne and surface firing. No weapons are fired.	W-291
	3	Surface-to-Air Missile Exercise	Live-firing event from a surface ship to an aerial target. Weapons employed are Rolling Airframe Missile and STANDARD missile. Aerial targets are drones recovered via parachute and small boat.	W-291
	4	Surface-to-Air Gunnery Exercise	Surface-to-air live-fire gunnery at aerial target that simulates a threat aircraft or missile. Weapons include the 5-inch naval gun, 76 mm and 20 mm cannon, and 7.62 machine guns.	W-291
	5	Air-to-Air Missile Exercise	Fighter/attack aircraft firing against an aerial target that simulates an enemy aircraft. Missiles include AIM-7 SPARROW, AIM-9 SIDEWINDER, and AIM-120 AMRAAM.	W-291
Anti-Submarine Warfare	**6**	Antisubmarine Warfare Tracking Exercise - Helicopter	Trains helicopter crews in anti-submarine search, detection, localization, classification and tracking with dipping sonar and passive and active sonobuoys. Two primary targets: recoverable MK 30 and expendable MK 39. The target simulates a submarine at varying depths and speeds. SH-60 crews drop sonobuoys to detect and localize the target.	SOCAL OPAREAs
	7	Antisubmarine Warfare Torpedo Exercise - Helicopter	Trains SH-60 crews in employment of air-launched torpedoes. Aircrew drops an inert, running exercise torpedo or a non-running practice torpedo against ASW targets detected using dipping sonar and active and passive sonobuoys.	SOAR/ SCIUR
	8	Antisubmarine Warfare Tracking Exercise - Maritime Patrol Aircraft	Trains patrol aircraft crews in anti-submarine search, detection, localization, classification and tracking. Employs multiple sensor systems, including passive and active sonobuoys, against a submarine simulating a threat.	SOCAL OPAREAs
	9	Antisubmarine Warfare Torpedo Exercise - Maritime Patrol Aircraft	Trains patrol aircraft crews in employment of air-launched torpedoes. Aircrew drops an inert, running exercise torpedo or a non-running practice torpedo against ASW targets detected using active and passive sonobuoys.	SOAR/ SOCAL OPAREAs
	10	Antisubmarine Warfare EER / IEER sonobuoy employment	Trains patrol aircraft crews in deployment and use of Extended Echo Ranging (EER) and Improved EER (IEER) sonobuoy systems that use a small explosive source to generate an acoustic signal.	SOCAL OPAREAs
	11	Antisubmarine Warfare Tracking Exercise - Surface	Trains ship crews in anti-submarine search, detection, localization, classification, tracking, and attack using hull-mounted and towed sonar systems. ASW targets simulate a submarine at varying depths and speeds. Ships crews and SH-60 helicopter crews employ sensors to detect and localize the target.	SOCAL OPAREAs

Table 1-6: SOCAL Range Complex- Activities by Warfare Area and Location (continued)

Warfare Area	No.	Operation Type	Summary	Location of Activity
Anti-Submarine Warfare (continued)	**12**	Antisubmarine Warfare Torpedo Exercise - Surface	Trains ship crews in anti-submarine search, detection, localization, classification, tracking, and attack using hull-mounted and towed sonar systems. One or more torpedoes are dropped or fired in this exercise. Includes Integrated ASW Phase 2 (IAC II).	SOAR/ SCIUR
	13	Antisubmarine Warfare Tracking Exercise - Submarine	Trains submarine crews in ASW using passive sonar (active sonar is not allowed for tactical reasons), No ordnance expended in this exercise.	SOCAL OPAREAs
	14	Antisubmarine Warfare Torpedo Exercise - Submarine	Submarine exercise training Tactical Weapons Proficiency, lasting 1-2 days and multiple firings or exercise torpedoes. Attacking submarines use only passive sonar.	W-291
Anti-Surface Warfare	**15**	Visit Board Search and Seizure	Training in interception of a suspect surface craft by a naval ship for the purpose of inspection for illegal activities. Helicopters, surface ships, and small boats participate. Small arms may be fired.	W-291, OPAREA 3803, SOAR
	16	Air-Surface Missile Exercise	Ships, helicopters, and fighter/attack aircraft expend precision-guided munitions against maneuverable, high-speed, surface targets. The missiles used in this operation are the AGM-114 (HELLFIRE) and the Harpoon. Small arms are also fired from helicopters.	SOAR, MIR, SHOBA
	17	Air-to-Surface Bombing Exercise	Trains fighter or patrol aircraft crews in delivery of bombs against surface vessels. Involves in-flight arming and releasing of bombs in accordance with appropriate tactics and drop restrictions. These include; Laser-Guided Training Round (LGTR) and Glide Bomb Units (GBUs) 12, 16 and 32i.	SOAR, MIR, SHOBA
	18	Air-to-Surface Gunnery Exercise	Trains helicopter crews in daytime aerial gunnery activities with the GAU-16 (0.50 cal) or M-60 (7.62 mm) machine gun.	W-291
	19	Surface-to-Surface Gunnery Exercise	Trains surface ship crews in high-speed engagement procedures against mobile seaborne targets, using 5-inch guns, 25-mm cannon, or 0.50 cal machine guns.	W-291, SHOBA
	20	Sink Exercise	Trains ship and aircraft crews in delivering live ordnance on a real, seaborne target, namely a large deactivated vessel, which is deliberately sunk using multiple weapon systems. The ship is cleaned, environmentally remediated, and empty. It is towed to sea and set adrift at the exercise location. The precise duration of a SINKEX is variable, ending when the target sinks, whether after the first weapon impacts or and after multiple impacts.	W-291
Amphibious Warfare	**21**	Naval Surface Fire Support	Trains ship crews in naval gunnery against shore targets. Training Naval Gunfire Spotters located ashore to direct the fires of naval guns.	SHOBA
	22	Expeditionary Fires Exercise	USMC field training in integration of close air support, naval gunfire, artillery, and mortars.	SCI, SHOBA, FSAs

Table 1-6: SOCAL Range Complex- Activities by Warfare Area and Location (continued)

Warfare Area	No.	Operation Type	Summary	Location of Activity
Amphibious Warfare (continued)	**23**	Expeditionary Assault - Battalion Landing	Proposed new exercises; not currently conducted (see description in Appendix A)	Eel Cove, Northwest Harbor, West Cove, Wilson Cove, Horse Beach, AVCM
	24	Stinger Firing Exercise	Trains Marine Corps personnel in employment of man-portable air defense systems with the Stinger missile. This is a ground-launched missile firing exercise against a small aerial target.	SHOBA
	25	Amphibious Landings and Raids (on SCI)	Trains Marine Corps forces in small unit live-fire and non-live-fire amphibious activities from the sea onto land areas of SCI.	SCI (West Cove, Impact Areas, Horse Beach Cove, NW Harbor)
Amphibious Warfare	**26**	Amphibious Operations	Trains Marine Corps small units including assault amphibian vehicle units and small boat units in amphibious activities.	Camp Pendleton Amphibious Assault Area (CPAAA)
Electronic Combat	**27**	Electronic Combat Operations	Signal generators on SCI and commercial air services provide air, surface and subsurface units with operating experience in electronic combat, using emitters and electronic and communications jammers to simulate threats	SOCAL OPAREAs
Mine Warfare	**28**	Mine Countermeasures Exercise	Surface ship uses all organic mine countermeasures, including sonar, to locate and avoid mines. No weapons are fired.	Kingfisher, ARPA
	29	Mine Neutralization	Proposed new exercises; not currently conducted (see description in Appendix A). May employ a towed sonar system (AN/SQS-20)	SCI (Pyramid Cove, Northwest Harbor, Kingfisher, MTR-1, MTR-2), ARPA
	30	Mine Laying	Training of fighter/attack and patrol aircraft crews in aerial mine laying.	MTRs, Pyramid Cove
Naval Special Warfare	**31**	NSW Land Demolition	Training of NSW personnel in construction, emplacement, and safe detonation of explosives for land breaching and demolition of buildings and other facilities.	SCI (Impact Areas, SWAT 1, SWAT 2, TARs).
	32	Underwater Demolition-Single Point Source Charge	Training of NSW personnel to construct, emplace and safety detonate single charge explosives for underwater obstacle clearance.	SCI nearshore (NW Harbor, TAR 2 and 3, Horse Beach Cove, SWATs) SOAR, FLETA HOT
	33	Underwater Demolition Multiple Charge and Obstacle Loading	Training of NSW personnel to construct, emplace and safety detonate multiple charges laid in a pattern for underwater obstacle clearance.	Northwest Harbor, SWAT 2
	34	Small Arms Training and GUNEX	Training of NSW personnel in employment of small arms up to 7.62 mm.	SCI, FLETA HOT
	35	Land Navigation	Training of NSW personnel in land navigation techniques.	SCI
	36	NSW UAV Operations	Training of NSW personnel in employment of unmanned aerial vehicles over land areas.	SCI, W-291
	37	Insertion/Extraction	Training of NSW personnel in covert insertion and extraction into target areas, using boats, aircraft, and parachutes.	SCI, SOCAL OPAREAs, W-291

Table 1-6: SOCAL Range Complex- Activities by Warfare Area and Location (continued)

Warfare Area	No.	Operation Type	Summary	Location of Activity
Naval Special Warfare (continued)	**38**	NSW Boat Operations	Training of NSW Special Boat Teams in open-ocean operations, and firing from boats, including into land impact areas of SCI.	SCI, SOCAL OPAREAs, SHOBA, FSAs
	39	Sea, Air, and Land (SEAL) Platoon Operations	SEAL Platoon live-fire training in special operations tactics, techniques and procedures	SCI / SHOBA, FLETA HOT
Strike	**41**	Bombing Exercise (Land)	Training of fighter/attack crews in bombing of land targets on SCI, using precision guided munitions and unguided munitions. Typical event involves 2-4 aircraft.	SHOBA, MIR
	42	Combat Search & Rescue	Training of aircrews, submarine, an NSW forces in rescue of military personnel in a simulated hostile area.	SCI
Explosive Ordnance Disposal	**43**	Explosive Ordnance Disposal SCI	Training of EOD teams to locate and neutralize or destroy unexploded ordnance.	SCI
U.S. Coast Guard	**44**	Coast Guard Training	Training in SOCAL OPAREA.	SOCAL OPAREAs, W-291
Air Operations-Other	**45**	NALF Airfield Activities	Flight training (e.g., landing and takeoff practice) of aircrews utilizing NALF airfield.	SCI (NALF)
RDT&E	**46**	Ship Torpedo Tests	Test event for reliability, maintainability, and performance of torpedoes used in training (REXTORPS and EXTORPS) and operational torpedoes. Dipping and hull-mounted sonars and passive and active sonobuoys are used.	SOAR, SCIUR, OPAREA 3803,
	47	Unmanned Underwater Vehicles	Development and operational testing of UUVs.	NOTS Pier Area, SOAR
	48	Sonobuoy QA/QC Testing	Test event for reliability, maintainability, and performance of lots of sonobuoys. Passive, active, and explosive sonobuoys are tested.	SCIUR
	49	Ocean Engineering	Test event for reliability, maintainability, and performance of marine designs.	NOTS Pier Area
	50	Marine Mammal Mine Shape Location/Research	Events in which Navy marine mammal units (primarily porpoises) are trained to locate and mark inert mine shapes.	MTR 1 and 2, NOTS Pier, SCIUR, SOAR,
	51	Missile Flight Tests	Missile testing; land attack missiles launched from within SOCAL Range Complex, impact at SCI or at range complex outside SOCAL.	SCI, SOCAL OPAREAs, W-291
	52	NUWC Underwater Acoustics Testing	Test events to evaluate acoustic and non-acoustic ship sensors.	SCIUR
	53	Other Tests	Diverse RDT&E activities.	SOAR, SHOBA, Kingfisher, OPAREA 3803
Major Range Events	**NA**	Major exercises	Comprised of multiple range events, identified above*	SOCAL Range Complex Point Mugu Sea Range(ASW)

*Major range events are comprised of multiple range activities conducted by several units operating together while commanded and controlled by a single Strike Group commander. In a major range event, most of the activities and activities being directed and coordinated by the Strike Group commander are identical in nature to the operations conducted in the course of individual, crew, and smaller-unit training events. (i.e., the events identified in items 1-45 of this table). In a major range event, however, these disparate training tasks are conducted in concert, rather than in isolation.

1.4.1 Proposed Activities: Increase Operational Training and Accommodate Force Structure Changes

The proposed activities are designed to meet Navy and Department of Defense current and near-term operational training requirements. Under the proposed activities, in addition to accommodating training activities currently conducted, SOCAL Range Complex would support an increase in training activities, including Major Range Events and force structure changes associated with introduction of new weapons systems, vessels, and aircraft into the Fleet. Under the proposed activities, baseline-training activities would be increased. Two new types of training events would be conducted, namely, a battalion-sized amphibious landing and additional amphibious training events at SCI, and mine neutralization exercises in the SOCAL OPAREAs. In addition, training and activities associated with force-structure changes would be implemented for the MV-22 Osprey, the EA-18G Growler, the SH-60R/S Seahawk Multi-Mission Helicopter, the P-8 Maritime Multi-mission Aircraft, the LPD 17 amphibious assault ship, and the DDG 1000 [Zumwalt Class] destroyer. Force structure changes associated with new weapons systems would include MCM systems. Force Structure changes also would include training associated with the proposed homeporting of the aircraft carrier USS CARL VINSON at NBC.[10]

1.4.1.1 Proposed New Operations

The proposed activities includes two types of training events that are not presently conducted in SOCAL Range Complex – large scale amphibious landings at SCI and Mine Neutralization Exercises (specifically, those involving OAMCM). Under the proposed activities, these types of training would be conducted, as discussed below. The proposed activities also would increase the scope and intensity of currently conducted training (described above in Section 1.2). Table 1-7 identifies the proposed increases in such training events.

Table 1-7: Baseline and Proposed Activities

Navy Warfare Area	No.	Operation Type	Location of Activity	Baseline	Proposed activities
Anti-Air Warfare	**1**	Aircraft Combat Maneuvers	W-291 (PAPA Areas)	3,608	3,970
	2	Air Defense Exercise	W-291	502	550
	3	Surface-to-Air Missile Exercise	W-291	1	6
	4	Surface-to-Air Gunnery Exercise	W-291	262	350
	5	Air-to-Air Missile Exercise	W-291	13	13
Anti-Submarine Warfare	**6**	Antisubmarine Warfare Tracking Exercise - Helicopter	SOCAL OPAREAs	544	1,690
	7	Antisubmarine Warfare Torpedo Exercise - Helicopter	SOAR/ SCIUR	187	245
	8	Antisubmarine Warfare Tracking Exercise - Maritime Patrol Aircraft	SOCAL OPAREAs	25	29

[10] This CD addresses only training activities associated with the homeporting of a third aircraft carrier at NB Coronado; separate environmental analysis is being conducted with regard to potential impacts of facilities, personnel, and support activities that might be associated with the homeporting proposal.

Table 1-7: Baseline and Proposed Activities (continued)

Navy Warfare Area	No.	Operation Type	Location of Activity	Baseline	Proposed Activities
Anti-Submarine Warfare (cont.)	**9**	Antisubmarine Warfare Torpedo Exercise - Maritime Patrol Aircraft	SOAR/ SOCAL OPAREAs	15	17
	10	Antisubmarine Warfare EER / IEER sonobuoy employment	SOCAL OPAREAs	2	3
	11	Antisubmarine Warfare Tracking Exercise - Surface	SOCAL OPAREAs	847	900
	12	Antisubmarine Warfare Torpedo Exercise - Surface	SOAR/ SCIUR	21	25
	13	Antisubmarine Warfare Tracking Exercise - Submarine	SOCAL OPAREAs	34	40
	14	Antisubmarine Warfare Torpedo Exercise - Submarine	W-291	18	22
Anti-Surface Warfare	**15**	Visit Board Search and Seizure	W-291, OPAREA 3803, SOAR	56	90
	16	Anti-Surface Missile Exercise	SOAR, MIR, SHOBA	47	50
	17	Air-to-Surface Bombing Exercise	SOAR, MIR, SHOBA	32	40
	18	Air-to-Surface Gunnery Exercise	W-291	47	60
Anti-Surface Warfare (continued)	**19**	Surface-to-Surface Gunnery Exercise	W-291, SHOBA	315	350
	20	Sink Exercise	W-291	1	2
Amphibious Warfare	**21**	Naval Surface Fire Support	SHOBA	47	52
	22	Expeditionary Fires Exercise	SCI, SHOBA, FSAs	6	8
	23	Expeditionary Assault - Battalion Landing	Eel Cove, Northwest Harbor, West Cove, Wilson Cove, Horse Beach, AVCM	0	2
	24	Stinger Firing Exercise	SHOBA	0	4
	25	Amphibious Landings and Raids (on SCI)	SCI (West Cove, Impact Areas, Horse Beach Cove, NW Harbor)	7	66
	26	Amphibious Operations - CPAAA	CPAAA	2,205	2,276
Electronic Combat	**27**	Electronic Combat Operations	SOCAL OPAREAs	748	775
Mine Warfare	**28**	Mine Countermeasures	Kingfisher, ARPA	44	48
	29	Mine Neutralization	SCI (Pyramid Cove, Northwest Harbor, Kingfisher, MTR-1, MTR-2), ARPA	0	732
	30	Mine Laying	MTRs, Pyramid Cove	17	18
Naval Special Warfare	**31**	NSW Land Demolition	SCI (Impact Areas, SWAT 1, SWAT 2, TARs).	354	674

Table 1-7: Baseline and Proposed Activities (continued)

Navy Warfare Area	No.	Operation Type	Location of Activity	Baseline	Proposed activities
Naval Special Warfare (cont.)	**32**	Underwater Demolition-Single Charge	SCI nearshore (NW Harbor, TAR 2 and 3, Horse Beach Cove, SWATs) SOAR, FLETA HOT	72	85
	33	Underwater Demolition- Multiple Charges	NW Harbor, SWAT 2	14	18
	34	Small Arms Training	SCI, FLETA HOT	171	205
	35	Land Navigation	SCI	99	118
	36	NSW UAV Operations	SCI, W-291	72	1176
	37	Insertion/Extraction	SCI, SOCAL OPAREAs, W-291	5	15
	38	NSW Boat Operations	SCI, SOCAL OPAREAs, SHOBA, FSAs	287	320
	39	SEAL Platoon Operations	SCI / SHOBA, FLETA HOT	340	668
	40	NSW Direct Action	SCI, SOCAL OPAREAs	156	190
Strike	**41**	Bombing Exercise (Land)	SHOBA, MIR	176	216
	42	Combat Search & Rescue	SCI	7	8
Explosive Ordnance Disposal	**43**	Explosive Ordnance Disposal SCI	SCI	4	10
U.S. Coast Guard	**44**	Coast Guard Operations	SOCAL OPAREAs, W-291	1,022	1,022
Air Operations-Other	**45**	NALF Airfield Activities	SCI (NALF)	26,376	33,000
RDT&E	**46**	Ship Torpedo Tests	SOAR, SCIUR, OPAREA 3803,	22	20
	47	Unmanned Underwater Vehicles	NOTS Pier Area, SOAR	10	15
	48	Sonobuoy QA/QC Testing	SCIUR	117	120
	49	Ocean Engineering	NOTS Pier Area	242	242
	50	Marine Mammal Mine Shape Location/Research	MTR 1 and 2, NOTS Pier, SCIUR, SOAR,	5	30
	51	Missile Flight Tests	SCI, SOCAL OPAREAs, W-291	5	20
	52	NUWC Underwater Acoustics Testing	SCIUR	44	139
Major Range Events	**NA**	Major exercises	SOCAL Range Complex Point Mugu Sea Range (ASW)	Comprised of multiple range events, identified above	Comprised of multiple range events, identified above

1.4.1.1.1 Large Amphibious Landings at SCI

The Navy and Marine Corps have identified a requirement to conduct large-scale amphibious landing exercises at SCI. (Presently, large-scale amphibious landings are not conducted at SCI. Marine Corps training on SCI is limited to individual and small unit training, primarily in naval gunfire support tasks, reconnaissance and raids, and small-unit over-the-beach operations). Specifically, the proposed activities would significantly expand the size and scope of amphibious training exercises at SCI to include a battalion-sized landing of approximately 1,500 Marines with weapons and equipment. Under the proposed activities, this exercise would be conducted no more than two times per year.

The landing force, is proposed to be 1,500 personnel, organized into a Marine Air Ground Task Force, consists of a battalion-sized ground combat element, an aviation combat element, and logistics and command forces. The forces would land by air using helicopters or MV-22 tilt-rotor airplanes and cross beaches from the sea using various landing craft and amphibious vehicles (Landing Craft Air Cushion, Amphibious Assault Vehicle, Expeditionary Fighting Vehicle, and Landing Craft Utility). In this exercise, forces would land at the VC-3 airfield, West Cove, Wilson Cove, Northwest Harbor, or Horse Beach (see Figure 1-12). The exercise force would execute live-fire and maneuver operations in accordance with exercise scenarios developed to meet the commander's training mission. Proposed amphibious training would include amphibious vehicle assault, reconnaissance, helicopter assault, combat engineer training, and armored vehicle operations. A battalion exercise would require identification and development of additional training areas on SCI capable of supporting maneuver by infantry, armored vehicles, and trucks. Training areas proposed to support this scale of exercise are identified in Table 1-8, and depicted in Figure 1-14.

Table 1-8: Proposed Amphibious Activities Training Areas

SCI Ranges	Description
Assault Vehicle Maneuver Corridor (AVMC)	The proposed AVMC would include AVMAs linked by an Assault Vehicle Maneuver Road (AVMR) generally along the track of an existing road.
Artillery Maneuver Points (AMP)	AMPs would be sited at designated locations for use in training for the emplacement and displacement of artillery weapons.
Infantry Operations Area (IOA)	An IOA would be generally located on either side of the AVMC, on the upland plateau, and would be designated for foot traffic by military units. No vehicles would be authorized in off-road areas.

1.4.1.1.2 Mine Neutralization Exercises

Mine neutralization exercises would involve training using Organic Airborne Mine Countermeasures (OAMCM) systems employed by helicopters in simulated threat minefields with the goal of clearing a safe channel through the minefield for the passage of friendly ships. Once a mine shape is located, mine neutralization is simulated. Helicopters engaged in MCM training would be configured with one or more of the following systems:

- AN/AQS-20 Mine Hunting System. The AQS-20 is an active high resolution, side-looking, multibeam sonar system used for mine hunting of deeper mine threats along the ocean bottom. It is towed by a helicopter. A small diameter electromechanical cable is used to tow the rapidly-deployable system that provides real-time sonar images to operators in the helicopter.
- AN/AES-1 Airborne Laser Mine Detection System (ALMDS). ALMDS is a helicopter-mounted system that uses Light Detection and Ranging (LIDAR) blue-green laser technology to detect, classify, and localize floating and near-surface moored mines in shallow water.

Figure 1-14: Proposed Assault Vehicle Maneuver Corridor / Areas / Road, Artillery Maneuvering Points, and Infantry Operations Area

- AN/ALQ-220 Organic Airborne Surface Influence Sweep (OASIS). OASIS is a helicopter-deployed, towed-body, 10 ft long and 20 inches in diameter, that is self-contained, allowing for the emulation of magnetic and acoustic signatures of the ships.
- Airborne Mine Neutralization System (AMNS). AMNS is a helicopter-deployed underwater vehicle that searches for, locates, and destroys mines. This self-propelled, unmanned, wire-guided munition with homing capability is expended during the mine destruction process
- AN/AWS-2 Rapid Airborne Mine Clearance System (RAMICS). RAMICS is a helicopter-borne weapon system that fires a 30-mm projectile from a gun or cannon to neutralize surface and near-surface mines. It uses LIDAR technology to detect mines.

Mine neutralization exercises also would involve shipboard MCM systems, including the Remote Minehunting System (RMS). The RMS is an unmanned, semi-submersible vehicle that tows a variable-depth sensor to detect, localize, classify, and identify mines. The RMS includes a shipboard launch and recovery system.

Mine neutralization exercises also would involve submarine-deployed MCM systems, the Long-term Mine Reconnaissance System (LMRS). The LMRS employs a self-propelled underwater vehicle equipped with forward-looking search sonar and side-looking classification sonar. The forward-looking sonar is used to detect underwater objects, while the side-looking sonar provides information used to classify any detected objects.

Under the proposed activities, mine neutralization training events would be conducted at the locations shown in Table 1-7. Under the proposed activities, the Navy also would establish a new Shallow Water Minefield near Tanner Bank, which also would support mine neutralization training. The proposed Shallow Water Minefield is described in Section 1.3.1.3.

1.4.1.2 Force Structure Changes

SOCAL Range Complex is required to accommodate and support training with new ships, aircraft, and vehicles as they become operational in the Fleet. In addition, SOCAL Range Complex is required to support training with new weapons and sensor systems. The Navy has identified several future platforms and weapons and sensor systems that are in development and likely will be incorporated into the Navy and Marine Corps training requirement within the 10-year planning horizon. Several of these new technologies are in early stages of development, and thus specific concepts of operations, operating parameters, or training requirements are not available.

Specific force structure changes within SOCAL Range Complex are based on the Navy's knowledge of future requirements for the use of new platforms and weapons systems and based on the level of information available to evaluate potential environmental impacts. Therefore, this CD, to the extent feasible, evaluates potential effects associated with training to be conducted upon the introduction of the platforms and weapons and sensor systems identified in this section.

1.4.1.2.1 New Platforms/Vehicles

The descriptions that follow of new platforms and vehicles are provided for information only. This CD addresses only training and test activities in SOCAL Range Complex, which may involve these new platforms. Basing issues such as personnel, facilities, maintenance, and logistics ashore are outside the scope of this CD.

Aircraft Carrier USS CARL VINSON

The Navy has announced that, in early 2010, it proposes to homeport a third aircraft carrier, USS CARL VINSON (CVN 70), on the west coast, with a preferred location in San Diego.

Littoral Combat Ship (LCS)

The LCS is a surface combatant ship designed to operate in littoral (shallow/nearshore) waters. The LCS would operate with CSGs and SSGs, in groups of other similar ships, or independently, for diplomatic and presence missions. The LCS also could operate cooperatively with the U.S. Coast Guard and allies. The primary missions of the LCS will include ASW, ASUW, and MIW. The Navy will base the first four LCS ships in San Diego.

MV-22 Osprey

The MV-22 is a tilt-rotor, vertical/short takeoff and landing (V/STOL), multi-mission aircraft developed to replace current Marine Corps medium-lift assault helicopters (CH-46E and CH-53D). It is designed for combat and combat support roles worldwide. The ability to rapidly self-deploy and quickly fly substantial distances provides a rapid response to crisis situations, and will extend the operational reach of ship-to-objective-maneuvers and sustained operations ashore. Transition to the MV-22 began in 2006, and two Marine Corps helicopter squadrons per year will transition to the MV-22. At present, no MV-22 squadrons regularly use SOCAL Range Complex; however, future training activities in SOCAL Range Complex will involve the MV-22.

EA-18G Growler

The EA-18G Growler is an electronic combat version of the FA-18 E/F designed to replace the EA-6B Prowler. The Growler will have an integrated suite of advanced EC and communications systems. It is scheduled for introduction to the Fleet in 2009. The Growler combines the capabilities of the FA-18 E/F strike aircraft with enhanced EC systems.

MH-60R/S Seahawk Multi-Mission Helicopter

The MH-60R/S Seahawk Multi-mission Helicopter will replace existing SH-60B and SH-60F helicopters. Primary missions include troop transport, vertical replenishment (supply of seaborne vessels by helicopter), and MIW. These aircraft will feature advanced sensors and weapons systems, including new OAMCM systems.

P-8 Multimission Maritime Aircraft

The P-8 is a multi-mission variant of the Boeing 737-800 airframe, designed to conduct ASW, ASUW, and EC missions. A replacement for the P-3 Orion ASW patrol aircraft, the P8 will carry an array of sensors and weapons systems, including sonobuoys, torpedoes, anti-ship missiles, and other weapons and systems. This class of aircraft is expected to be introduced to the Fleet after 2012.

LPD 17 San Antonio Class Amphibious Assault Ship

The LPD 17 *San Antonio* Class of amphibious transport dock ships will replace four classes of amphibious ships now in use. It is designed to accommodate all three elements of the Marine Corps' "mobility triad," the new tilt-rotor MV-22 Osprey aircraft, the expeditionary fighting vehicle (EFV), and the landing craft air cushion (LCAC). It is designed to support embarking, transporting, and landing elements of a Marine landing force in an assault by helicopters, landing craft, or amphibious vehicles, or by a combination of these methods, to conduct primary amphibious warfare missions. USS SAN ANTONIO was commissioned in 2006.

DDG 1000 Zumwalt Class Destroyer

The DDG-1000 Zumwalt is the lead ship in a class of next-generation, multi-mission surface combatants tailored for land attack and littoral dominance, with capabilities designed to defeat current and projected threats and to improve Strike Group defense. This class of ship is expected to be introduced to the Fleet after 2012.

1.4.1.2.2 New Weapons Systems

Training in use of MCM systems being introduced into the Navy inventory are addressed in this CD. These systems include helicopter-deployed OAMCM systems (AN/AQS-20 Mine Hunting System, ALMDS; AMNS, OASIS, and RAMICS); shipboard MCM systems (RMS); and submarine-deployed MCM systems. These systems are described in Section 2.2.6.2.

1.4.1.3 SOCAL Range Complex Enhancements

The Navy has identified specific investments and recommendations to optimize range capabilities required to adequately support training for all missions and roles assigned to SOCAL Range Complex. Investment recommendations were based on capability shortfalls (or gaps) (see Section 1.3.3), and were assessed using the Navy and Marine Corps Range Required Capabilities Document. Proposed enhancements for SOCAL Range Complex are discussed below and analyzed in this CD.

1.4.1.3.1 Commercial Air Services Increase

Commercial Air Services are services provided by non-military aircraft in contracted support of military training activities; examples of support include air refueling, target towing, and simulation of threat aircraft. Under the proposed activities, an increase in Commercial Air Services would be implemented. To provide the required training for CSGs and ESGs, a corresponding increase in Commercial Air Services acting as OPFOR would be required. This enhancement would increase the number of supersonic and subsonic aircraft within SOCAL Range Complex. The increase is necessary to mitigate for the loss of Fleet aircraft funding and to meet Navy OPFOR requirements for training events.

Navy records documented a total of 1,072 Air Combat Maneuvering (ACM) operations in SOCAL Range Complex during Fiscal Year (FY) 2003. ACM skills are perishable, and need to be practiced often to maintain the degree of proficiency expected of frontline forces. Most ACM is practiced between aircraft of the same type (e.g. F/A-18 vs. F/A-18). A subset of ACM is Dissimilar Air Combat Training (DACT). As the name implies, DACT means practicing ACM against aircraft of different types. Most of the world's air forces are composed of non-U.S. built aircraft whose capabilities and limitations differ greatly from their U.S. counterparts. The ability to recognize the adversary's capabilities, adapt one's tactics, and overcome the opponent during the intensity of air combat is essential to the survival of any fighter pilot. Due to the current U.S. basing structure, the loss of fleet aircraft funding, the capabilities commonality among U.S. fighter aircraft, and geographical distances between bases of different fighter aircraft, DACT for U.S. fighters is extremely limited, and almost non-existent against non-U.S. type aircraft. Under the proposed activities, the investment to increase Commercial Air Services would meet this deficiency. Five dedicated OPFOR aircraft are required for daily activities. This would result in an overall increase in ACM activities of 20 percent (1,286 operations). This estimate is based upon several considerations: 1) current training trends placing an emphasis on precision strike missions (bomb dropping); 2) the Fleet Response Plan (FRP) for six west coast CSGs; and 3) the acknowledgement that a percentage of ACM activities would be a one-for-one swap between an active duty aircraft and an OPFOR aircraft.

1.4.1.3.2 Shallow Water Minefield

As a result of the risk to Navy vessels from moored mines, Congress has required the Navy to develop a MCM master plan, and sought assurance from the Secretary of Defense and the Chairman of the Joint Chiefs of Staff that the plan would be adequately funded and meet military requirements. Consequently, the Navy has a need to expand its use of the two existing shallow water minefields in support of MCM training, and develop two additional training minefields in SOCAL. Currently, the Navy conducts Small Object Avoidance training in two existing ranges:

the Kingfisher Range off SCI and the ARPA Training Minefield off La Jolla. Small Object Avoidance operations have three objectives: (1) mine detection and avoidance; (2) navigation and reporting; and (3) in the future, more advanced, safe multiple avoidance training by finding a "safe route" through the minefield. Military personnel use onboard sonar to search for, detect, and avoid mine-like shapes; in the future, remote off-board systems will be used (see RMS discussion below).

Currently, the Navy utilizes two areas for unit level Small Object Avoidance training: the Kingfisher range off San Clemente Island and the ARPA Training Minefield off La Jolla. Used since 1996, the Kingfisher Range is a one by two nautical mile area northwest of Eel Point, approximately one nautical mile off shore. There are more that a dozen "mine-like" shapes moored to the ocean bottom by cables and coming within 50 feet of the surface. U.S. ship participants consist of CGs, DDs, DDGs, and FFGs equipped with AN/SQS-53 and AN/SQS-56 active sonar. In the future, Kingfisher would support MH-60S training using AN/AQS-20 dipping sonar.

The ARPA off La Jolla has historically been used for shallow water submarine and UUV Small Object Avoidance and MCM training, and is the desired location for expanding mine avoidance and MCM training. ARPA supports the shallow water minefield submarine MCM training requirement for a depth of 250-420 feet, and a sandy bottom and flat contour in an area relatively free from high swells and waves. Mine shapes are approximately 500-700 yards apart and 30-35 inches in size, and consist of a mix of recoverable/replaceable bottom shapes (~10 cylinders weighed down with cement) and moored shapes (~15 shapes, no bottom drilling required for mooring). Shapes typically need maintenance or cleaning every two years.

Use of the shallow water minefield would be expanded from its current use by submarines and UUV to include surface ships and helicopters. Ships, submarines, UUVs, and aircraft would continue to operate a mix of mid to high frequency navigation/mine detecting sonar systems that are either platform based or remotely operated. Once located, mine neutralization of permanent shapes by explosive shaped-charge, ordnance or removal would be by simulation only. Typical submarine usage would vary between 5-10 training operations per year, lasting up to 8 hours per day for a two day event. Training would occur at both basic and advanced levels and in accordance with the tactical Weapons Certification Program. Surface vessel Organic Mine Countermeasures training usage would utilize the new RMS. The RMS is an unmanned, semi-submersible vehicle that will be deployed from both the DDG-51 Class and the LCS.

The Navy proposes to establish an offshore shallow water minefield on Tanner Banks. The training area would be approximately 2 by 3 nm in size. Mines would be placed on the ocean floor, with a total of 15 mine shapes in three rows of five. This offshore field would be utilized by surface ships deploying the RMS to detect, classify and localize underwater mines. The RMS is launched and recovered by the host ship using a davit system. After deployment, the host DDG will stand off while the RMS enters the target zone to perform reconnaissance for bottom-laid mines. An area search is conducted following an operator-programmed search pattern. The RMS searches using low-power (<85dB) acoustic sonar, towed by the UUV itself. Upon detecting a mine, the unit will localize and photograph the object for classification, and then continue on its programmed search. RF communications between the RMS and host ship provide for data telemetry. When the search portion of the mission is completed, the RMS will proceed to a programmed location for recovery. A typical RMS training mission will last for approximately 8 hrs.

The Navy also proposes to establish a shallow water minefield off the southern end of SCI to support MIW training requirements in shallow water. MIW training MH-60S helicopters and M-Class ships. MH-60S helicopters include an OAMCM package that requires a shallow water range (40-150') for deploying recoverable shapes and live ordnance usage. Two of the five MCM systems would be deployed in this shallow water minefield: ALMDS for detecting and RAMICS for neutralizing submerged and moored mines: ALMDS is capable of detecting, locating and classifying floating and shallow water mines. RAMICS provides helicopters with the capability of neutralizing bottom-moored and close-tethered mines. For the MH-60S, shallow water minefield operations are anticipated to reach 680 training operations per year, typically lasting less than 4-hours per operation.

Once installed, the mine shapes would remain in place; however, if in the future the Navy no longer has a requirement for MCM training or no longer uses the Shallow Water Minefield for training, then the Navy will comply with applicable federal environmental planning and regulatory requirements pertaining to the disposition of these facilities.

1.4.1.3.3 West Coast Shallow Water Training Range

In 1999, the Navy formally identified the requirement for a SWTR on the west coast of the U.S. This requirement, validated in an Operational Requirements Document (DoN 1999), identifies criteria for the SWTR. These criteria include:

- Shallow water depth criteria;
- Located within existing OPAREA and beneath SUA;
- Capability to interface with air and surface tracking systems to permit multi-dimensional training;
- Availability of range infrastructure, logistics support, and exercise control services;
- Located near a current deep-water range to support related training and maximize training efficiency
- Seamless tracking of exercise participants moving between existing deep water range and SWTR; and
- Proximity to Fleet homeports and air stations to facilitate access by training units and management of personnel tempo.

Multiple site options for establishing the SWTR were considered, including sites in the Hawaii Range Complex and Northwest Training Range Complex. The Navy determined that SOCAL OPAREAs, near SCI and the existing SOAR range, is the most suitable location for the SWTR (see Figure 1-15). This location provides the necessary shallow water training environment, is readily accessible to Fleet units in San Diego, maximizes use of existing training support structure, including communications infrastructure and logistics support services, and otherwise maximizes training and support efficiencies.

The SWTR component of the proposed activities would provide underwater instrumentation for two additional areas of the current SOAR, one 250-nm^2 (463-km^2) area to the west of the already instrumented (deep water) section, in the area of Tanner/Cortes Banks, and one 250-nm^2 (463-km^2) area between the deep water section and the southern section of SCI (Figure 1-15). If installed in these areas, the SWTR would increase the use of these areas for ASW training with MFAS.

The proposed instrumentation would consist of undersea cables and sensor nodes, similar to instrumentation currently in place in SOAR. The new areas would form an integral SWTR capability for SOAR. The combination of deep water and shallow water instrumentation would support a seamless tracking interface from deep to shallow water, which is an essential element of effective ASW training. The instrumented area would be connected to shore via multiple trunk cables.

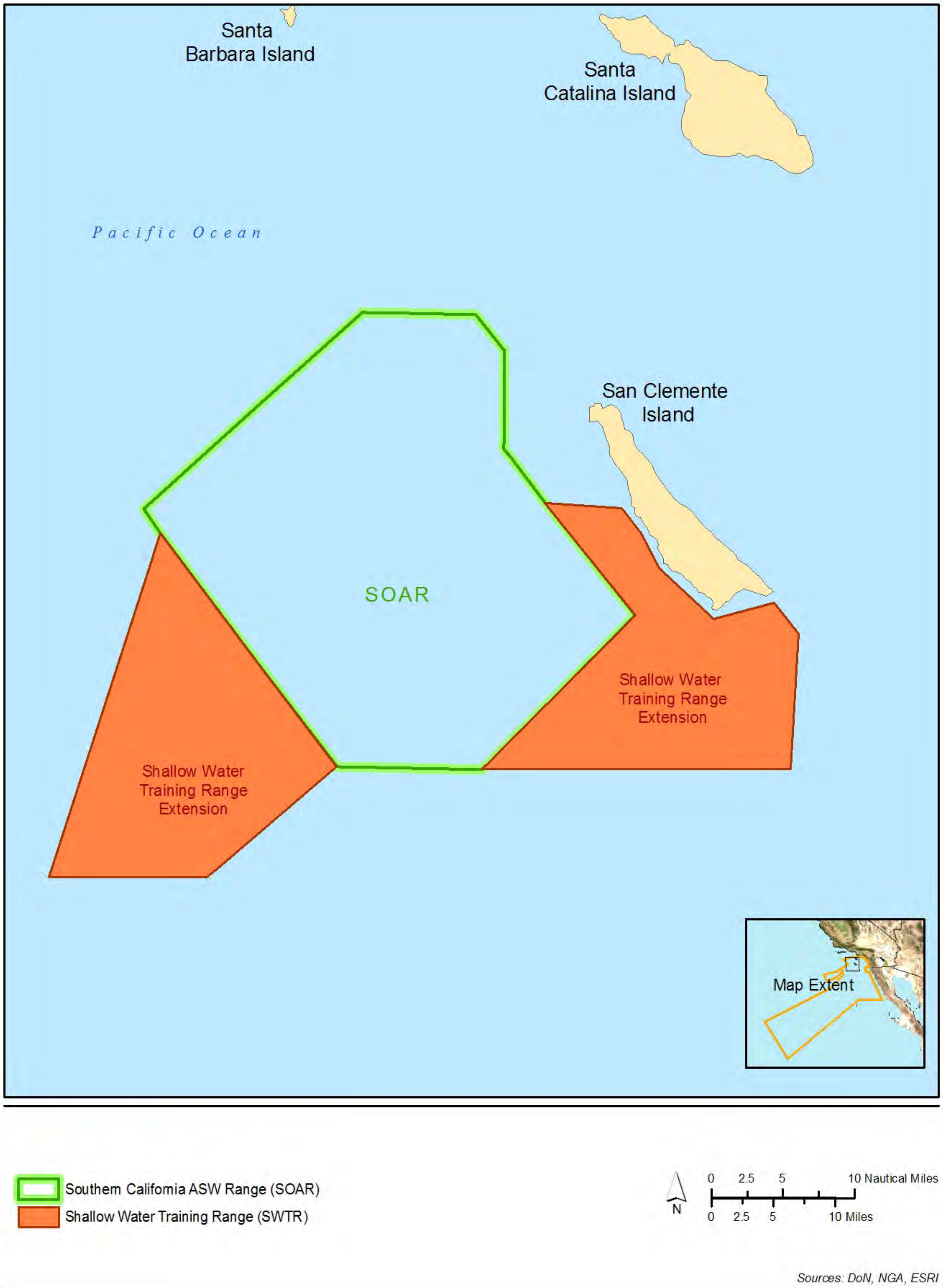

Figure 1-15: Proposed Location of Shallow Water Training Range Extensions of the SOAR

The SWTR instrumentation would be an undersea cables system integrated with hydrophone and underwater telephone sensors, called nodes, connected to each other and then connected by up to 8 trunk cable(s) to a land-based facility where the collected range data are used to evaluate the performance of participants in shallow water (120 ft - 600 ft deep) training exercises. The basic proposed features of the instrumentation and construction follow.

The transducer nodes are capable of both transmitting and receiving acoustic signals from ships operating within the instrumented areas of SOAR (a transducer is an instrument that converts one form of energy into another [in this case, underwater sound into an electrical signal or vice-versa]). Some nodes are configured to support only receiving signals, some can both transmit and receive, and others are transmit-only versions. The acoustic signals that are sent from the exercise participants (e.g. submarines, torpedoes, ships) to the receive-capable range nodes allow the position of the participants to be determined and stored electronically for both real-time and future evaluation. The transmit-capable nodes allow communication from the range to ships or other devices that are being tracked. More specifically:

> The SWTR extension would consist of no more than 500 sensor nodes spread on the ocean floor over 500 nm^2. The distance between nodes would vary between 0.5 nm and 3 nm, depending on water depth. Sensor nodes would be similar in construction to existing SOAR instrumentation. The sensor nodes are small spherical shapes <6 inches in diameter. The sensors would be either suspended up to 15 ft (4.5 m) in the water column or laid flat on the sea floor. An additional protective device would surround or overlay a sensor node located in shallow water in areas of commercial fishing activity. These protective devices would be 3-4 ft (1 m) round or rectangular with a shallow height. The final physical characteristics of the sensor nodes would be determined based upon local geographic conditions, and would accommodate man-made threats such as fishing activity. Sensor nodes would be connected to each other by standard submarine telecommunications cables with diameters less than 1 inch. Approximately 900 nm of interconnecting cables would be deployed.

Sensor nodes would be connected by cables to rectangular underwater junction boxes located at diver-accessible water depths; junction box dimensions would be 10-15 ft (3-4.5 m) on a side. The junction boxes would connect to a shore-based facility by trunk cables (submarine cables up to 2 inches in diameter with additional data capacity). Trunk cables eliminate the need for numerous interconnect cables running to the shore. Up to eight trunk cables would be used, with a combined length of 375 nm. Trunk cables would be protected in shore areas by directionally drilled horizontal pipes running beneath the surface of the shoreline.

- The cables would be deployed using a ship up to 300 ft (91 m) long. Trunk cables would be routed through deep water as much as is possible. Trunk cables deployed in shallow water may need to be buried. Burial equipment would cut (hard bottom) or plow (soft sediment) a furrow 4 inches (10 cm) wide by up to 36 inches deep. Burial equipment (tracked vehicle or towed plow) would be deployed from a ship. The trunk cable, which passes through the sea-shore area, would terminate at the Navy's existing cable termination facility at West Cove. From there, information gathered on the SWTR would be transmitted via an existing microwave data link to the Navy's Range Operations Center on Naval Air Station North Island. The adjacent SOAR has a single junction box located outside the nearshore area, and places the trunk cable in a horizontally directionally drilled bore that terminates on shore. The size of the SWTR may require up to 8 junction boxes and 8 trunk cables. Multiple horizontal bores are in the SOAR. Every effort would be made to use any excess bore capacity available in the SOAR.

- The in-water instrumentation system would be structured to achieve a long operating life, with a goal of 20 years and with a minimum of maintenance and repair throughout the life-cycle. This is desirable due to the high cost of at-sea repairs on transducer nodes and cables; the long lead-time to plan, permit, fund and conduct such repairs (6-18 months); and the loss of range capability while awaiting completion. The long operational life would be achieved by using high-quality components, proven designs, and multiple levels of redundancy in the system design. This includes back-up capacity for key electronic components and fault tolerance to the loss of individual sensors, or even an entire sensor string. The use of materials capable of withstanding long-term exposure to high water pressure and salt water-induced corrosion is also important. Periodic inspection and maintenance in accessible areas also extends system life.

Southern California Offshore Range would submit cable area coordinates to the National Geospatial Intelligence Agency and request that the combined SWTR/SOAR area be noted on charts within the appropriate warning area. This area would be noted in the U.S. Coast Pilot as a Military Operating Area, as are other areas on the West Coast. The Navy will promulgate a Notice to Mariners (NOTMAR) or a Notice to Airmen (NOTAM) within 72 hours of the training activities, as appropriate.

If in the future the Navy no longer has a requirement for ASW training or no longer uses the SWTR for training, then the Navy will comply with applicable federal environmental planning and regulatory requirements pertaining to the disposition of these facilities.

1.4.2 Distribution of Training and Testing Activities

The proposed activities includes approximately 53 types of Navy at-sea and SCI training and test activities in 10 major warfare areas that occur in the SOCAL Range Complex, both inside and outside the CZ. Table 1-9 describes their distribution, relative to the CZ.

The distribution of activities presented in Table 1-9 is based in part on general information on the ranges or OPAREAs used for the activity (e.g., ACM activities occur in W-291 and small arms training occurs at land ranges on SCI) and in part on additional location information presented in the Operations Data Book that was developed to support the SOCAL Range Complex Draft EIS/OEIS (DoN 2008). In Section 2, the potential for these activities to have a reasonably foreseeable effect on CZ uses or resources will be evaluated.

Table 1-9: Geographical Distribution of Training and RDT&E Activities

TRAINING AND TEST ACTIVITIES		DISTRIBUTION	
		In CZ?	Discussion
TRAINING			
AAW*	Aircraft Combat Maneuvers (1)	NO	> 3 miles from coast, +5,000 ft AGL
	Air Defense Exercise (2)	NO	> 3 miles from coast
	Surface-to-Air Missile Exercise (3)	YES	Missile could fly through CZ
	Surface-to-Air Gunnery Exercise (4)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	Air-to-Air Missile Exercise (5)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
ASW*	Helicopter ASW TRACKEX/TORPEX (6,7)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	MPA ASW TRACKEX/TORPEX (8,9)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	Surface Ship ASW TRACKEX/TORPEX (11,12)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	Extended Echo Ranging (EER) Operations (Integrated ASW Course II) (10)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	Submarine ASW TRACKEX/TORPEX (13,14)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
ASUW*	Visit Board Search and Seizure (15)	YES	Nearshore and beyond 3 miles from coast
	Air-to-Surface Missile Exercise (16)	YES	Nearshore and beyond 3 miles from coast
	Air-to-Surface Bombing Exercise (17)	YES	Nearshore and beyond 3 miles from coast
	Air-to-Surface Gunnery Exercise (18)	YES	Nearshore and beyond 3 miles from coast
	Surface-to-Surface Gunnery Exercise (19)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	Sink Exercise (20)	NO	> 50 nm from coast
AMW*	Naval Surface Fire Support (21)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	Expeditionary Fires Exercise (22)	YES	Beyond CZ, in CZ, and ashore
	Battalion Landing (23)	YES	Beyond CZ, in CZ, and ashore
	USMC Stinger Firing Exercise (24)	YES	Targets are fired on in the CZ
	Amphibious Landings and Raids (25)	YES	Personnel and vessels pass through CZ
	Amphibious Operations - CPAAA (26)	YES	All activities in CZ
EC*	Electronic Combat Exercises (27)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
MIW*	Mine Countermeasures (28)	YES	Mostly CZ / nearshore; some open ocean
	Mine Neutralization (29)	YES	Mostly CZ / nearshore; some open ocean
	Mine Laying Exercise (30)	YES	Evenly distributed inside/outside of CZ
NSW*	NSW Land Demolition (31)	NO	All activities on SCI (federally controlled)
	Underwater Demolition - Single Charge (32)	YES	All activities in CZ
	Underwater Demolition - Multiple Charges (33)	YES	All activities in CZ
	Marksmanship - Small Arms Training (34)	NO	All activities on SCI (federally controlled)
	Land Navigation (35)	NO	All activities on SCI (federally controlled)
	NSW UAV Operations (36)	NO	All activities on/above SCI (federally controlled land)
	Insertion/Extraction (37)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast

Table 1-9: Geographical Distribution of Training and RDT&E Activities (continued)

TRAINING AND TEST ACTIVITIES		DISTRIBUTION	
		In CZ?	Discussion
TRAINING			
NSW*	NSW Boat Operations (38)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	NSW SEAL Platoon Operations (39)	YES	All activities in CZ or on SCI
	NSW Direct Action (40)	YES	All activities in CZ or on SCI
STW*	BOMBEX - Land (41)	NO	All activities on SCI
	Combat Search & Rescue (42)	YES	Mostly SCI / and nearshore in CZ; and greater than 3 miles from coast
Other	Explosive Ordnance Disposal (43)	NO	All activities on SCI
	USCG Operations (44)	YES	Evenly distributed inside/outside of CZ
	NALF Activities (45)	NO	On SCI, inbound/outbound traffic over CZ
RDT&E*	Ship Torpedo Tests (46)	YES	Some nearshore in CZ but mostly beyond 3 miles from coast
	Unmanned Underwater Vehicles (47)	YES	All activities in CZ
	Sonobuoy QA/QC Testing (48)	YES	Evenly distributed inside/outside of CZ
	Ocean Engineering (49)	YES	All activities in CZ
	Marine Mammal Mine Shape Location/Research (50)	YES	All activities in CZ
	Missile Flight Tests (51)	YES	Missile could fly through CZ
	NUWC Underwater Acoustics Testing (52)	YES	Evenly distributed inside/outside of CZ

NOTES: AAW - Anti-Air Warfare; ASW - Anti-Submarine Warfare; ASUW - Anti-Surface Warfare; AMW - Amphibious Warfare; EC - Electronic Combat; MIW - Mine Interdiction Warfare; NSW - Naval Special Warfare; STW - Strike Warfare; RDT&E - Research, Development, Test, and Evaluation.

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2 PROPOSED ACTIVITY AREAS AND ACTIVITIES SUBJECT TO CONSISTENCY REVIEW

2.1 COASTAL ZONE CONSISTENCY CONSIDERATIONS

2.1.1 Coastal Zone Definition

The implementing regulations of the Coastal Zone Management Act (CZMA) and the enforceable policies of the California Coastal Zone Management Program (CZMP), as defined in the California Coastal Act (CCA), Chapter 3 (California Public Resources Code, Sections [§] 30200 - 30260) apply to coastal zone (CZ) uses and resources, and to activities conducted within or outside of the CZ that have a reasonably foreseeable effect on them. As defined in Section 307 of the CCA (16 U.S. Code § 1456), the term "coastal zone" does not include "lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government" 16 U.S.C. § 1453(1). Lands that are wholly owned and operated by the Navy and over which it has exclusive control, such as San Clemente Island (SCI), are excluded from the CZ. The proposed activities do not include activities on any land areas except on SCI. All components of the proposed activities were considered in identifying those training and test activities for which CZ effects are reasonably foreseeable.

2.1.2 Portions of the Coastal Zone Located Within SOCAL Range Complex

Southern California (SOCAL) Range Complex encompasses several portions of the CZ in southern California. The CZ portions of SOCAL Range Complex include the waters within 3 nautical miles (nm) of the coasts of San Diego County and of Orange County south of Dana Point. They also include the waters within 3 miles of the coasts of SCI, Santa Barbara Island (SBI), San Nicolas Island (SNI), and Santa Catalina Island (Catalina). References to the CZ in the text generally apply to all portions of the CZ within SOCAL Range Complex unless one or more of these sub-areas are specifically identified. The proposed activities do not occur on any land areas except on SCI.

2.2 PROPOSED ACTIVITY ELEMENTS AFFECTING THE COASTAL ZONE

Proposed activities must be evaluated for consistency with enforceable State of California (State) CZ policies if they have reasonably foreseeable effects on CZ uses or resources. Thus, elements of the proposed activities must first be examined to determine whether they have reasonably foreseeable effects before determining whether those effects, if any, are consistent with the State's enforceable policies. This effects analysis is presented below. Those proposed activities elements that have reasonably foreseeable effects on CZ uses or resources are addressed in the consistency determination in Section 3. CZ resources include both resources permanently located in the CZ (e.g., benthic organisms) and mobile resources (e.g., dolphins and seals) that typically move into and out of the CZ as part of a natural cycle. Actions that affect a resource while it is outside of the CZ such that effects are felt later in the CZ are considered to be reasonably foreseeable effects on coastal resources. Actions that temporarily affect a resource while it is outside of the CZ (e.g., temporary behavioral effects on a marine mammal that National Marine Fisheries Services (NMFS) may classify as harassment) such that the effects on the resource are not felt within the CZ, are not considered to be reasonably foreseeable effects on coastal resources. See Preamble to December 8, 2000 CZMA Federal Consistency Regulations Final Rule, Federal Register Volume 65, Number 237, page 77130

Thirty-three of the 53 activities included as elements of the proposed activities could take place in the CZ. The Shallow Water Minefield would be located in the CZ and a portion of the Shallow Water Training Range (SWTR) Expansion would be located in the CZ. Table 1-10 lists training and test activities in the CZ and Table 1-7 lists the ranges or OPAREAs where they occur. The foreseeable effects of proposed activities in the CZ are described below by major warfare area.

The discussion below is not intended to be a complete description of the exercise (detailed exercise descriptions are provided in Appendix A), but rather a discussion of whether the elements of the exercise have a reasonably foreseeable effect on CZ uses or resources.

2.2.1 Anti-Air Warfare (AAW)

AAW includes Air Combat Maneuvers (ACM), Air Defense Exercises (ADEX), Surface-to-Air (S-A) and Air-to-Air (A-A) Missile Exercises (MISSILEXs), and S-A Gunnery Exercises (GUNEXs). All AAW activities occur in W-291, the eastern boundary of which lies 12 nm off the mainland California coast, 9 nm beyond the 3 mile limit of the CZ along the mainland coast. Some of these activities would occur, however, in the portion of the CZ surrounding SCI.

2.2.1.1 Air Combat Maneuver (ACM)

ACM occurs in Special Use Airspace (SUA), the floor of which is 5,000 feet (ft) above ground level (agl). Thus, while some aircraft involved in ACM may overfly that portion of the CZ surrounding SCI, these activities occur at high altitudes, are very transitory, and are dispersed over large areas, such that their effects on their immediate surroundings are minimal; no effects would occur in the CZ. At the altitudes at which these activities would occur, bird-aircraft strikes are not a hazard (birds, especially shorebirds and seabirds, typically fly close to the surface); CZ resources and uses would not be affected. ACM activities have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.1.2 Air Defense Exercise (ADEX)

ADEX involves no expenditure of ordnance; it consists of aircraft and vessel movements outside of the CZ. Aircraft involved in ADEXs may overfly that portion of the CZ surrounding SCI; effects of these activities would be as described above for aircraft flyovers during ACM. ADEXs would have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.1.3 Surface-to-Air Missile Exercise (S-A MISSILEX)

In a S-A MISSILEX, one live or practice surface-to-air missile is fired at a towed aerial target or BQM-74. Intact targets are recovered at the conclusion of the exercise. West Cove waters must be temporarily cleared of vessels when BQM-74 targets are used.

Expended missiles and targets fall to the ocean's surface and sink to the ocean bottom, and thus are contained within W-291. Residual amounts of liquid propellants disperse quickly due to wave action and currents. Because of their relatively small quantities and the large volume of water into which they disperse, the concentrations of these materials outside of the immediate area of impact are very low. Residual amounts of solid propellants and explosives, if any, settle to the ocean bottom along with other expended training materials.

Missiles and targets are composed mostly of relatively inert materials such as steel, aluminum, and plastic. These unreactive materials degrade slowly, if at all, in the dark, cold, low-oxygen environment generally found on the ocean bottom. Corrosion of the exterior surfaces of metallic items typically creates a relatively insoluble surface layer that greatly slows further corrosion. Interior components generally are not in direct contact with the surrounding seawater, greatly limiting their rate of dissolution or leaching. Plastic parts may be abraded by bottom sediments or cracked or broken by internal stresses or exterior mechanical damage.

The expended items eventually become buried in sediment or encrusted with benthic organisms. These processes further insulate the expended training materials from the exterior environment, substantially limiting physical damage to the items and establishing a steep gradient for leaching or dispersion of substances from the training items. Benthic organisms may absorb leached substances and organic and inorganic compounds in benthic sediments may form chemical complexes with leached substances, slowing or preventing their release into the larger marine environment. For the reasons outlined above, any individual releases of potentially hazardous substances into the marine environment would initially be very small, and the release rate would tend to decline over time.

Thus, S-A MISSILEXs in W-291 have no reasonably foreseeable effects on CZ resources, but could have a reasonably foreseeable effect on CZ uses for short periods in the West Cove area, and will be evaluated for consistency with enforceable CZ policies in Section 3.

2.2.1.4 Surface-to-Air Gunnery Exercise (S-A GUNEX)

In a S-A GUNEX, ship's guns are fired at towed aerial targets. Intact targets are recovered at the conclusion of the exercise. Expended ordnance and target materials fall to the ocean's surface and sink to the ocean bottom, and thus are contained within W-291.

Naval gun rounds and target materials are composed mostly of relatively inert materials such as steel, aluminum, and plastic. These unreactive materials degrade slowly, if at all, in the dark, cold, low-oxygen environment generally found on the ocean bottom. Corrosion of the exterior surfaces of metallic items typically creates a relatively insoluble surface layer that greatly slows further corrosion. Interior components generally are not in direct contact with the surrounding seawater, greatly limiting their rate of dissolution or leaching. Plastic parts may be abraded by bottom sediments or cracked or broken by internal stresses or exterior mechanical damage.

The expended items eventually become buried in sediment or encrusted with benthic organisms. These processes further insulate the expended training materials from the exterior environment, substantially limiting physical damage to the items and establishing a steep gradient for leaching or dispersion of substances from the training items. Benthic organisms may absorb leached substances and organic and inorganic compounds in benthic sediments may form chemical complexes with leached substances, slowing or preventing their release into the larger marine environment. For the reasons outlined above, any individual releases of potentially hazardous substances into the marine environment would initially be very small, and the release rate would tend to decline over time.

The potential for a S-A GUNEX to affect a marine animal is very low. Vessels orient the geometry of gunnery exercises to prevent expended materials from falling near sighted marine mammals, sea turtles, and floating kelp. Vessels expedite the recovery of parachutes deploying aerial targets to reduce the potential for entanglement of marine mammals and sea turtles. Target-towing aircraft maintain a lookout. If a marine mammal or sea turtle is sighted near the exercise, the tow aircraft notifies the firing vessel to secure gunnery firing until the area is clear. With these measures, S-A GUNEXs have no effect on sea turtles or marine mammals.

The Navy does not require exclusive control over any portion of the CZ to conduct these exercises. S-A GUNEXs thus have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.1.5 Air-to-Air Missile Exercise (A-A MISSILEX)

A-A MISSILEXs occur in SUA at altitudes of 15,000 ft to 25,000 ft agl. Aircraft fire live or practice missiles at aerial targets. Any live missiles used in the exercise would detonate in the air at high altitudes. Therefore, explosions associated with A-A MISSILEX would have no effect on coastal resources. The environmental fate of expended missile and target materials is as described above for S-A MISSILEXs. While some aircraft involved in A-A MISSILEXs may overfly that portion of the CZ surrounding SCI; effects of these activities would be as described above for aircraft flyovers during ACM. A-A MISSILEXs have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.2 Anti-Submarine Warfare (ASW)

2.2.2.1 TRACKEXs and TORPEXS

Anti-Submarine Warfare (ASW) training activities include Helicopter, Maritime Patrol Aircraft (MPA), Surface Ship, and Submarine Tracking Exercises (TRACKEXs) and Torpedo Exercises (TORPEXs), as well as Extended Echo Ranging (EER) and Improved EER (IEER) activities.

ASW activities in or affecting the CZ consist primarily of TRACKEXs and TORPEXs conducted by helicopters, aircraft, surface ships, and submarines. None of these ASW activities would take place within 3 miles of the mainland coast. TRACKEXs and TORPEXs would occur, however, in those portions of the CZ within 3 miles of SCI, primarily on the Kingfisher range, the offshore portions of the Shore Bombardment Area (SHOBA), and the proposed SWTR (western portion between SOAR and SCI). MPA, helicopter, and surface ship TRACKEXs/TORPEXs generate airborne and underwater (mid-frequency active sonar [MFAS]) sound. While MFAS may periodically ensonify some portions of the CZ near SCI; the intensity of that sonar would depend on the distance between the source and a receptor, such as marine mammals. ASW sonar activities would require relatively infrequent periods of limited duration, so any sonar exposures would be of relatively short duration.

During TORPEXs, exercise torpedoes may be fired and torpedo launch accessories (guide wire, ballast, hose, etc) could be expended in the CZ; the environmental fate of these materials would be substantially similar to that described above for training materials expended during A-S MISSILEXs and S-A GUNEXs. During these events, recreational and commercial users could be temporarily excluded from the OPAREAs in which they take place. Thus, these activities could have reasonably foreseeable effects on CZ resources and uses, and will be evaluated for consistency with enforceable CZ policies in Section 3.

The Navy would take numerous steps to reduce the potential for adverse sonar exposures of marine mammals during ASW activities. All lookouts onboard platforms involved in ASW training events will review the NMFS-approved Marine Species Awareness Training material prior to use of mid-frequency active sonar. All COs, XOs, and officers standing watch on the bridge will review the Marine Species Awareness Training material prior to a training event employing the use of mid-frequency active sonar. Navy lookouts will undertake extensive training to qualify as a watchstander in accordance with the Lookout Training Handbook (Naval Educational Training [NAVEDTRA], 12968 series).

Lookout training will include on-the-job instruction under the supervision of a qualified, experienced watchstander. Following successful completion of this supervised training period, lookouts will complete the Personal Qualification Standard program, certifying that they have demonstrated the necessary skills (such as detection and reporting of partially submerged objects). Lookouts under the instruction of supervisors who monitor their progress and performance are considered legitimate watchstanders for meeting mitigation requirements. In order to facilitate implementation of mitigation measures if marine species are spotted, lookouts will be trained in the most effective means to ensure quick and effective communication within the command structure.

On the bridge of surface ships, there will always be at least three people on watch whose duties include observing the water surface around the vessel. All surface ships participating in ASW training events will, in addition to the three personnel on watch noted previously, have at all times during the exercise at least two additional personnel on watch as marine mammal lookouts. Personnel on lookout and officers on watch on the bridge will have at least one set of binoculars available for each person to aid in the detection of marine mammals. On surface vessels equipped with mid-frequency active sonar, pedestal mounted “Big Eye” (20x110) binoculars will be present and in good working order to assist in the detection of marine mammals in the vicinity of the vessel. Personnel on lookout will employ visual search procedures employing a scanning methodology in accordance with the Lookout Training Handbook (NAVEDTRA 12968 series). After sunset and prior to sunrise, lookouts will employ Night Lookouts Techniques in accordance with the Lookout Training Handbook. Personnel on lookout will be responsible for reporting all objects or anomalies sighted in the water (regardless of the distance from the vessel) to the Officer of the Deck, since any object or disturbance (e.g., trash, periscope, surface disturbance, discoloration) in the water may be indicative of a threat to the vessel and its crew or indicative of a marine species that may need to be avoided as warranted.

Official guidance will be given prior to the exercise to disseminate further the personnel training requirement and general marine mammal mitigation measures. COs will make use of marine species detection cues and information to limit interaction with marine species to the maximum extent possible consistent with safety of the ship. All personnel engaged in passive acoustic sonar operation (including aircraft, surface ships, or submarines) will monitor for marine mammal vocalizations and report the detection of any marine mammal to the appropriate watch station for dissemination and appropriate action. During mid-frequency active sonar operations, personnel will use all available sensor and optical systems (such as night vision goggles) to aid in the detection of marine mammals. Navy aircraft participating in exercises at sea will conduct and maintain, when operationally feasible and safe, surveillance for marine species of concern as long as it does not violate safety constraints or interfere with the accomplishment of primary operational duties. Aircraft with deployed sonobuoys will use only the passive capability of sonobuoys when marine mammals are detected within 200 yd (183 m) of the sonobuoy. Marine mammal detections will be immediately reported to assigned Aircraft Control Unit for further dissemination to ships in the vicinity of the marine species as appropriate where it is reasonable to conclude that the course of the ship will likely result in a closing of the distance to the detected marine mammal.

Safety Zones—When marine mammals are detected by any means (aircraft, shipboard lookout, or acoustically) within 1,000 yd (914 m) of the sonar dome (the bow), the ship or submarine will limit active transmission levels to at least 6 decibels (dB) below normal operating levels. (A 6 dB reduction equates to a 75 percent power reduction because decibel levels are on a logarithmic scale, not a linear scale.) Thus, a 6 dB reduction results in a power level only 25 percent of the original power. Ships and submarines will continue to limit maximum transmission levels by this 6-dB factor until the animal has been seen to leave the area, has not been detected for 30 minutes, or the vessel has transited more than 2,000 yd (1,829 m) beyond the location of the last detection.

Should a marine mammal be detected within or closing to inside 500 yd (457 m) of the sonar dome, active sonar transmissions will be limited to at least 10 dB below the equipment's normal operating level. (A 10 dB reduction equates to a 90 percent power reduction from normal operating levels.) Ships and submarines will continue to limit maximum ping levels by this 10-dB factor until the animal has been seen to leave the area, has not been detected for 30 minutes, or the vessel has transited more than 2,000 yd (457 m) beyond the location of the last detection.

Should the marine mammal be detected within or closing to inside 200 yd (183 m) of the sonar dome, active sonar transmissions will cease. Sonar will not resume until the animal has been seen to leave the area, has not been detected for 30 minutes, or the vessel has transited more than 2,000 yd (457 m) beyond the location of the last detection.

Special conditions apply to dolphins and porpoises. If, after conducting an initial maneuver to avoid close quarters with dolphins or porpoises, the Officer of the Day (OOD) concludes that dolphins or porpoises are deliberately closing to ride the vessel's bow wave, no further mitigation actions are necessary while the dolphins or porpoises continue to exhibit bow wave riding behavior.

If the need to power-down should arise, as detailed in “Safety Zones” above, the Navy shall follow the requirements as though they were operating at 235 dB—the normal operating level (i.e., the first power-down will be to 229 dB, regardless of at what level above 235 sonar was being operated). Prior to start up or restart of active sonar, operators will check that the Safety Zone radius around the sound source is clear of marine mammals.

Sonar levels (generally)— The Navy will operate sonar at the lowest practicable level, not to exceed 235 dB, except as required to meet tactical training objectives. Helicopters shall observe/survey the vicinity of an ASW training event for 10 minutes before the first deployment of active (dipping) sonar in the water. Helicopters shall not dip their sonar within 200 yd (183 m) of a marine mammal and shall cease pinging if a marine mammal closes within 200 yd (183 m) after pinging has begun. Submarine sonar operators will review detection indicators of close-aboard marine mammals prior to the commencement of ASW training events involving mid-frequency active sonar. Navy personnel will exercise increased vigilance during ASW training events with tactical active sonar when critical conditions are present.

Based on lessons learned from strandings in Bahamas 2000, Madeiras 2000, Canaries 2002 and Spain 2006, the presence of beaked whales in combination with other conditions are of particular concern because certain beaked whale strandings have been associated with mid-frequency active sonar operations. The Navy will avoid planning Major ASW Training Exercises with mid-frequency active sonar in areas where they will encounter conditions which, in their aggregate, may contribute to a marine mammal stranding event. (Note, however, that these conditions do not exist in the aggregate in the SOCAL Range Complex; they are presented here only for the purpose of providing a complete discussion.)

The conditions to be considered during exercise planning include:

- Areas of at least 1,000-m depth near a shoreline where there is a rapid change in bathymetry on the order of 1,000-6,000 yd (914-5,486 m) occurring across a relatively short horizontal distance (e.g., 5 nautical miles [nm]).
- Cases for which multiple ships or submarines (≥ 3) operating mid-frequency active sonar in the same area over extended periods (≥ 6 hours) in proximity (≤ 10 nm apart).
- An area surrounded by land masses, separated by less than 35 nm and at least 10 nm in length, or an embayment, wherein activities involving multiple ships/subs (≥ 3) employing mid-frequency active sonar near land may produce sound directed toward the channel or embayment that may cut off the lines of egress for marine mammals.
- Though not as dominant a condition as bathymetric features, the historical presence of a significant surface duct (i.e., a mixed layer of constant water temperature extending from the sea surface to 100 or more ft).

If a Major Range Event is to occur in an area where the above conditions exist in their aggregate, then these conditions must be fully analyzed in environmental planning documentation. The Navy will increase vigilance by undertaking the following additional mitigation measures:

- A dedicated aircraft (Navy asset or contracted aircraft) will undertake reconnaissance of the embayment or channel ahead of the exercise participants to detect marine mammals that may be in the area exposed to active sonar. Where practical, advance survey should occur within about 2 hours prior to mid-frequency active sonar use and periodic surveillance should continue for the duration of the exercise. Any unusual conditions (e.g., presence of sensitive species, groups of species milling out of habitat, and any stranded animals) shall be reported to the Officer in Tactical Command, who should give consideration to delaying, suspending, or altering the exercise.

- All safety zone power down requirements described above will apply.
- The post-exercise report must include specific reference to any event conducted in areas where the above conditions exist, with exact location and time/duration of the event, and noting results of surveys conducted.

2.2.2.2 Extended Echo Ranging/Improved Extended Echo Ranging (EER/IEER Exercise)

EER/IEER exercises may occur anywhere in the SOCAL OPAREAs, including portions of the CZ near SCI. P-3 aircraft would drop explosive and non-explosive sonobuoys into the water, and the explosive sonobuoys, each armed with two 4.2-lb net explosive weight (n.e.w.) high-explosives charges, would be detonated. Byproducts of the detonations would be primarily non-toxic inorganic compounds that are common in the environment. During operation, sonobuoy seawater batteries would release small amounts of potentially hazardous substances, but trace concentrations of these substances would not affect seawater quality or biological productivity (DoN 2008). Expended sonobuoys would sink to the ocean bottom; their environmental fate would be substantially similar to that described above for S-A MISSILEXs and S-A GUNEXs.

Detonations associated with these exercises may injure or startle nearby fish, sea turtles, or marine mammals (DoN 2008). Sound from these detonations could affect marine biota at various distances from the source. The Navy would require exclusive use of the range for this exercise. These activities thus could have reasonably foreseeable effects on CZ resources (e.g., fish) and uses, and will be evaluated for consistency with enforceable CZ policies in Section 3.

Several measures would be implemented prior to the exercise to avoid effects on sea turtles and marine mammals. Crews would conduct a visual reconnaissance of the intended drop area prior to laying their intended sonobuoy pattern. This search will be conducted below 1,500 ft (457 m) at a slow speed, if operationally feasible and weather conditions permit. In dual aircraft operations, crews would conduct coordinated area clearances. Crews would conduct a minimum of 30 minutes of visual and aural monitoring of the search area prior to commanding the first post detonation. This 30-minute observation period may include pattern deployment time. For any part of the briefed pattern where a post (source/receiver sonobuoy pair) will be deployed within 1,000 yd (914 m) of observed marine mammal activity, only the receiver would be deployed and the crew would monitor it while conducting a visual search. When marine mammals were no longer detected within 1,000 yd (914 m) of the intended post position, the crew would co-locate the explosive source sonobuoy (AN/SSQ-110A) (source) with the receiver and proceed with the exercise.

When able, crews would conduct continuous visual and aural monitoring of marine mammal activity. They would monitor the aircraft's own sensors from first sensor placement to checking off station and out of radio-frequency range of these sensors. If marine mammals were detected aurally, then that would cue the aircrew to increase visual surveillance. Subsequently, if no marine mammals were visually detected, then the crew would continue a multi-static active search. If marine mammals were detected aurally, then that would cue the aircrew to increase their visual surveillance. Subsequently, if no marine mammals were visually detected, then the crew would continue a multi-static active search.

If marine mammals are visually detected within 1,000 yd (914 m) of the explosive source sonobuoy (AN/SSQ-110A) intended for use, then that payload would not be detonated. Aircrews may use this post once the marine mammals have not been re-sighted for 10 minutes, or are observed to have moved outside the 1,000 yd (914 m) safety buffer. Aircrews may shift their multi-static active search to another post, where marine mammals are outside the 1,000 yd (914 m) safety buffer.

Following the exercise, aircrews will make every attempt to detonate manually the unexploded charges at each post in the pattern prior to departing the operations area. Aircrews will not use the “Scuttle” command when two payloads remain at a given post. When manually detonating the devices, aircrews will ensure that a 1,000 yd (914 m) safety buffer, visually clear of marine mammals, is maintained around each post as is done during active search operations. Aircrews will only leave posts with unexploded charges if a sonobuoy or aircraft system malfunctions, or when an aircraft must immediately depart the area due to fuel constraints, inclement weather, or in-flight emergencies. In these cases, the sonobuoy will self-scuttle. Explosive source sonobuoys (AN/SSQ-110A) that cannot be scuttled will be reported as unexploded ordnance and would eventually sink to the sea floor. Mammal monitoring shall continue until out of own-aircraft sensor range.

2.2.3 Anti-Surface Warfare (ASUW)

Anti-Surface Warfare (ASUW) training activities include Visit, Board, Search, and Seizure (VBSS); A-S MISSILEX; A-S Bombing Exercise (BOMBEX); A-S GUNEX; Surface-to-Surface (S-S) GUNEX; and Sinking Exercise (SINKEX).

2.2.3.1 Visit, Board, Search, and Seizure (VBSS)

VBSS activities take place in W-291, OPAREA 3803, and SOAR. VBSS activities may take place within 3 miles of shore in OPAREA 3803, but most of the activities would occur beyond the CZ in SOAR or W-291. The exercise involves rotary-wing aircraft and surface vessels, and includes the firing of small arms. The environmental fate of expended projectiles from small arms would be substantially as described above for S-A GUNEXs; no environmental effects are expected. This brief, occasional, small-scale activity would not require that commercial or recreational users be generally excluded from ocean areas normally available for public use. This activity has no reasonably foreseeable effects on CZ uses or resources, and is not considered further in this CD.

2.2.3.2 Air-to-Surface Missile Exercise (A-S MISSILEX)

A-S MISSILEXs occur in SOAR, MIR, or SHOBA; portions of SHOBA are in the CZ. Fixed- or rotary-winged aircraft fire missiles at surface targets. Missiles detonate at the ocean's surface, potentially injuring or affecting the behavior of marine animals in the target area; some of these animals could be CZ resources.

To minimize the potential effects of this activity on marine mammals or sea turtles, ordnance would not be targeted to impact within 1,800 yd (1,646 m) of known or observed floating kelp, which may be inhabited by immature sea turtles. In addition, aircraft would visually survey the target area for marine mammals and sea turtles. Visual inspection of the target area would be made by flying at 1,500 ft (457 m) or lower, if safe to do so, and at slowest safe speed. Firing or range clearance aircraft would be required to actually see the ordnance impact areas. Explosive ordnance would not be targeted to impact within 1,800 yd (1,646 m) of sighted marine mammals and sea turtles. A-S MISSILEXs could affect a small number of fish near the point of detonation, but population-level effects are not expected.

Intact targets are recovered at the conclusion of the exercise. Expended missiles and target materials are deposited in the water, where their environmental fate is as described above for S-A MISSILEX. A-S MISSILEXs in SHOBA require that offshore areas within the CZ offshore of the southern portion of SCI be closed to the public for public safety. A-S MISSILEXs thus could have reasonably foreseeable effects on CZ resources and on commercial or recreational uses in portions of the CZ offshore of SCI, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.3.3 Air-to-Surface Bombing Exercise (A-S BOMBEX)

A-S BOMBEXs occur in SOAR, TMA-3, TMA-4, TMA-5, and MISR-1; these ranges are outside of the CZ in W-291. Fixed- or rotary-winged aircraft drop bombs on surface targets. Smoke canisters may be used to mark the target. Bombs detonate at the ocean's surface, potentially injuring or affecting the behavior of marine animals in the target area; some of these animals could be CZ resources.

If surface vessels are involved, trained lookouts will survey for floating kelp, which may be inhabited by immature sea turtles, and for sea turtles and marine mammals. A 1,000 yd (914 m) radius buffer zone will be established around the intended target. Aircraft will visually survey the target and buffer zone for marine mammals and sea turtles prior to and during the exercise. The survey of the impact area will be made by flying at 1,500 ft (457 m) or lower, if safe to do so, and at the slowest safe speed. Release of ordnance through cloud cover is prohibited: aircraft must actually be able to see ordnance impact areas. Exercises are conducted only if marine mammals and sea turtles are not visible in the buffer zone.

Expended training materials are contained within the range. Bombs, targets, and smoke canisters may be deposited in the water; the environmental fate of expended bomb and target materials would be as described above for S-A MISSILEXs and S-A GUNEXs. A-S BOMBEXs would have no reasonably foreseeable effects on CZ uses, but could affect CZ resources outside of the CZ, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.3.4 Air-to-Surface Gunnery Exercise (A-S GUNEX)

A-S GUNEXs occur in SOAR, TMA-3, TMA-4, TMA-5, and MISR-1; these ranges are outside of the CZ in W-291. Fixed- or rotary-winged aircraft fire on surface targets. Smoke canisters may be used to mark the target. Ordnance strikes the ocean's surface, potentially injuring or affecting the behavior of marine animals in the target area; some of these animals could be CZ resources.

A 200 yd (183 m) radius buffer zone will be established around the intended target. If surface vessels are involved, lookouts will visually survey the buffer zone for marine mammals and sea turtles prior to and during the exercise. Aerial surveillance of the buffer zone for marine mammals and sea turtles will be conducted prior to commencing the exercise, preferably from an altitude of 500 feet to 1,500 feet (ft) (152 - 457 m). Aircraft crew and pilot will maintain a visual watch during exercises. Release of ordnance through cloud cover is prohibited: aircraft must actually be able to see ordnance impact areas. The exercise will be conducted only if marine mammals and sea turtles are not visible within the buffer zone.

Expended training materials are contained within the range. Ordnance, targets, and smoke canisters may be deposited in the water; the environmental fate of expended ordnance and target materials is as described above for S-A GUNEX. A-S GUNEXs would have no reasonably foreseeable effects on CZ uses, but could affect CZ resources outside of the CZ, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.3.5 Surface-to-Surface Gunnery Exercise (S-S GUNEX)

Surface-to-Surface (S-S) GUNEXs occur in W-291 and SHOBA. Surface ship crews fire on surface targets. Smoke canisters may be used to mark the target. Ordnance strikes the ocean's surface, potentially injuring or affecting the behavior of marine animals in the target area; some of these animals could be CZ resources.

For exercises using targets towed by a vessel or aircraft, target-towing vessels and aircraft maintain trained lookouts for marine mammals and sea turtles. A 200 yd (183 m) to 600-yd (585-m) radius buffer zone is established around the intended target. From the intended firing position, trained lookouts survey the buffer zone for marine mammals and sea turtles prior to commencement and during the exercise as long as practicable. Due to the distance between the firing position and the buffer zone, lookouts are only expected to visually detect breaching whales, whale blows, and large pods of dolphins and porpoises. If applicable, target-towing vessels maintain a lookout. If a marine mammal or sea turtle is sighted near the exercise, the tow vessel immediately notifies the firing vessel to secure gunnery firing until the area is clear. The exercise is conducted only when the buffer zone is visible and marine mammals and sea turtles are not detected within the target area and the buffer zone.

Expended training materials are contained within the range. Ordnance, targets, and smoke canisters may be deposited in the water; the environmental fate of expended ordnance and target materials is as described above for S-A GUNEX. S-S GUNEXs in SHOBA require exclusive use of the marine portions of this range. This activity thus could have reasonably foreseeable effects on CZ resources and uses, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.3.6 Sinking Exercise (SINKEX)

Sinking Exercises (SINKEXs) occur in SOAR and W-291 well outside of the CZ. By law, SINKEXs are held at least 50 nm offshore and in at least 6,000 feet of water. Aircraft and vessels fire numerous types of ordnance at an environmentally clean ship hulk (i.e., a hulk that has been stripped of all hazardous materials and potential marine water contaminants in accordance with the requirements of 40 CFR §229.2 [*Transport of target vessels*]). Ordnance detonates at the ocean's surface, potentially injuring or affecting the behavior of marine animals in the target area but, because this activity occurs so far from the CZ, none of these animals would be CZ resources. Expended training materials are contained within the immediate area of the SINKEX. Expended training materials are deposited in the water, along with the ship hulk; the environmental fate of expended ordnance and target materials is as described above for S-A MISSILEX and S-A GUNEX. There are no spillover effects in the CZ. SINKEXs have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.4 Electronic Warfare (EW)

Electronic Warfare (EW) activities could occur anywhere within the SOCAL OPAREAs. EW activities involve aircraft and vessel movements and dispensing of chaff (bundles of glass fibers), flares, and smokey Surface-to-Air Missiles (smoke cartridges that simulate the launch of a surface-to-air missile). Chaff fibers would be widely dispersed before settling on the ocean surface, and would not affect turbidity or water chemistry. Flare and smoke cartridge residues would sink to the ocean bottom; their environmental fate would be as described above for S-A GUNEX. EW activities have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.5 Amphibious Warfare

Amphibious Warfare activities include Naval Surface Fire Support (NSFS), Expeditionary Fires (EFEX), Battalion Landing, Stinger Firing, and Amphibious Landings and Raids. These activities occur exclusively at SCI. Amphibious Warfare also includes Amphibious Operations, which occurs in the ocean waters off Marine Corps Base Camp Pendleton.

2.2.5.1 Naval Surface Fire Support (NSFS)

NSFS consists of naval gunfire from surface ships on land targets. In this exercise, surface ships use their main gun batteries to support forces ashore. NSFS normally consists of one or more surface ships bombarding a land target within the SHOBA Impact Areas from a distance of 4-6 nm (i.e., beyond the CZ). This activity is often supported by Navy or Marine spotters ashore or by spotters in fixed-wing or rotary-wing aircraft aloft. A Shore Fire Control Party may consist of up to 10 personnel who supply target information to the ship. Offshore waters of SHOBA are closed to the public for public safety during the exercise; some of the rounds fired may fall short and land in the water. NSFS thus could have reasonably foreseeable effects on CZ resources and uses, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.5.2 Expeditionary Fires Exercise (EFEX)

EFEX involves coordinating naval gunfire from surface ships (i.e., NSFS - described above) with land-based artillery in support of ground amphibious activities. During an EFEX, artillery units are brought ashore and extracted using Landing Craft Air Cushion (LCACs), resulting in occasional, temporary disturbance of selected beaches on SCI (disturbance of sand and sediments in the surf zone). Offshore waters of SHOBA are closed to the public for public safety during the exercise. This activity could have reasonably foreseeable effects on resources and uses in the CZ, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.5.3 Battalion Landing Exercise

In the Battalion Landing exercise, four companies of infantry land at four different beaches on SCI, using Landing Craft Utility (LCUs), LCACs, and Assault Amphibian Vehicles (AAVs), and proceed inland (LCACs are high-speed cargo vessels, while AAVs are lightly armored troop carriers). The LCACs air cushion allows it to ride onto the beach, offloading cargo, vehicles, and personnel. The AAVs are tracked vehicles.

Reconnaissance forces also land in small inflatable boats. Tanks, Expeditionary Fighting Vehicles (EFVs), and other military vehicles also come ashore. Use of live ordnance is restricted to SHOBA. The units generally leave SCI in the same manner as they arrived. The entire exercise takes approximately four days. Physical effects consist mostly of disturbance of sand and sediment in the surf zone. Movement of personnel and equipment into upland areas would disturb soils, increasing erosion of soils along transportation routes; this effect, however, would be substantially mitigated by the Navy's Erosion Control Plan (see below). Battalion Landings require use of nearshore waters off landing beaches. This activity could have reasonably foreseeable effects on resources and uses in the CZ, and will be evaluated for consistency with enforceable CCA policies in Section 3.

Erosion Control Plan

As a result of the 2008 SCI Terrestrial Biological Assessment, the Navy proposed to develop a plan that would address soil erosion associated with planned military activities in the Artillery Vehicle Maneuver Corridor (AVMA), Artillery Firing Points (AFPs), Artillery Maneuver Points (AMPs), and the Infantry Operations Area (IOA). Control of erosion would promote sustainable land use in support of military activities in these areas. The goals of the plan are to:

1) minimize soil erosion in each of these operational areas and minimize off-site impacts;
2) prevent soil erosion from affecting federally listed or proposed species or their habitats; and
3) prevent soil erosion from substantially affecting other sensitive resources, including sensitive plants and wildlife and their habitats, jurisdictional wetlands and non-wetland waters, the Area of Special Biological Significance (ASBS) surrounding SCI, and cultural resources.

The plan would describe the Navy's approach to assessing and reducing soil erosion in the AVMA, AMPs, AFPs, and Infantry Operations Area, as well as on 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 each area. The plan would include an adaptive management approach, and would contain the following essential elements:

- Site-specific Best Management Practices (BMPs) to minimize soil erosion on site and minimize off site impacts, which could include:
    - Setbacks or buffers from steep slopes, drainages, and sensitive resources,
    - Engineered or bio-engineered structures to reduce soil erosion and off-sit transport of sediment,
    - Revegetation,
    - Maps defining boundaries of operational areas that provide appropriate setbacks, and
    - A BMP maintenance schedule.
- A plan to monitor soil erosion and review the effectiveness of BMPs.
- A mechanism for determining and implementing appropriate remedial measures and refining BMPs should the need arise.

2.2.5.4 Stinger Exercise

The Stinger is a small shoulder-fired or vehicle-mounted anti-aircraft missile used by Marine and NSW forces. Training is conducted from positions on-shore in SHOBA, or by NSW units firing the missiles from boats in the near-shore area. The missiles are fired toward a target (Ballistic Aerial Target [BAT] or Remotely Piloted Vehicle [RPV]) over the ocean portion of SHOBA. BATs usually are destroyed during the exercise; small quantities of missile and target materials fall in the CZ; the environmental fate of these expended training materials is as described for S-A MISSILEX. RPVs land in SHOBA after the exercise, and are reused. CZ effects consist primarily of restricting nearshore waters for public safety. Stinger training thus would have no reasonably foreseeable effects on CZ resources, but could have a reasonably foreseeable effect on CZ uses, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.5.5 Amphibious Landings

Amphibious Landing units come ashore on SCI (West Cove, SHOBA Impact Areas, Horse Beach Cove, Northwest Harbor) from Navy ships in LCACs, AAVs, and EFVs. A typical landing includes one or two High-Mobility Multi-purpose Wheeled Vehicles (HMMWVs) and one or two 5-ton trucks. Light Armored Vehicles (LAVs), high-speed armored personnel carriers, also are used for amphibious landings. Effects of this activity in the CZ are similar to those described for a Battalion Landing, but involve fewer personnel and equipment per exercise. This activity could have reasonably foreseeable effects on resources and uses in the CZ, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.5.6 Amphibious Exercises

Amphibious exercises in CPAAA would consist primarily of vessel movements into and out of CZ waters; no shore activities would be included in these exercises. No live fire or other expenditures of training materials would occur. These amphibious exercises would have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.6 Mine Warfare (MIW)

MIW training includes Mine Countermeasures (MCM) Exercises, Mine Neutralization, and Mine Laying Exercises (MINEX).

2.2.6.1 Mine Countermeasures Exercise (MCM)

MCM training is conducted on the Kingfisher Range, part of which lies in the CZ; in the future, MIW training is also planned in ARPA. MCM training uses sonar to detect and avoid mines. Assets could include MCM ships, airborne mine countermeasures helicopters, divers, unmanned underwater vehicles, and Navy marine mammals. Equipment could include side-scan sonar, high-frequency sonar, laser line scans, magnetic sweep gear, and influence sweep gear. Sonar emissions during these activities could affect marine mammals in or outside of the CZ. Devices towed through the water (sweep gear) could disturb marine animals. Some MCM activities could require temporary exclusive use of ocean areas. This activity could have reasonably foreseeable effects on resources and uses in the CZ, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.6.2 Mine Neutralization Exercise

Mine neutralization training would involve Organic Airborne Mine Countermeasures (OAMCM) systems employed by helicopters in simulated threat minefields with the goal of clearing a safe channel through the minefield for the passage of friendly ships. Once a mine shape is located, mine neutralization is simulated. Helicopters engaged in Mine Neutralization training would be configured with one or more of the following systems: AN/AQS-20 Mine Hunting System; AN/AES-1 Airborne Laser Mine Detection System; AN/ALQ-220 Organic Airborne Surface Influence Sweep (OASIS); Airborne Mine Neutralization System; and AN/AWS-2 Rapid Airborne Mine Clearance System (RAMICS). Mine neutralization exercises also involve shipboard MCM systems, such as the Remote Minehunting System (RMS) and the submarine-deployed Long-term Mine Reconnaissance System (LMRS). Mine neutralization training would be conducted at: Pyramid Cove and Northwest Harbor. Mine Neutralization training could have reasonably foreseeable effects on resources and uses in the CZ, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.6.3 Mine-Laying Exercise (MINEX)

MINEX events are conducted in the Castle Rock, Eel Point, China Point, and Pyramid Head areas offshore of SCI. MINEX events involve aircraft dropping inert training shapes (inert general purpose bombs, such as the MK62 [inert 500-lb MK82 bomb]) and, less frequently, submarine mine laying. The training shapes are recovered at the end of the operation to the extent feasible (historically about 66 percent); some training shapes cannot be retrieved because retrieval is technically infeasible or cost-prohibitive. Under the proposed activities, up to 68 25-lb MK-76 shapes, up to 11 MK-18 shapes, and up to 13 500-lb MK-62 shapes would be used, and the MK-18s and MK-62s would be recovered, to the extent possible..

The probability of a marine species being in the exact spot in the ocean where an inert object is dropped is remote. Initial target points will be briefly surveyed prior to inert ordnance release from an aircraft to ensure the intended drop area is clear of marine mammals and sea turtles. With the implementation of this measure, MINEXs would not affect marine mammals or sea turtles.

The environmental fate of unrecovered training shapes would be as described for other mostly inert expended training materials (e.g., S-A GUNEX). The public would be temporarily excluded from the area of the exercise for safety. This activity would not affect CZ resources, but could have a reasonably foreseeable effect on CZ uses, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.6.4 MIW Mitigation Measures

All Mine Warfare and Mine Countermeasures Operations involving the use of explosive charges would include exclusion zones for marine mammals and sea turtles to prevent physical or acoustic effects on those species. These exclusion zones would extend in a 700-yard radius arc around the detonation site.

For Ship Mine Countermeasures Operations, pre-exercise survey shall be conducted within 30 minutes prior to the commencement of the scheduled explosive event. The survey may be conducted from the surface, by divers, or from the air, and personnel shall be alert to the presence of any marine mammal or sea turtle. Should such an animal be present within the survey area, the exercise shall be paused until the animal voluntarily leaves the area. The Navy will suspend detonation exercises and ensure the area is clear. Personnel will record any protected species marine mammal and sea turtle observations during the exercise as well as measures taken if species are detected within the exclusion zone.

Surveys within the same radius also will be conducted within 30 minutes after the completion of the explosive event. If there is evidence that a marine mammal or sea turtle may have been stranded, injured or killed by the action, Navy training activities will be immediately suspended and the situation immediately reported by the participating unit to the Officer in Charge of the Exercise (OCE), who will follow Navy procedures for reporting the incident to Commander, Pacific Fleet, Commander, Navy Region Southwest, Environmental Director, and the chain-of-command.

2.2.7 Naval Special Warfare (NSW)

Naval Special Warfare (NSW) activities include Land Demolition, Underwater Demolition, Marksmanship, Land Navigation, Unmanned Aerial Surveillance, Insertion / Extraction, Boat Operations, SEAL Platoon Operations, and Direct Action.

2.2.7.1 Land Demolition

Land Demolition activities are conducted in the Impact Areas, in SWAT 1 and SWAT 2, and in the TARs on SCI. These activities result in some local soil disturbance and the release of small amounts of explosives byproducts, most of which are contained within the range. These activities are expected to have no effects on marine water quality, bottom sediments, or other resources of the CZ (DoN 2008); studies have shown that offsite migration of potentially hazardous constituents is negligible (see Range Sustainability Environmental Program Assessment below). Located outside of the CZ, they have no effect on CZ uses. Because these activities have no reasonably foreseeable effects on CZ uses or resources, they will not be further considered in this CD.

Range Sustainability Environmental Program Assessment

The Range Sustainability Environmental Program Assessment (RSEPA) is a component of the Navy's Tactical Training Theater Assessment and Planning Program. RSEPA is a range compliance management process intended to ensure long-term sustainability of the range. Its purposes are to ensure compliance with applicable environmental regulations and to assess the potential for off-site migration of munitions and their constituents. The first phase of the RSEPA process is the Range Condition Assessment (RCA). This is a qualitative and quantitative assessment of facility compliance with environmental regulations and evaluation of the status of munitions constituents on the site.

In 2003, the Navy conducted a RCA of SCI. Operational range site models were developed for SWATs 1 and 2, MIR, and SHOBA. Potential releases of munitions constituents from high-order detonations, low-order detonations, and duds [items that failed to function] were estimated, based on recorded munitions use at SCI in Fiscal Years 2001 and 2002, and maximum soil concentrations of these constituents were estimated. The conclusions of the RCA were that further steps were not required to maintain compliance with federal environmental regulations, and further analysis was not required to assess the risks of off-range releases of munitions or their constituents, because the estimated offsite migration of munitions constituents was negligible.

The vertical and horizontal migration of some munitions constituents in SHOBA were modeled for the RCA, based upon their estimated maximum soil concentrations. This predictive analysis indicated that some constituents could migrate as much as 0.16 foot (0.05 meter) below the ground surface in detectable concentrations, and that perchlorate (the most mobile of the compounds that were modeled) could migrate vertically as far as the groundwater table (5.4 feet [1.6 meters] below the ground surface). Perchlorate could migrate horizontally in groundwater a distance of up to 300 meters (984 feet) beyond the boundary of the Impact Area over 400 years at a concentration of up to 0.6 microgram per liter. This concentration is below current laboratory detection limits and no known human or ecological receptors would be exposed to the groundwater.

The potential transport of munitions constituents via overland flow in storm water runoff also was modeled. This analysis determined that TNT concentrations at the SHOBA shoreline could be up to 4.3 milligrams per liter and that perchlorate concentrations could be up to 0.001 microgram per liter. These negligible concentrations hazardous constituents would be conveyed into nearshore waters infrequently during substantial rainfall events, dispersed among several drainages, and would be further diluted by the large volumes of seawater into which the storm water runoff would flow.

2.2.7.2 Underwater Detonation (UNDET)

Underwater detonation activities take place primarily in the CZ (Northwest Harbor, TARs 2 and 3, Horse Beach Cove, SWATs 1 and 2), but may occur outside of the CZ (SOAR, FLETA HOT). In underwater detonations, NSW or EOD personnel use explosives charges to destroy underwater obstacles or other structures. These charges may be detonated near the SCI shoreline in shallow water. Single charge detonations usually use less than 5 lb of C-4 explosives, while large underwater demolition training (conducted in Northwest Harbor and SWAT 2) uses larger, multiple charges laid in a pattern; up to 1,000 lb, n.e.w., may be detonated at one time. A safety zone surrounding the activity would need to be temporarily cleared of commercial and recreational users for public safety.

The detonations could damage marine vegetation or kill, injure, or disorient fish or other marine animals near the point of detonation. To ensure protection of marine mammals and sea turtles during underwater detonation training, the exercise area would be determined to be clear of marine mammals and sea turtles prior to detonation. Implementing this measure would ensure that marine mammals and sea turtles were not exposed to temporary threshold shift (TTS), permanent threshold shift (PTS), or injury from physical contact with training mine shapes.

Pre-exercise surveys would be conducted within 30 minutes prior to the commencement of the scheduled explosive event. The survey could be conducted from the surface, by divers, or from the air, and personnel would be alert to the presence of any marine mammal or sea turtle. If an animal were present within the survey area, the exercise would be paused until the animal voluntarily left the area. The Navy would suspend the detonation exercise and ensure that the area was clear for a full 30 minutes prior to detonation. Personnel would record any protected species marine mammal and sea turtle observations during the exercise, as well as any measures taken if species were detected within the Exclusion Zone. Surveys would also be conducted within 30 minutes after the completion of the explosive event. These measures would ensure that underwater demolition had no effect on sea turtles or marine mammals in the CZ. The potential still exists for fish or diving birds to be killed or injured in the vicinity of the exercise.

These training activities thus would have reasonably foreseeable effects on coastal resources and uses, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.7.3 Small Arms Training

Small Arms Training activities are conducted at TARs 4, 9, 13, 16, and 20 on SCI. These activities result in some local soil disturbance and the expenditure of small amounts of training materials (small arms rounds), most of which are contained within the range. These activities are expected to have no effects on water quality, bottom sediments, or other resources of the CZ (see Section 2.2.7.1). The Surface Danger Zone for the small arms range extends out over the ocean, however, and this area must be cleared prior to use of the range. Personnel will adhere to range safety procedures. Weapons will not be fired in the direction of known or observed floating weeds or kelp, marine mammals, sea turtles. Thus, this activity would have no reasonably foreseeable effect on CZ resources but could have a reasonably foreseeable effect on CZ uses near SCI, so this activity will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.7.4 Land Navigation

Land Navigation activities occur between MIR and NALF on SCI. These activities result in some soil disturbance from foot traffic. These activities would have no effects on marine water quality, bottom sediments, or other resources of the CZ (see discussion in Section 2.2.7.1). Because these activities have no reasonably foreseeable effects in the CZ, they will not be further considered in this CD.

2.2.7.5 Unmanned Aerial Vehicle (UAV) Exercises

Unmanned Aerial Vehicle (UAV) activities consist of launching these vehicles and flying them over SCI. The vehicles are recovered after their use. These activities would have no effects on marine water quality, bottom sediments, or other resources of the CZ. UAV operating areas extend over the nearshore waters, however, which may require these areas to be temporarily cleared of commercial and recreational users. Thus, these activities would have no reasonably foreseeable effects on CZ resources, but could have reasonably foreseeable effects on CZ uses near SCI, so this activity will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.7.6 Insertion and Extraction (I/E)

Insertion/Extraction (I/E) activities may occur on SCI or anywhere within the SOCAL OPAREAs. I/Es may involve fixed-wing or rotary-wing aircraft or surface or subsurface vessel movements. No training materials are expended in these exercises, so CZ resources are not affected. These activities do not require the Navy to have exclusive control over any portion of the CZ, so CZ uses are not affected. I/Es have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.7.7 NSW Small Boat, SEAL Platoon, and Direct Action

NSW Small Boat, SEAL Platoon, and Direct Action activities are dispersed, small-scale clandestine activities in which one of the objectives is to avoid attracting attention by minimizing effects on the environment. Small Boat and Direct Action training may occur anywhere on SCI or within the SOCAL OPAREAs, while SEAL Platoon activities may occur on SCI, in SHOBA, or in FLETA HOT. The ocean portions of these activities consist primarily of small boat movements. The ashore portions of these activities consist primarily of foot traffic from the shoreline to upland areas by small groups. SEAL Platoon and Direct Action training may include live fire of small arms on the beach and in upland areas. Ocean resources are not affected. These activities do not require the Navy to have exclusive control over any portion of the CZ. NSW Small Boat, SEAL Platoon, and Direct Action activities have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.8 Strike Warfare

Strike Warfare consists of Bombing Exercises (BOMBEX) and Combat Search and Rescue (CSAR).

2.2.8.1 Bombing Exercise

BOMBEXs are conducted by fixed-wing aircraft that approach SHOBA Impact Area I or II at altitudes above 5,000 feet agl, and then release live or practice unguided or precision-guided bombs on land targets. These activities result in some local soil disturbance and the release of small amounts of explosives byproducts, most of which are innocuous compounds. These activities are expected to have no effects on marine water quality, bottom sediments, or other resources of the CZ, similar to the effects of Land Demolition, as discussed in Section 2.2.7.1. BOMBEXs require exclusive use of the marine portions of SHOBA. Thus, while these activities would not have a reasonably foreseeable effect on CZ resources, they could have a reasonably foreseeable effect on CZ uses, so this activity will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.8.2 Combat Search and Rescue

CSAR exercises can include reconnaissance aircraft, helicopters, and fighter aircraft. Most of the CSAR activity would occur outside of the CZ on or over SCI, and ground activities would take place primarily on SCI. In addition, the surface activity associated with a CSAR exercise is minimal and dispersed. No training materials would be expended in the CZ. The Navy would not need to exercise exclusive control over portions of the CZ around SCI for this training. CSAR activities thus would have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.9 U.S. Coast Guard Training Activities

U.S. Coast Guard training events include: search and rescue, maritime patrol training, boat handling, and helicopter and surface vessel live-fire training with small arms. The exercise involves rotary-wing aircraft and surface vessels, and includes the firing of small arms. Expended projectiles from small arms firing would sink to the ocean bottom and quickly become buried in sediment or encrusted with benthic organisms. Leaching and dispersion of potentially hazardous constituents would be negligible, and would be dispersed over a large area, so as to have no effect on CZ uses or resources, as discussed in the SOCAL Range Complex Draft EIS/OEIS (DoN 2008). This brief, occasional, small-scale activity would not require that commercial or recreational users be generally excluded from ocean areas normally available for public use. U.S. Coast Guard activities thus would have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.10 Naval Auxiliary Landing Field (NALF)

NALF activities consist of approaches to and landings at NALF and takeoffs and departures from NALF on SCI. Storm water runoff from paved surfaces at the airfield may convey potential marine contaminants into nearshore waters, but the amounts of these substances would be minimal, these events would occur intermittently, and the substances would be dispersed into large volumes of seawater, so as to have no effect on water quality. Therefore, these activities would have no effects on marine water quality, bottom sediments, or other resources of the CZ. CZ uses would not be affected by activities at NALF. Because these activities have no reasonably foreseeable effects on CZ resources or uses, they will not be further considered in this CD.

2.2.11 Research, Development, Test, and Evaluation (RDT, &E)

RDT&E activities include Ship Torpedo Tests, Unmanned Underwater Vehicles, Sonobuoy QA/QC Tests, Ocean Engineering, Marine Mammal Mine Shape Location, Missile Flight Tests, and NUWC Underwater Acoustics Tests.

2.2.11.1 Ship Torpedo Tests

Ship Torpedo Tests occur in SOAR, San Clemente Island Underwater Range (SCIUR), and OPAREA 3803; when the SWTR Extensions are implemented as part of the proposed activities, these activities also may occur in the SWTR. Ship Torpedo Tests check the reliability, maintainability, and performance of training (recoverable exercise torpedoes [REXTORP] and exercise torpedoes [EXTORP]) and operational torpedoes. Aircraft and vessels fire non-explosive exercise torpedoes for various purposes. Test torpedoes are recovered to the extent practicable. Expended training materials are deposited in the water, where their environmental fate is as described for other expended training materials (e.g., S-A MISSILEX, S-A GUNEX). Portions of the CZ around SCI could be closed for safety during these tests, possibly affecting commercial and recreational uses of the area. Ship Torpedo Tests would have no reasonably foreseeable effects on CZ resources, but could have a reasonably foreseeable effect on public uses of the CZ surrounding SCI, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.11.2 Unmanned Underwater Vehicle (UUV) Exercises

Unmanned Underwater Vehicle (UUV) tests occur at NOTS Pier and in SOAR; the latter area is outside of the CZ. These tests consist primarily of infrequent movements of small underwater vessels through CZ waters. The UUVs would emit no substances under normal operating conditions, so CZ resources would not be affected. These tests do not require that the public be cleared from portions of the CZ, so CZ uses would not be affected. These activities would have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.11.3 Sonobuoy QA / QC Tests

Sonobuoy QA/QC tests are conducted in SCIUR. These tests evaluate random lots of sonobuoys (passive, active, and explosive) to determine the quality of the set received from the manufacturer. The sonobuoys are dropped from an aircraft into the SCI Underwater Range area to the east of SCI, and are allowed to operate for a representative period. All defective sonobuoys are recovered. In addition, 10 percent of a given sonobuoy model may be recovered for QA/QC purposes. All other sonobuoys are expended in the range; they self-scuttle (i.e., a port opens and it floods) and sink to the ocean bottom. Typically, about 3,000 - 3,100 sonobuoys per year are tested, and about 420 - 430 are recovered. An analysis by the Navy determined that the battery constituents released during sonobuoy operation had no effect on water quality, and that the scuttled sonobuoys had no effect on the quality of bottom sediments or ocean waters. Sonobuoy QA/QC tests do not require exclusive Navy control over any portion of the CZ off of SCI. This activity would have no reasonably foreseeable effects on CZ resources or uses, and is not considered further in this CD.

2.2.11.4 Ocean Engineering Tests

Ocean engineering tests are conducted off NOTS Pier. These tests are used to determine the characteristics, reliability, maintainability, and endurance of various items of marine design. The items to be tested are placed in the water off NOTS Pier and left for an extended period. No water pollutants would be emitted from these items, so CZ resources would not be affected. These tests do not require exclusive Navy control over any portion of the CZ off of SCI. This activity thus would have no reasonably foreseeable effects on CZ uses or resources, and is not considered further in this CD.

2.2.11.5 Marine Mammal Units

Marine Mammal Mine Shape tests occur in MTRs 1 and 2, NOTS Pier area, SCIUR, and SOAR. Activities in the CZ consist primarily of trained Navy marine mammals finding objects and communicating with their human handlers. No training materials are expended, and no pollutants are released into the water column. These tests do not require exclusive Navy control over any portion of the CZ off of SCI. This activity would have no reasonably foreseeable effects on CZ uses or resources, and is not considered further in this CD.

2.2.11.6 Underwater Acoustical Tests

Underwater acoustical tests evaluate the accuracy of acoustical and non-acoustical ship sensors. MK-46 torpedoes are used for some of the tests. All tests are conducted in the SCI Underwater Range (SCIUR). These tests do not affect the quality of marine waters or sediments. These tests do not require exclusive Navy control over any portion of the CZ off of SCI. These activities thus would have no reasonably foreseeable effects on CZ uses or resources, and are not considered further in this CD.

2.2.11.7 Missile Flight Tests

Missile Flight Tests occur in W-291 12 nm or more offshore. Aircraft or vessels fire different types of missiles for various purposes. Expended training materials are contained within W-291. Expended training materials are deposited in the water; the environmental fate of these materials is as discussed for other expended training materials under S-A MISSILEX. Missile Flight Tests having targets on SCI would require that nearshore areas be cleared of commercial and recreational users. Missile Flight Tests thus have no reasonably foreseeable effects on CZ resources, but may have a reasonably foreseeable effect on CZ uses, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.12 Range Enhancements

2.2.12.1 Shallow Water Minefield

The Navy proposes to construct a shallow water minefield in SOCAL Range Complex for expanding MCM training. Multiple site options off Tanner Bank, Cortes Bank, La Jolla, and Point Loma have been identified, with consideration being given to bathymetry and required capabilities. Of the five areas identified, an area known as Advanced Research Project Agency Training Minefield (ARPA) off La Jolla (and historically used for shallow water submarine MCM training) is the desired location. The Tanner Bank and Cortes Bank locations are outside the CZ, while the La Jolla and Point Loma locations would be partly in the CZ. MCM training is addressed above in Section 2.1.1.4.

Installation of anchors on the ocean bottom for the inert mine shapes would disturb bottom sediments and benthic organisms. This disturbance would occur over very small areas, and would be temporary. These installed materials would eventually become encrusted by marine organisms, and the anchor points on the bottom would be buried in sediment. If in the future the Navy no longer has a requirement for ASW training or no longer uses the Shallow Water Minefield for training, then the Navy will comply with applicable federal environmental planning and regulatory requirements pertaining to the disposition of these facilities.

Installation of the in-water minefield elements could temporarily exclude the public from small portions of the range for short periods. Installation thus would have no reasonably foreseeable effects on CZ resources, but may have a reasonably foreseeable effect on CZ uses, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.2.12.2 Shallow Water Training Range (SWTR) Extension

The proposed activities include the installation of instrumented extensions of SOAR. The areas of the proposed extensions of the SOAR are called the Shallow Water Training Range (SWTR). These areas currently are used for undersea activities, but are not instrumented. Proposed training activities on the SWTR are addressed above.

Installation of ocean bottom elements of the range would disturb bottom sediments and benthic organisms. This disturbance would occur over very small areas, and would be temporary. These installed materials would eventually become encrusted by marine organisms, and buried in sediment. The Navy has no plans to remove these inert materials at the conclusion of their useful life. Installation of the in-water range elements could temporarily exclude the public from small portions of the range for short periods. Installation thus would have no reasonably foreseeable effects on CZ resources, but may have a reasonably foreseeable effect on CZ uses, and will be evaluated for consistency with enforceable CCA policies in Section 3.

2.3 SUMMARY OF PROPOSED ACTIVITIES IN THE COASTAL ZONE

Twenty-nine of the 53 activities included in the proposed activities could have reasonably foreseeable effects on CZ resources or uses, along with the installation of the SWTR. In addition, the installation of the Shallow Water Minefield could affect CZ uses depending upon where it is located. The potential effects on CZ uses and resources of these activities are summarized below in Table 2-1. These effects will be evaluated for consistency with CCA enforceable policies in Section 3.

Table 2-1: Proposed Activity Elements with a Reasonably Foreseeable Effect on the CZ

	ELEMENT	DISCUSSION
Training		
AAW	Surface-to-Air Missile Exercise (3)	When BQM-74 targets are used, a portion of the CZ off SCI must be under the exclusive control of the Navy for target launch and recovery.
ASW*	Helicopter TRACKEX/TORPEX (6,7)	Activities would emit acoustical energy (sonar) in areas outside of the CZ; these emissions could propagate into the CZ at attenuated levels. In addition, these activities would emit acoustical energy in portions of the CZ surrounding SCI.
	MPA TRACKEX/TORPEX (8,9)	
	Surface Ship TRACKEX/TORPEX (11,12)	
	Submarine TRACKEX/TORPEX (13,14)	
	Extended Echo Ranging (EER) Operations (Integrated ASW Course II) (10)	Sound and overpressure from underwater detonations could affect CZ resources. Small portions of the SOCAL OPAREAs would be closed to non-participants for public safety.
ASUW*	Air-to-Surface Missile Exercise (16)	Ordnance could affect mobile marine resources on the surface of the ocean and in the water column. Activities require the offshore portions of SHOBA to be closed to the public for public safety.
	Air-to-Surface Bombex (17)	Ordnance could affect mobile marine resources on the surface of the ocean and in the water column.
	Air-to-Surface Gunnery Exercise (18)	Ordnance could affect mobile marine resources at or near the surface of the ocean.
	Surface-to-Surface Gunnery Exercise (19)	Ordnance could affect marine resources at or near the surface of the ocean. Activities require the offshore portions of SHOBA to be closed to the public for public safety.
AMW*	Naval Surface Fire Support (21)	Activities require the offshore portions of SHOBA to be closed to the public for public safety.
	Expeditionary Fires Exercise (22)	Activities require the offshore portions of SHOBA to be closed to the public for public safety. Also, activities would include landing of amphibious vessels on selected SCI beaches.
	Battalion Landing (23)	Activity disturbs sand and sediments in the surf zone of sandy beaches, and requires exclusive Navy control over portions of the CZ around SCI.
	USMC Stinger Firing Exercise (24)	Activities require the offshore portions of SHOBA to be closed to the public for public safety.
	Amphibious Landings and Raids (25)	Activity disturbs sand and sediments in the surf zone of sandy beaches, and requires exclusive Navy control over portions of the CZ around SCI.
MIW*	Mine Countermeasures (28)	Activity could expose CZ resources (marine mammals) to active sonar, and requires exclusive Navy control over portions of the CZ.
	Mine Neutralization (29)	Activity would require exclusive Navy control of Castle Rock, Eel Point, China Point, or Pyramid Head.
	Mine Laying Exercise (30)	Activities require temporary exclusion of commercial and recreational users from Castle Rock, Eel Point, China Point, or Pyramid Head for public safety.

Table 2-1: Proposed Activity Elements with a Reasonably Foreseeable Effect on the CZ (continued)

ELEMENT		DISCUSSION
Training		
NSW*	Underwater Demolition (32)	This activity could directly harm or disorient marine plants and animals near the point of detonation, and would require exclusive Navy control of portions of the CZ around SCI for safety.
NSW*	Large Underwater Demolition (33)	This activity could directly harm or disorient marine plants and animals near the point of detonation, and would require exclusive Navy control of portions of the CZ around SCI for safety.
NSW*	Marksmanship - Small Arms Training (34)	Activities require that the public be cleared from that portion of the range's Surface Danger Zone that extends over the ocean.
NSW*	NSW UAV Operations (36)	Activities require exclusive Navy control of portions of the CZ around SCI for safety.
STW*	BOMBEX - Land (41)	Activities require the offshore portions of SHOBA to be closed to the public for public safety.
Research, Development, Test, and Evaluation		
RDT&E*	Ship Torpedo Tests (46)	Activities may require that a portion of the CZ around SCI be closed temporarily for public safety
RDT&E*	Missile Flight Tests (51)	Activities may require marine portions of SHOBA to be closed temporarily for public safety.
Installation of Range Enhancements		
	Shallow Water Minefield	Activity would temporarily exclude the public from small areas of the ocean.
	Shallow Water Training Range	Activity would temporarily exclude the public from small areas of the ocean.

NOTES: ASW - Anti-Submarine Warfare; ASUW - Anti-Surface Warfare; AMW - Amphibious Warfare; MIW - Mine Interdiction Warfare; NSW - Naval Special Warfare; STW - Strike Warfare; RDT&E - Research, Development, Test, and Evaluation.

2.4 Effects on Birds

Under the CZMA, terrestrial birds and shorebirds are considered to be wildlife rather than marine resources. With regard to the California Coastal Act (CCA), wildlife is addressed in Section 30240, *Environmentally Sensitive Habitat Areas*. Section 30240 applies to land areas; however, SOCAL Range Complex includes no land areas that are within the CZ. SCI is federally owned, so it is not in the CZ. No other land areas are included in the proposed activities.

SCI wildlife is not addressed in Section 3, Consistency Determination. The potential effects of the proposed activities on these resources, however, are addressed in the Draft EIS/OEIS prepared for the proposed activities (DoN 2008). In addition, the Navy has requested consultation under the Endangered Species Act Section 7 with the U.S. Fish and Wildlife Service for the Federally-listed bird species associated with the EIS proposed action. The San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*) and the San Clemente sage sparrow (*Amphispiza belli clementeae*) are upland birds that do not normally nest, forage, or roost in the CZ; these bird species are not CZ resources. Two shorebird species that are found on San Clemente Island (SCI) nest in, feed in, or migrate through the CZ, and thus are considered to be CZ resources: California least tern (*Sterna antillarum browni*) and western snowy plover

(*Charadrius alexandrinus nivosus)*. The following analyses of the proposed activities' effects on these two species are summarized below for informational purposes.

2.4.1 Western Snowy Plover

Western snowy plover (*Charadrius alexandrinus nivosus*) habitat on SCI is found at Training Areas and Ranges (TARs) 3, 5, 20, 21, and 22. The western snowy plover population at SCI peaks in winter; 27-41 sightings have been made during typical island-wide winter surveys (November 2000 through December 2003), suggesting that SCI may be an important wintering habitat. The draft recovery plan for the western snowy plover identified five beaches on SCI as important for wintering snowy plovers: Pyramid Cove, Horse Beach, China Cove, West Cove, and Northwest Harbor. Wintering plovers are most frequently seen at Pyramid Cove, China Beach, and West Cove. Winter surveys between November 2003 and February 2004 recorded 23 to 33 sightings of snowy plovers on SCI beaches. (DoN 2008)

While wintering plovers have been regularly observed at all of these beaches, nesting has only been documented on the beaches at West Cove and Horse Beach Cove. Breeding was last documented at West Cove in 1989. Currently, most potential snowy plover nesting habitat at West Cove beach is subject to inundation during high tides, so it is unsuitable for nesting. At Horse Beach Cove beach, western snowy plovers have nested twice, once in 1996 and in 1997. Other potential nesting beaches, including China Cove and Pyramid Cove, are very narrow, backed by escarpments, and subject to periodic inundation by waves and tides, so they are unsuitable for nesting by snowy plovers. The narrowness of the beaches also makes nests vulnerable to predation by foxes, cats, and ravens that forage on the beaches. Northwest Harbor, West Cove, Pyramid Cove, China Cove and Horse Beach Cove constitute only about 5 percent (2.8 miles [4.6 km]) of the 55 miles (88.5 km) of SCI coastline, but are in some of the areas used most frequently for ongoing training, because sandy beaches are required for many of the training activities requiring movements from water to land or from land to water. (DoN 2008)

The SOCAL Range Complex Draft EIS/OEIS (DoN 2008) evaluated the potential impacts of the proposed activities on the western snowy plover, including accidental fires, ordnance use and sound, and foot and vehicle traffic. In the overall context of the listed population of western snowy plovers, SCI has very limited significance. Effects of the proposed activities on the western snowy plover thus are expected to be minimal, and would be further reduced by existing and planned mitigation measures (see below). SCI has very limited potential to support a substantially larger population of snowy plovers due to lack of suitable breeding habitat.

Two measures were identified to mitigate potential effects of the proposed activities on the western snowy plover. First, the Navy will continue periodic surveys for the western snowy plover at beaches where suitable nesting or wintering habitat exists (Northwest Harbor and West Cove). During April and May, beaches with potential snowy plover nesting habitat will be surveyed for evidence of nesting by snowy plovers. Survey results will be incorporated into training plans to reduce effects on breeding plovers, if present. Second, to reduce potential impacts on plovers, movement of troops and vehicles across beaches to the AVMR will be controlled to minimize adverse effects on the beach ecosystem.

2.4.2 California Least Tern

California least terns (*Sterna antillarum browni*) use SOCAL Range Complex only for foraging. Nesting colonies are located adjacent to the Range Complex, including on Camp Pendleton, Naval Air Station North Island, and San Diego Bay. California least terns may forage up to 3 miles (5.56 km) off the coast, but primarily forage in estuarine and bay waters near nesting and roosting sites. SOCAL Range Complex training and testing activities present a minimal potential to affect foraging of this species. The aircraft operating near the mainland coast generally fly above 1,000 ft (305 m) MSL, except during landing or taking-off, and for some helicopter training near Camp Pendleton. Vessel traffic is transient and would not effect least terns. Overall effects attributed to range activities would be temporary and local, and would have no effect on California least tern populations. See page 3.10-35 of the Draft EIS/OEIS for more discussion of this issue.

3 CONSISTENCY DETERMINATION

3.1 SUMMARY OF CONSISTENCY DETERMINATION

This Coastal Consistency Determination (CD) was prepared in compliance with Section 307 of the Coastal Zone Management Act (CZMA), which states that federal actions must be consistent to the maximum extent practicable with the enforceable policies of approved state coastal management programs. Sections of the California Coastal Act (CCA) (14 California Code of Regulations, Section 13001 et seq.) deemed applicable to the proposed activities, as determined by the Navy, are identified in Table 3-1 and are discussed in Section 3.3. Sections of the CCA not applicable to the proposed activities are discussed in Section 3.2.

3.2 RATIONALE FOR NON-APPLICABILITY OF CCA POLICIES

3.2.1 Article 2 - Public Access

Section 30211 - Development not to interfere with access: The proposed activities would include no land development.

Section 30212 - New development projects: The proposed activities are not a development project.

Section 30212.5 - Public facilities; distribution: The proposed activities do not include public facilities.

Section 30213 - Lower cost visitor and recreational facilities; encouragement and provision; overnight room rentals: The proposed activities does not include visitor or recreational facilities.

Section 30214 - Implementation of public access policies; legislative intent: The proposed activities are not subject to State legislative intent.

3.2.2 Article 3 - Recreation

Section 30220. Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses. The proposed activities would not expand the existing footprint of Naval training in coastal areas, nor would such training take place on lands within the coastal zone (CZ).

Section 30221 -Oceanfront land; protection for recreational use and development: The proposed activities include no oceanfront land within the coastal zone (CZ).

Section 30222 -Private lands; priority of development purposes: No private lands are included in the proposed activities.

Section 30222.5 -Oceanfront lands; aquaculture facilities; priority: The proposed activities include no oceanfront land within the CZ.

Section 30223 -Upland areas: The proposed activities include no upland areas within the CZ.

Section 30224 -Recreational boating use; encouragement; facilities: The proposed activities are not a development project.

3.2.3 Article 4 - Marine Environment

Section 30232 - Oil and hazardous substance spills: The proposed activities includes no development or bulk transport of crude oil, gasoline, petroleum products, or hazardous substances.

Section 30233 - Diking, filling and dredging: The proposed activities would not include diking, filling, or dredging.

Section 30234 – Commercial fishing and recreational boating facilities: The proposed activities do not involve commercial fishing and recreational boating facilities.

Table 3-1: Applicability of California Coastal Act to Proposed Activities

Article	Section	Description	Applicability
Article 2: Public Access	30210	Access; recreational opportunities; posting	Consistent to the maximum extent practicable
	30211	Development not to interfere with access	NA
	30212	New development projects	NA
	30212.5	Public facilities; distribution	NA
	30213	Lower cost visitor and recreational facilities; encouragement and provision; overnight room rentals	NA
	30214	Implementation of public access policies; legislative intent	NA
Article 3: Recreation	30220	Protection of certain water-oriented activities	NA
	30221	Oceanfront land; protection for recreational use and development	NA
	30222	Private lands; priority of development purposes	NA
	30222.5	Oceanfront lands; aquaculture facilities; priority	NA
	30223	Upland areas	NA
	30224	Recreational boating use; encouragement; facilities	NA
Article 4: Marine Environ-ment	30230	Marine resources; maintenance	Consistent to the maximum extent practicable
	30231	Biological productivity; wastewater	Consistent to the maximum extent practicable
	30232	Oil and hazardous substance spills	NA
	30233	Diking, filling and dredging	NA
	30234	Commercial fishing and recreational boating facilities	NA
	30234.5	Fishing; economic, commercial and recreational importance	Consistent to the maximum extent practicable
	30235	Revetments, breakwaters, etc.	NA
	30236	Water supply and flood control	NA
Article 5: Land Resources	30240(a)	Environmentally sensitive habitat areas	NA
	30240(b)	Environmentally sensitive habitat areas; adjacent developments	NA
	30241	Prime agricultural land; maintenance in agricultural production	NA
	30241.5	Agricultural lands; viability of uses	NA
	30242	Lands suitable for agricultural use; conversion	NA
	30243	Productivity of soils and timberlands; conversions	NA
	30244	Archaeological or paleontological resources	NA
Article 6: Develop-ment	30250	Location, generally	NA
	30251	Scenic and visual qualities	NA
	30252	Maintenance and enhancement of public areas	NA
	30253	Safety, stability, pollution, energy conservation, visitors	NA
	30254	Public works facilities	NA
	30254.5	Sewage treatment plants and conditions	NA
	30255	Priority of coastal-dependent developments	NA

Table 3-1: Applicability of California Coastal Act to Proposed Activities (continued)

Article	Section	Description	Applicability
Article 7: Industrial Develop- ment	30260	Location or expansion	NA
	30261	Use of tanker facilities	NA
	30262	Oil and gas development	NA
	30263	Refineries or petrochemical facilities	NA
	30264	Thermal electric generating plants	NA
	30265	Offshore oil transport and refining	NA
	30265.5	Coordination of offshore oil transport and refining activities	NA

Section 30234 - Commercial fishing and recreational boating facilities: The proposed activities would include no facilities serving the commercial fishing or recreational boating industries.

Section 30235 - Revetments, breakwaters, etc.: The proposed activities would include no construction that would alter the natural shoreline.

Section 30236 - Water supply and flood control: The proposed activities does not involve water supply or flood control.

3.2.4 Article 5 - Land Resources

The proposed activities would include no land resources within the CZ.

3.2.5 Article 6 - Development

The proposed activities would include no development, as that term is defined in the CCA.

3.2.6 Article 7 - Industrial Development

The proposed activities would include no industrial development.

3.3 DISCUSSION OF APPLICABLE CCA POLICIES

In the following determination, the applicable CCA policy is stated first, followed by a summary of the reasonably foreseeable coastal effects and a more-detailed discussion of anticipated proposed activities effects in relation to the specific coastal policy. In accordance with the federal CZMA, as amended, the Navy has determined that the proposed training and testing activities conducted in the Southern California (SOCAL) Range Complex would be consistent to the maximum extent practicable with the enforceable policies of the CCA, pursuant to the requirements of the CZMA.

3.3.1 Article 2 – Public Access

3.3.1.1 Section 30210 - Public Access, Recreational Opportunities

California Policy

Maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

Coastal Zone Effects

The proposed activities are consistent to the maximum extent practicable with Section 30210 because the public would continue to have substantial access to existing recreational areas or recreational opportunities in the CZ, to the extent consistent with public safety needs. Public beaches and beach access routes are not affected, nor are publicly designated recreational areas such as Channel Islands National Park. The Navy beaches on SCI are not accessible to the public. Notices to Mariners (NOTMARs) and Notices to Airmen (NOTAMs) are issued to allow mariners and commercial and recreational services (e.g., dive charters) to select alternate locations for their activities.

Discussion

Recreational activities in the CZ portions of the SOCAL OPAREAs include sport fishing, sailing, boating, whale-watching, and diving. Commercial uses include fishing, tourism, and marine transportation. These areas also are used by the public for scientific research and education. SCI is Navy-owned property where public access is strictly controlled for purposes of military security and public safety. The Navy considers all ocean areas to be co-use zones that are available for public access, except for the restricted anchorages in the Wilson Cove Exclusive Zone at SCI.

Navy training and test activities are generally compatible with concurrent recreational activities. Some activities (i.e., those involving the live firing of weapons) require access to be restricted temporarily for public safety and military security concerns. Activities in areas of joint Navy and public use limit public access because the Navy implements strict safety procedures prior to each training activity. The locations, sizes, and durations of safety zones are carefully tailored to the needs of the military exercise.

The Navy has implemented procedures to efficiently inform the public about temporary exclusions when such exclusions are necessary for public safety. The proposed activities would not affect public access to beaches because the Navy's beach training activities generally take place on federal property (SCI) which the public is not permitted to access. Closures under the Proposed activities would, however, limit public access to littoral waters near SCI.

Those Navy training and testing activities that require temporary, exclusive use of an ocean area could affect public access and recreational fishing. Around SCI, these activities generally occur in existing federally designated danger and restricted zones. No other nearshore areas (i.e. littoral areas along the mainland coast or around other islands) within the CZ would require exclusive Navy control as part of the proposed activities.

For Navy training and testing activities requiring exclusive use of an ocean area, non-participants are requested to avoid the area for the duration of the exercise for public safety. Short-term, intermittent limits on individual recreational users of these areas may result from temporary closures of specific operating areas. Prior to commencement of Navy training events, NOTMARs and NOTAMs are issued, providing the public, including commercial fishermen, with notice of upcoming location and time restrictions in specific training areas. In addition, the Southern California Offshore Range (SCORE) maintains a public web site depicting upcoming restrictions in designated Danger Zones around SCI. These notices provide the date, time, duration, and location of restricted access so that commercial and private fishermen and divers can plan their activities accordingly. The restrictions only extend through the duration of the training activity, allowing the public to shift its activities to alternate areas during temporary closures. The Navy will continue to provide adequate public notice of its activities to minimize the potential for conflicts between Navy and public uses of the SOCAL OPAREAs.

Although the Navy does limit access to some areas, the availability of littoral ocean areas is greater than the aggregate demand for this resource. With the implementation of the proposed activities, vast expanses of island and mainland coastlines would remain available for commercial and recreational use. The advance public notices provided by the Navy: (a) are consistent with the need to maintain public safety in accordance with Section 30210, (b) maintain public access by enabling the public to shift its activities to available areas, and (c) maximize the overall use of the available resources by encouraging concurrent use of portions of the SOCAL OPAREAs by the Navy and other parties.

In summary, the proposed activities would maintain maximum public access to recreational areas and recreational opportunities in the CZ, so the proposed activities would be consistent to the maximum extent practicable with Section 30210.

3.3.2 Article 4 – Marine Environment

3.3.2.1 Section 30230, Marine Resources

3.3.2.1.1. California Policy

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

3.3.2.1.2. Coastal Zone Effects

The proposed activities are consistent to the maximum extent practicable with Section 30230. Marine resources will be maintained and populations of fish and other marine organisms will be sustained. As noted in Section 2, the Navy will implement measures to protect species of special biological significance (marine organisms listed as threatened or endangered under the federal Endangered Species Act (ESA) and marine mammals covered by the Marine Mammal Protection Act [MMPA]).

The Navy has requested a Letter of Authorization (LOA) from NMFS under the MMPA and has entered into Section 7 consultation with the National Marine Fisheries Service under the federal ESA. The Navy will comply with mitigation measures set forth in any incidental take authorization issued by NMFS for these activities, and the terms and conditions set forth in any biological opinion and associated incidental take authorization.

Discussion

Elements of the proposed activities in the SOCAL OPAREAs that could affect marine resources in the CZ include: deployment of inert mine shapes, sonobuoys, and targets; use of various types of sonar; sea-to-land and land-to-sea weapons firing, underwater detonation, and amphibious landings and related activities. Training and test activities may affect marine resources through: ordnance impacts or sound in the water. Because of the dispersed, low-intensity use of the CZ portions of the SOCAL OPAREAs for Navy training and testing activities and the wide dispersal of marine resources, biological productivity of coastal waters will be maintained.

Marine resources of special biological or economic significance in the SOCAL OPAREA include:

- marine flora, especially kelp forests,
- commercial and recreational fish stocks, and essential fish habitat, and
- special-status species: primarily marine mammals, sea turtles, and abalones.

These resources are considered, for this analysis, to be suitable indicators of general biological productivity, and representative of the overall marine resources within the SOCAL OPAREAs.

3.3.2.1.2.1. Marine Flora

The giant kelp (*Macrocystis pyrifera*) beds located along the coast and around all of the offshore islands are an important element of coastal fish habitat. Navy training and testing activities would not affect marine flora along the mainland coast, within the CZ, or in the CZ surrounding the Channel Islands, except for SCI.

The kelp bed off SCI extends around the island from about 500 feet (ft) (150 meters [m]) to about 2,500 ft (760 m) offshore. In cooperation and with the support of the Navy, researchers from the Channel Islands National Park Kelp Forest Monitoring Program came to SCI and conducted surveys in 2003 and 2004 (Department of the Navy [DoN] 2004). The research revealed that all monitoring sites had thick, healthy giant kelp canopies that covered 85 - 100 percent of the survey transects, and all monitoring sites appeared to have changed little from 2003-2004.

The waters around SCI out to a distance of one nautical mile (nm), or to the 300-ft isobath, have been designated as an Area of Special Biological Significance (ASBS). Under the proposed activities, the kelp forest is expected to continue providing high-quality marine habitat. Thus, with regard to marine flora, the proposed activities would be consistent to the maximum extent practicable with Section 30230.

3.3.2.1.2.2. Commercial and Recreational Fish Stocks, and Essential Fish Habitat (EFH)

Baseline Description of the Resource - Fish Stocks and EFH

Threats to offshore fish habitat generally include: navigation, dumping, offshore sand and mineral mining, oil and gas exploration, development, transportation, commercial and industrial activities, natural events, and global warming. Ninety-one fish and invertebrate species with designated Essential Fish Habitat (EFH) occur in the SOCAL OPAREAs (DoN 2008). They are grouped into the coastal pelagic species, Pacific coast ground fish, and highly migratory species.

Coastal pelagic species are small to medium-sized, schooling species, such as anchovies, mackerels, and sardines that migrate in coastal waters, often near the ocean surface. Coastal pelagic species collectively comprise one of the largest marine fisheries in California with respect to biomass, landed volume, and revenue. “Boom or bust” population cycles of coastal pelagic stocks have been attributed to several factors, including relatively short life-cycles, variable recruitment (percentage of individuals surviving to adulthood), and annual and longer-cycle variation in optimal habitats for spawning, larval survival, recruitment, and feeding. Large natural fluctuations in Coastal pelagic species abundance have been accentuated in the past by human influence (California Department of Fish and Game [CDFG] 2001).

Ground fish species are bottom-dwelling fin fishes such as flatfishes, skates, and rockfish. More than 80 species of marine fish are included in the *Pacific Coast Ground Fish Fisheries Management Plan (FMP)* adopted by the Pacific Fishery Management Council in 1982. Fewer than 20 of these commercially and recreationally important fish ever have been comprehensively assessed. The current status of many rockfish and lingcod off California is poor. Ground fish landings have declined sharply, and the condition of West Coast ground fish stocks generally is poor.

Highly migratory fish species include the tuna, billfish, pelagic sharks, and dolphin fish. This group contributes to valuable commercial fisheries, and is important to the sport fishery in southern California. The stocks of all highly migratory species are considered to be healthy (CDFG 2001). These species are less likely to be affected by conditions within the CZ than coastal pelagic species or ground fish species.

Effects of Proposed Activities - Fish Stocks and EFH

Several of the proposed training activities would directly affect the water column.

Pressure Waves

Pressure waves from non-explosive mine shapes, inert bombs, and intact missiles and targets hitting the water surface could result in short-term disturbances to fish or result in mortality. A small number of fish would be affected based on the small zone of influence associated with these pressure waves. These and several other types of activities common to many exercises or tests (muzzle blasts from naval guns, falling small arms rounds and other expended training materials; and underwater demolition) have minimal effects on fish. Underwater demolition exercises in Northwest Harbor would kill fish, but the area and number of fish that would be affected is relatively small. No population-level effects would result from the proposed activities because the number of organisms affected would be low relative to the total fish population.

Underwater Sound

Anti-Submarine Warfare (ASW) and Mine Interdiction Warfare (MIW) training would expose fish in the CZ to sonar at various levels, depending upon the distance between the source and the fish. Only a few species of fish may be able to hear the relatively higher frequencies of mid-frequency sonar, so effects of sonar on individual fish would be minimal. ASW exercises would be intermittent, and dispersed over a large area, so the potential for population-level effects would be negligible.

For mid- and high-frequency sounds, some potential effects on fish are clearly eliminated. Most fish species studied are hearing generalists, and cannot hear sounds above 0.5 to 1.5 kHz (depending upon the species); behavioral effects on these species from higher frequency sounds are unlikely. Even those marine species that may hear above 1.5 kHz have relatively poor hearing above 1.5 kHz, compared to their hearing sensitivity at lower frequencies. Thus, even among the species that have hearing ranges that overlap with mid- and high-frequency sounds, the fish will likely only actually hear the sounds if the fish and source are very close to one another. And, finally, since most sounds that are of biological relevance to fish are below 1 kHz (e.g., Zelick et al. 1999; Ladich and Popper 2004), even if a fish detects a mid- or high-frequency sound, these sounds will not mask detection of lower-frequency biologically relevant sounds. Thus, underwater sound will have few or no impacts on the behavior of fish.

Intense mid- and high-frequency signals or explosives could physically affect fish, damaging the swim bladder or other organs. These kinds of effects have only been seen in a few cases, in response to explosives, and only when the fish was very close to the source. Such effects have never been seen in response to any Navy sonar emissions. Moreover, at greater distances (distance affects the intensity of the signal from the source) sound appears to have little or no impact on fish, and particularly no impact on fish with no swim bladder or other air bubble that would be affected by rapid pressure changes.

Based on the evaluation presented in the SOCAL Range Complex Draft EIS/OEIS (DoN 2008), the likelihood of substantial effects on individual fish from the proposed use of MFA sonar is low. While MFA sonar may affect some individual fish (e.g. herring) the overall effects on populations will be minimal when compared to their natural daily mortality rates. Overall, the effects on fish of underwater sound generated by the proposed activities are likely to be minimal, considering the few fish species able to detect sound at the frequencies generated by the proposed activities and the limited exposure of juvenile fish with swim bladder resonance in the frequencies of the sound sources.

Falling Debris and Small Arms Rounds

Most missiles hit the target or are disabled before hitting the water. Thus, most missiles and targets enter the water as fragments that lose their kinetic energy at or near the surface. Expended small-arms rounds may hit the water surface with sufficient force to cause injury, but quickly lose their kinetic energy. Most fish swim well below the surface of the water. Therefore, fewer fish are killed or injured by falling fragments, whose effects are limited to the near surface, than from intact missiles and targets whose effects can extend well below the water surface. Effects of falling debris and small arms rounds on fish would be minimal because these events would be short in duration, small in footprint, and local.

Summary - Fish Stocks and EFH

In summary, the proposed activities would have no substantial effects on commercial or recreational fish stocks, or on Essential Fish Habitats, for the reasons discussed above. With respect to fish, marine resources would be maintained and the biological productivity of coastal waters would be sustained in accordance with Section 30230.

3.3.2.1.2.3. Special-Status Species

3.3.2.1.2.3.2 Abalone

White Abalone

Description of the Resource - White Abalone

The white abalone, a marine gastropod with a lifespan of more than 30 years, is listed as endangered under the federal Endangered Species Act (ESA). The white abalone is found at depths to 60 m (197 ft) on rocky substrate from Point Conception, California, to Punta Abreojos, Baja California, Mexico (Hobday and Tegner 2000; National Marine Fisheries Service [NMFS] 2001). White abalones are not randomly distributed on rocky substrate. They occupy crevices in open, low relief rock or boulder habitat surrounded by sand (Tutschulte 1976; Davis et al. 1996).

Historically, white abalone densities in southern California were greatest around the Channel Islands. For example, up to 80 percent of commercial landings were taken off SCI (Hobday and Tegner 2000; Rogers-Bennett et al. 2002). SCI also once supported a strong white abalone recreational fishery (Hobday and Tegner 2000). The current distribution of the species is primarily around islands along banks of the area (Davis et al. 1996; Davis et al. 1998; Hobday and Tegner 2000; DoN 2002).

Densities of the white abalone are very low throughout its range. The recent, documented 99 percent decline in the white abalone population is due to overfishing, not habitat degradation, so no critical habitat has been designated (NMFS 2001) Density estimates ranged from zero at Santa Cruz Island and Osborn Bank to 9.79/hectare (ha) (3.9/acre [ac]) at Tanner Bank (2.7/ha [1.1/ac] overall); 24 individuals recorded at 30–65-m (98-213 ft) depths off west SCI gave a density estimate of 0.96/ha (0.38/ac). NMFS conducted a submersible and multi-beam and side-scan sonar survey of Tanner Banks, about 80 kilometers (km) (128 miles [mi]) southwest of SCI, in 2002 for white abalone and abalone habitat. A total of 194 white abalone were recorded at depths of 30–60 m (98-197 ft), resulting in a density estimate of 18/ha (7.1/ac) (NMFS 2003). Another survey, a joint effort between NMFS, Scripps, California State University Monterey Bay, and the Navy using a remote operated vehicle (ROV) and divers to map white abalone habitat in waters 20–70 m (66-230 ft) deep on the western side of SCI, was completed in August 2004. During this survey, only six abalones were recorded at depths of 37–50 m (121-164 ft) (DoN 2005).

Effects of the Proposed Activities - White Abalone

Most training activities in the SOCAL OPAREAs are not likely to affect white abalone because those activities would occur outside the habitat of this species. Some Navy training and testing activities, however, could affect the species because they occur in or next to white abalone habitat, and result in objects entering or being placed within that habitat. These activities include sonobuoy testing and use and mine training exercises.

Sonobuoys

Sonobuoys are tested in SCIUR on the northeastern side of SCI. This area is located adjacent to the island, and extends 5 nm (9 km) offshore. Within this area, sonobuoys are tested seaward of the 3,000-ft (914-m) depth contour (approximately 1.5 mi [2.4 km] offshore). Sonobuoys that fail to function properly (approximately 5 percent) are recovered, and 10 percent of a given model of sonobuoy also could be recovered for QA/QC purposes. The rest are scuttled and sink to the bottom. Based on the current directions and operational procedure of scuttling the test sonobuoys while they are still over deep water, none of the sonobuoys would sink in the white abalone habitat at the northern end of SCI.

The probability of a sonobuoy sinking to the bottom on or next to a white abalone is very low due to the sparse distribution of white abalone and the likelihood that the sonobuoys would be scuttled far from abalone habitat. Modeling and laboratory testing have shown that the concentration of potentially toxic chemical components (lead, copper, and silver) of the seawater batteries used in sonobuoys released during operation of the batteries and during scuttling is below the maximum levels allowed in the California Ocean Plan. These substances are further diluted by oceanic currents. The slow release of chemicals during the corrosion of the sonobuoy materials is also well below toxic levels. Bioaccumulation of these metals by the attached algae eaten by white abalone is unlikely because the metals are released away from the nearshore areas where these algae grow and dilution by oceanic currents would keep concentrations too low for accumulation to levels that could be toxic to white abalone.

Mine Training

During mine training exercises, inert mine shapes are dropped from aircraft into specific MTRs along the western and southern sides of SCI (up to 91 shapes per exercise). Some of the mine shapes (approximately 25% per exercise) are recovered. The unrecovered shapes are made of inert materials that sink to the bottom. The four MTRs overlap white abalone habitat where they are over water less than 197 ft (60 m) deep. These overlap areas include the northern and eastern sides of MTR1, the eastern side of MTR2, the China Point area for the China Point range, and the northwestern corner (near China Point) of the Pyramid Head range. The number of mine shapes that could be dropped in white abalone habitat on each training range is shown in Table 3-2. The density of white abalone at SCI is estimated to be one per hectare (National Marine Fisheries Service (NMFS) FY01 Annual Report; nine abalones per million ft^2). Adult white abalones live on rock surfaces that are at various angles, and they may be within crevices or on the sides of rocks where they would be unlikely to be hit by falling objects. Mine shapes are made of inert materials (e.g., steel), and would have no effect on water quality or direct toxic effects if abalone were to come in contact with the mine shapes.

Table 3-2. Mine Shapes per Year in White Abalone Habitat

Location	Baseline	Proposed
MTR1	43	46
MTR2	17	18
China Point + Pyramid Head	18	18

Shallow Water Training Range Extension

The exact cable route has not been decided, so it is not possible to determine if sensitive habitat will be affected by the SWTR Extension. The marine biological resource that could be most affected by installation of the SWTR Extension is the white abalone. Anywhere the cable crosses between a depth of 65 to 196 ft (20 to 60 m) where the substrate is rocky, white abalone could be affected or abalone habitat could be disrupted.

If rocky substrate is avoided throughout the cable corridor, the activities that could affect marine biological resources are associated with the construction of the SWTR Extension. Direct impact and mortality of marine invertebrates at each node and from burial of the trunk cable would occur. Assuming that 300 transducer nodes will be used, approximately 65,400 ft^2 (6,075 m^2) of soft bottom habitat would be affected. Assuming that 14 nm (25.9 km) of the trunk cable will be buried (and assuming a width of 7.8 inches [20 cm], which is twice the wide of the trench to account for sidecasted material), approximately 55,757 ft^2 (5,180 m^2) of soft bottom habitat would be affected. Soft bottom habitats are not considered sensitive habitats, and generally support lower biological diversity than hard substrate habitats. Soft bottom organisms are also generally opportunistic and would be expected to rapidly re-colonize the disturbed areas. Local turbidity during installation may also temporarily impact suspension feeding invertebrates near the cable corridor and nodes. Therefore, assuming that rocky substrate is avoided, impacts of the SWTR Extension on marine biological resources would be minimal.

Summary - White Abalone

In summary, the proposed activities would have no substantial effects on populations of white abalone in the CZ. With respect to white abalone, species of special biological importance would be protected in accordance with Section 30230.

Black Abalone

Description of the Resource - Black Abalone

The black abalone (*Haliotis cracherodii*) was added to NMFS' Candidate Species list on June 23, 1999 (64 Federal Register [FR] 33466), transferred to NMFS' Species of Concern list on April 15, 2004 (69 FR 19975), and has since been proposed for the List of Endangered and Threatened Species under the ESA. Black abalone ranged historically from Crescent City (Del Norte County, California) to Cabo San Lucas (Southern Baja California). Black abalones are now found from Point Arena (Mendocino County, California) to Northern Baja California, but are rare north of San Francisco. Of the seven species of abalone found in California, black abalone is a relatively shallow water species, and is most abundant in rocky intertidal habitat, although they do occur from the high intertidal zone to a depth of 6 m. Larval black abalones tend to settle into areas of bare rock and coralline red algae. Once settled onto rocky substrata, black abalone juveniles consume rock-encrusting coralline algae and diatom and bacterial films. Adult black abalones feed primarily on pieces of algae drifting with the surge or current, such as kelp. Abalones are long-lived (30+ years) and black abalones take approximately 20 years to reach their maximum length. Black abalones are preyed upon by a wide variety of marine predators including sea stars, fishes, octopus, southern sea otter, and striped shore crab. (DoN 2008)

Historically, sea otter predation and hunting were the two primary sources of mortality for large black abalone. By the mid-1980s over harvesting had substantially reduced southern California coastal populations of black abalone. In the mid- and late-1980s, black abalone on the Channel Islands suffered massive local die-offs (generally >90 percent losses) from Withering Syndrome (WS), attributed to a Rickettsiales-like pathogen. The black abalone population decline in southern and central California has been attributed to over-harvesting and the onset of WS in southern California in the 1980s. Black abalone populations have declined by over 99 percent in southern California, except for San Nicolas and San Miguel Islands. No black abalones were observed during rocky intertidal surveys conducted at 11 locations around SCI in 2006. (DoN 2008)

A recent, intensive survey of black abalone distribution at SCI was conducted in January 2008. The area surveyed was between Northwest Harbor and Pyramid Head along the western shore within primary abalone habitat. Ten abalones were recorded, with most found at locations previously documented to support abundant populations (e.g., West Cove, Eel Point, Mail Point). All abalone were greater than 100 mm long, with no signs of recruitment (fresh shells), and most were observed on exposed headlands where Navy activities have little potential for interaction. Based on the area surveyed, the approximate black abalone density at SCI is estimated at one abalone per 2.3 ac (9,150 square meters [m^2]).

Effects of Proposed Activities - Black Abalone

Most Navy training and test activities in the SOCAL OPAREAs would not affect black abalone populations in the CZ because those activities would occur outside the areas inhabited by this species. NSFS and EFEXs, however, could affect the species because they could damage black abalone habitat.

During NSFS and EFEX activities, surface ships fire at surface targets in fire support areas in the Shore Bombardment Area (SHOBA). Potential impacts of NSFS activities include damage to rocky intertidal and subtidal habitat. Fire Support Area II is located in the China Cove area and has some rocky nearshore habitat (e.g., China Point) interspersed between sandy habitats. About 1.5 percent of the shells fired during NSFS fell short and entered the water during the baseline year. An unknown number of these may have detonated in or near rocky habitats and destroyed the substrate and associated organisms (e.g., surf grass, algae, and invertebrates).

No data are available on the extent of impacts, but they are predicted to affect areas on the order of 10s to 100s of square feet, denuding the substrate, or breaking existing rocks to create new unoccupied surfaces. It is not known if black abalones are present near Fire Support Area (FSA) II but, given the dramatic decline in black abalone populations due to WS, and island-wide intertidal surveys that documented 10 abalones around SCI, black abalone are presumed to be rare or absent at FSA II.

In summary, the proposed activities would have no substantial effects on populations of black abalone in the CZ. With respect to black abalone, species of special biological importance would be protected in accordance with Section 30230.

3.3.2.1.2.3.3 Sea Turtles

Baseline Description of the Resource

Four species of sea turtles may occur off the coast of southern California: loggerhead (*Caretta caretta*); leatherback (*Dermochelys coriacea*); eastern Pacific green (*Chelonia agassizi*); and olive ridley (*Lepidochelys olivacea*). The eastern Pacific green, also known as the black sea turtle, is considered by some to be a subspecies of the green sea turtle (*Chelonia mydas*). None of the four species are known to nest on southern California beaches. All of the four species are currently listed as either Endangered or Threatened under the Endangered Species Act (ESA) (see Table 3-3). No data are available on actual numbers of turtles occurring in southern California waters, but their presence in the SOCAL OPAREAs is considered very rare.

Table 3-3: Sea Turtle Status in SOCAL OPAREAs

Common Name (*Scientific Name*)	Status	Occurrence in Project Area
Loggerhead (*Caretta caretta*)	Threatened	very unlikely; rarely sighted
Leatherback (*Dermochelys coriacea*)	Endangered	very unlikely; rarely sighted
Green (*Chelonia agassizi*))	Threatened	very unlikely; rarely sighted
Olive Ridley (*Lepidochelys olivacea*)	Threatened	very unlikely; rarely sighted
Sources: DoN 2005, DoN 2002, NMFS and U.S. Fish and Wildlife Service (USFWS) 1998.		

The distribution of sea turtles is strongly affected by seasonal changes in ocean temperature. Young loggerhead, green, and olive ridley sea turtles are believed to move offshore into open ocean convergence zones where food is abundant (Carr 1987; National Research Council [NRC] 1990; NMFS and USFWS 1998a, 1998b, 1998c, 1998d). A survey of the eastern tropical Pacific found that sea turtles were present during 15 percent of observations in habitats of floating debris and material of biological origin (flotsam) (Pitman 1990; Arenas and Hall 1992). In general, sightings increase during summer as warm water moves northward along the coast (Stinson 1984). Sightings may also be more numerous in warm years than in cold years.

Stinson (1984) reported that over 60 percent of eastern Pacific green and olive ridley turtles observed in California waters were in waters less than 165 ft (50 m) deep. Green turtles were often observed along the shore in areas of eelgrass. Loggerheads and leatherbacks were observed over a broader range of depths out to 3,300 ft (1,000 m). When sea turtles reach subadult size, they move to the shallow, nearshore benthic feeding grounds of adults (Carr 1987; NRC 1990; NMFS and USFWS 1998a, 1998b, 1998c, 1998d). Aerial surveys off California have shown that most leatherbacks occur in slope waters, and that few occur over the continental shelf (Eckert 1993). Tracking studies found that migrating leatherback turtles often travel parallel to deep-water contours ranging in depth from 650 to 11,500 ft (200 to 3,500 m). Thus, loggerhead and leatherback turtles are not likely to be found in the CZ.

Effects of Proposed Activities

Mid-Frequency Active Sonar

Studies indicate that the auditory capabilities of sea turtles are centered in the low-frequency range (<1,000 hertz [Hz]). Green turtles exhibit maximum hearing sensitivity between 200 and 700 Hz, and may have a useful hearing span of 60–1,000 Hz. The response of juvenile loggerhead turtles to brief, low-frequency broadband clicks was tested, as well as their response to brief tone bursts at four frequencies from 250 to 1,000 Hz. The results demonstrated that loggerheads hear well between 250 and 1,000 Hz; within that frequency range, the turtles were most sensitive at 250 Hz. A recent study on the effects of air guns on sea turtle behavior also suggests that sea turtles are most likely to respond to low-frequency sounds. (DoN 2008)

The mid-frequency active sonar (MFAS) with the lowest operating frequency operates at a center frequency of 3.5 kilohertz (kHz). Sea turtles hear in the range of 30 to 2,000 Hz, with best sensitivity between 200 to 800 Hz, which is well below the center operating frequency of the sonar. Hearing sensitivity even within this optimal hearing range is apparently low, as threshold detection levels in water are relatively high at 160 to 200 decibels (dB) referenced to one micro-Pascal-meter (re 1 μPa-m), which is only slightly lower than the operating levels of the sonar. A temporary threshold shift would not be expected to occur at such a small margin over threshold in any species. Thus, no threshold shifts in green, olive ridley, or loggerhead turtles are expected. Given a lack of audiometric data, the potential for temporary threshold shifts among leatherback turtles must be classified as unknown, but would likely be similar to those of other sea turtles.

Even if sea turtles could sense sonar, physiological stress leading to endocrine and corticosteroid imbalances over the long term (allostatic loading) is unlikely. An example of plasma hormone responses to stress was described for breeding adult male green turtles. Using capture/restraint as a stressor, they found a smaller corticosterone response and significant decreases in plasma androgen for breeding migrant males compared to nonbreeding males. These responses were highly correlated with the poorer body condition and body length of migrant breeders, compared to nonmigrant and premigrant males. While this study illustrates the complex relationship between stress/physiological state and plasma hormone responses, these kinds of effects from mid-frequency active sonar are unlikely for sea turtles.

The role of long-range acoustical perception in sea turtles has not been studied. The concept of sound masking is difficult, if not impossible, to apply to sea turtles. Although low-frequency hearing has not been studied in many sea turtle species, most of those that have been tested exhibit low audiometric and behavioral sensitivity to low-frequency sound. Any potential for mid-frequency sonar to mask sea turtle hearing would be minimal. Also, although Navy ASW training may involve many hours of active ASW sonar events, the actual "pings" of the sonar signal may only occur several times a minute, because the ASW operators must listen for the return echo of the sonar ping before another ping is transmitted. Thus, acoustic sources used during ASW exercises in the CZ are unlikely to affect sea turtles. Finally, the general and ASW mitigation measures described in Section 2, intended to avoid exposure of sea turtles to underwater sound, would further reduce the potential for affecting sea turtles. With the potential for effects on individual sea turtles so low, the potential for an effect on a population of sea turtles is negligible.

Underwater Detonations

Very little is known about the effects of underwater detonations on sea turtles. Analysis of data on the propagation effects of underwater detonations in very shallow water (VSW) indicates that such detonations would not adversely affect the annual recruitment or survival of any sea turtle species and stocks. NSW in-water demolitions training and Extended Echo Ranging (EER)/Improved Extended Echo Ranging (IEER) sonobuoy detonations are unlikely to encounter sea turtles, due to the relatively small number of such exercises and the mitigation measures described in Section 2. With the potential for effects on individual sea turtles so low, the potential for an effect on a population of sea turtles is negligible.

Expended Military Training Materials

The Navy endeavors to recover expended training materials. Notwithstanding these efforts, it is not possible to recover all expended training materials, and some may be encountered by sea turtles. Expended military training materials that are not recovered generally sink; the amount that might remain on or near the sea surface is low, and the density of these materials in the CZ would be very low. Types of training materials that might be encountered include: parachutes of various types (e.g., those employed by personnel or on targets, flares, or sonobuoys); torpedo guidance wires, torpedo "flex hoses;" cable assemblies used to facilitate target recovery; sonobuoys; and Expendable Mobile ASW Training Targets (EMATT). The following discussion addresses major categories of expended materials.

Overall, the proposed activities would expend about 572 tons per year of training materials throughout the SOCAL Range Complex (DoN 2008). Based on very conservative assumptions, this rate of deposition would be equivalent to about 48 pounds (lb) per square nautical mile (nm^2) per year, as discussed in Section 3.4.4.4.1 of the Draft EIS/OEIS (DoN 2008). At such densities, the aggregate leaching of potentially hazardous substances from expended training items would still have no effect on the marine environment.

Torpedo Guide Wires

Submarine-launched torpedoes are equipped with a single-strand guidance wire, which is laid behind the torpedo as it moves through the water. At the end of a training torpedo run, the wire is released from the firing vessel and the torpedo to enable torpedo recovery. The wire sinks rapidly and settles on the ocean floor. Guide wires are expended with each exercise torpedo launched. Torpedoes fired from aircraft or surface ships do not include guidance or control wires. The Navy analyzed the potential entanglement effects of torpedo control wires on sea turtles, and concluded that the potential for entanglement will be low for the following reasons:

- The guide wire is a very thin-gauge copper-cadmium core with a polyolefin coating. The tensile breaking strength of the wire is a maximum of 19 kilograms (kg) (42 pounds [lb]), and can be broken by hand. Except for a chance encounter with the guide wire while it was sinking to the sea floor (at an estimate rate of 0.2 m [0.5 ft] per second), a sea turtle would be vulnerable to entanglement only if its diving and feeding patterns placed it in contact with the bottom.
- The torpedo control wire is held stationary in the water column by drag forces as it is pulled from the torpedo in a relatively straight line until its length becomes sufficient for it to form a chain-like droop. When the wire is cut or broken, it is relatively straight and the physical characteristics of the wire prevent it from tangling, unlike the monofilament fishing lines and polypropylene ropes identified in the entanglement literatures.

While it is possible that a sea turtle would encounter a torpedo guidance wire as it sinks to the ocean floor, the likelihood of such an event is considered remote, as is the likelihood of entanglement after the wire has descended to and rests upon the ocean floor.

Parachutes

Aircraft-launched sonobuoys, flares, torpedoes, and EMATTs deploy nylon parachutes of varying sizes. At water impact, the parachute assembly is expended and sinks, as all of the material is negatively buoyant. Some components are metallic and will sink rapidly. Entanglement and the eventual drowning of a sea turtle in a parachute assembly would be unlikely, because such an event would require the parachute to land directly on an animal, or the animal would have to swim into it before it sinks. The expended material will accumulate on the ocean floor and will be covered by sediments over time, remaining on the ocean floor and reducing the potential for entanglement. If bottom currents are present, the canopy may billow (bulge) and pose an entanglement threat to sea turtles with bottom-feeding habits; however, the probability of a sea turtle encountering a submerged parachute assembly and the potential for accidental entanglement in the canopy or suspension lines is low.

Torpedo Flex Hoses

Improved flex hoses or strong flex hoses will be expended during submarine launched torpedo exercises. Torpedoes fired from aircraft or surface ships do not include flex hoses. The Navy analyzed the potential for the flex hoses to affect sea turtles. This analysis concluded that the potential for entanglement of sea turtles would be insignificant for reasons similar to those stated for their potential entanglement in control wires:

- Flex hoses rapidly sink to the bottom upon release. Except for a chance encounter with the flex hose while it was sinking to the sea floor, a sea turtle would be vulnerable to entanglement only if its diving and feeding patterns placed it in contact with the bottom.
- Due to its stiffness, the flex hose will not form loops that could entangle sea turtle.

Expendable Mobile ASW Training Targets

EMATTs are approximately 5 by 36 in (12 by 91 centimeters [cm]), and weigh approximately 21 lb. EMATTs are much smaller than sonobuoys. EMATTs, their batteries, parachutes, and other components will scuttle, sink to the ocean floor, and be covered by sediments over time. The small amount of expended material will be spread over a relatively large area. Due to the small size and low density of the materials, these components are not expected to float at the water surface or remain suspended within the water column. Over time, the amount of materials will accumulate on the ocean floor, but due to ocean currents, the materials will not likely settle in the same area. Sea turtles will not be affected by expended EMATTs or their components.

Summary - Expended Materials. The potential for sea turtles to encounter expended Navy training and testing materials is very low, and the potential for these materials to harm a sea turtle are still lower. There is no potential for populations of sea turtles to be affected from the deposition of these materials in the SOCAL OPAREAs.

Falling Training Materials

The probability of injury to a sea turtle from falling items such as munitions constituents, inert ordnance, or targets is very low. There is no potential for populations of sea turtles to be affected from the deposition of these materials in the SOCAL OPAREAs.

Shallow Water Training Range Installation

Once underway during hydrophone array installation for the SWTR, the larger project vessels would move very slowly during cable installment activities (0 to 2 knots [0 to 3.7 km per hour]), and would not pose a collision threat to sea turtles that may be present. Entanglement of marine species is not likely because the rigidity of the cable that is designed to lie extended on the sea floor vice coil easily. Anchor and cable lines would be taut, posing no risk of entanglement or interaction with sea turtles that may be swimming in the area. Once installed on the seabed, the new cable and communications instruments would be equivalent to other hard structures on the seabed, again posing no risk of adverse effect on sea turtles. There are no documented incidents of sea turtle entanglement in a submarine cable during the past 50 years (Norman and Lopez 2002). The project vessels would abide by all appropriate Naval regulations regarding marine species sighting and reporting.

Summary - Sea Turtles

MFAS is not expected to have substantial effects on sea turtles. Underwater detonations could affect nearby sea turtles, but the Navy has put procedures in place to assure that a buffer area around a planned underwater detonation is clear of sea turtles, sea birds, and marine mammals; with these measures in place, no substantial effects on sea turtles are expected. Expended training materials are not anticipated to pose a substantial hazard to sea turtles, as discussed in detail above. The Navy's proposed activities would not affect sea turtle nesting areas.

In summary, the proposed activities in the CZ are not expected to have substantial effects on sea turtle populations. Sea turtles, which are of special biological importance because they are generally in decline, would be given special protection in accordance with Section 30230 of the CCA, as previously outlined in the discussion of the Navy’s mitigation measures in this document.

3.3.2.1.2.3.4 Seabirds

Baseline Description of the Resource

Seabird Populations

The abundant food in the California current, resulting from high ocean primary productivity, attracts millions of seabirds that breed or migrate throughout the region annually (Mills et al. 2005). Due to the mobility of birds, their ranges are not restricted to jurisdictions or boundaries. Populations of birds in SOCAL Range Complex are not accurately documented; however, the importance of the Southern California Bight (SCB) area for both breeding and migratory species has been well established. Currently, more than 195 species of birds use coastal or offshore aquatic habitats in the SCB; that is, the area of the Pacific Ocean lying between Point Conception on the Santa Barbara County coast to a point shortly south of the United States/Mexico border (Dailey et al. 1993). A variety of seabirds use this southern California coastal region for breeding and wintering. For certain seabird species, the area south of Point Conception, California, is the northern or southern perimeter of breeding or migratory ranges.

Coastal habitats and productive offshore waters are important nesting and foraging areas for breeding and migratory seabirds. Many of the SCB seabird populations roost on islands and offshore rocks around the Channel Islands. The Channel Islands offer nesting sites to seabird species, some of which have extremely scarce suitable habitat elsewhere in southern California. The southern Channel Islands (San Clemente, Santa Catalina, and Santa Barbara) provide vital habitat to nesting and migratory seabirds. However, the northern Channel Islands (San Miguel, Santa Rosa, Santa Cruz, San Nicolas, and Anacapa) contain the majority of seabird breeding colonies considered sensitive. Population status of breeding seabirds on the west coast has been measured primarily through the determination of, and trends in, population size based on counts of birds and nests at nesting colonies (Sowls et al. 1980).

Numerous seabirds occur in SOCAL Range Complex, with the most numerous groups being shearwaters, storm petrels, phalaropes, and auklets (see Table 3-4).

Table 3-4: Seabirds Known to Occur in SOCAL Range Complex

Common Name	Genus species	Status
red-throated loon	*Gavia stellata*	
arctic loon	*Gavial arctica*	
common loon	*Gavia immer*	
Laysan albatross	*Phoebastria immutabilis*	
black-footed albatross	*Phoebastria nigripes*	*BCC*
pink-footed shearwater	*Puffinus creatopus*	
sooty shearwater	*Puffinus ariseus*	
black-vented shearwater	*Puffinus opisthomelas*	
leach's storm-petrel	*Oceanodroma leucorhoa*	
ashy storm-petrel	*Oceanodroma homochroa*	*BCC*
black storm-petrel	*Oceanodroma melania*	
least storm-petrel	*Oceanodroma microsoma*	
California brown pelican	*Pelecanus occidentalis californicus*	*CE, FE*
double-crested cormorant	*Phalacrocorax auritus*	
Brandt's cormorant	*Phalacrocorax penicillatus*	
pelagic cormorant	*Phalacrocorax pelagicus*	
surf scoter	*Melanitta perspicillata*	
white-winged scoter	*Melanitta fusca*	
red-necked phalarope	*Phalaropus lobatus*	
red phalarope	*Phalaropus fulicaria*	
pigeon guillemot	*Cepphus columba*	
Xantus's murrelet	*Synthliboramphus hypoleucus*	*BCC*
Craveri's murrelet	*Synthliboramphus craveri*	
marbled murrelet	*Brachyramphus marmoratus*	*CE, FT*
Cassin's auklet	*Ptychoramphus aleuticus*	*BCC*
rhinoceros auklet	*Cerorhinca monocerata*	
BCC – Bird of Conservation Concern, 2002, **FE** – Federally Endangered, **FT** – Federally Threatened **CE** – California Endangered		

(Adapted from Dailey et al. 1993 with additions)

Seabird species known to occur in SOCAL Range Complex include federally endangered species (California brown pelican, short-tailed albatross), federally threatened species (marbled murrelet), and one candidate species for listing (Xantus's murrelet). The short-tailed albatross is unlikely to be found in the CZ, and is not discussed further in this CD. Seabirds identified as species of concern include several species of auklet, and murrelet, among others. All seabirds in SOCAL Range Complex are protected under the Migratory Bird Treaty Act (MBTA).

Shearwaters (Procellariidae)

Shearwaters are medium-sized, long-winged seabirds most common in temperate and cold waters. Shearwaters breed on islands and coastal cliffs. They are nocturnal at breeding sites. Outside of the breeding season, they are pelagic (frequent the open waters). They feed on fish, squid, and similar oceanic food.

Storm-petrels (Hydrobatidae)

Storm-petrels are small seabirds that feed on crustaceans and small fish picked from the surface. Storm-petrels are found in all oceans. They are strictly pelagic, coming to land only to breed. For most species, little is known of their behavior and distribution at sea.

Phalaropes (Scolopacidae)

These species winter at sea, mostly in tropical waters. Large numbers migrate south along the Califorina coast and winter off the west coast of South America.

Pelicans (Pelecanidae)

The California brown pelican (*Pelecanus occidentalis californicus),* listed as federally endangered under the ESA, breeds along the Pacific coast from the Channel Islands to Mexico. Its numbers have increased recently at the two primary nesting colonies in the Channel Islands (West Anacapa and Santa Barbara Island) following severe pre-1975 declines. Although California populations have recovered substantially from previous declines, they continue to show variation in productivity related to prey availability (Anderson et al. 1982). Approximately 12,000 brown pelicans breed in southern California, representing nearly 12 percent of the western subspecies (Kushlan et al. 2002). SOCAL Range Complex provides extensive breeding and foraging territory for the California brown pelican, including a large breeding population on Santa Barbara Island.

Cormorants (Phalacrocoracidae)

Cormorants are coastal rather than oceanic birds. Cormorants are colonial nesters, using trees, rocky islets, or cliffs. All three species occurring in SOCAL Range Complex have significant breeding populations in the Channel Islands, located on rocky headlands and isolated offshore rocks.

Alcids (Alcidae)

Alcids include auklets, guillemots, murres, and puffins. True seabirds, they come to land to breed in large colonies and then disperse to the open ocean for most of their lives. Important southern breeding colonies historically occurred on the Channel Islands of California, and continue to exist at mostly unknown levels.

Scoters (Anatidae)

Scoters are large sea ducks that spend the non-breeding part of the year in large rafts on the ocean or in open bays and inlets. They forage by diving, taking prey from the ocean floor and also taking mussels from man-made structures. Surf scoters nest in the Arctic and winter in open coastal environments, favoring shallow bays and estuaries with rocky substrates.

Current Mitigation Measures

SOCAL Range Complex training activities encompass a wide array of operations that include aircraft, ocean going vessels, and land-based activities. Currently, the majority of aircraft activities are concentrated at the Naval Auxiliary Landing Field (NALF) San Clemente Island (SCI). In accordance with OPNAV Instruction 5090.1C CH-22, the Environmental Division or Natural Resource Section of a Naval Air Station is responsible for preparing and implementing a Bird Aircraft Strike Hazard (BASH) Plan. The BASH program was established to minimize bird/aircraft interaction at Navy airfields. Following the outcome of an ecological study (wildlife hazard assessment) completed in 2002, several recommendations were made to increase aircraft safety by limiting bird strikes (DoN 2007). One general mitigation measure ensures that the California brown pelican is clear of any over-blast pressure prior to underwater demolition activities. Monitoring of seabird populations and colonies by conservation groups and researchers is conducted intermittently within coastal areas and offshore islands, often with the support of the Navy.

Effects of the Proposed Activities

Seabird Populations

The potential for proposed training and testing activities to conflict with seabirds centers primarily on islands and adjacent waters. The spatial and temporal variability of SOCAL Range Complex training and the seasonal changes in seabird foraging locations complicate the evaluation of direct or indirect effects.

Effects of ocean training and testing on seabirds breeding in SOCAL Range Complex are limited to activities within 0.25 km of known breeding seabird colonies on SCI and associated offshore rocks. Ocean activities that could affect seabirds do not occur within 0.25 km of Santa Barbara Island (SBI) or Santa Catalina Island (Catalina). Seal Cove and China Cove on SCI have documented breeding populations of ashy storm-petrels and Xantus's murrelets that are susceptible to ground and noise disturbance during their breeding season. Naval Surface Fire Support and Expeditionary Fires Exercise expend high-explosive ordnance within SHOBA Impact Area II. Detonations from ocean activities occurring within 0.25 km of nest sites during breeding season could have adverse effects on breeding success.

The potential for interaction between amphibious and small vessels and foraging or breeding seabirds involves training activities operating near beaches, offshore rocks, and islands where roosting or breeding seabirds are concentrated. Roosting or foraging seabirds could be disturbed by small vessel movement and explosions occurring near (within 500 meters of) seabird populations. Ingress and egress of amphibious vehicles and live-fire and explosive detonations around SCI are typically confined to Northwest Harbor, Wilson Cove, and SHOBA impact areas.

Populations of breeding seabirds near landing beaches are only sparingly documented, and similar habitat is available over much of SCI. Species most likely to be impacted are roosting cormorants and pelicans. Any effects on foraging, roosting, or breeding seabird populations related to amphibious landings or small vessel operation would be local and temporary.

Nearshore waters within 1 km (0.54 nm) are the primary foraging habitat for many seabird species. This area could be affected by ordnance explosions. Lethal exposure of birds to pressure waves varies, not only from size of the explosive and distance from impact, but also on the water depth at which the detonation occurs, overall depth, bottom substrate, and location of the bird both in distance from the detonation, and whether the bird is on the surface or underwater. The only offshore island in the SOCAL OPAREAs where Ingress/Egress, live fire, and detonations occur is SCI. The majority of nearshore habitat, within 1 km (0.54 nm), adjacent to SCI is rocky bottom, less than 100 ft (30 m) containing persistent kelp forests.

Excluding the eastern shore of SCI, where few nearshore training activities take place, seabirds are likely to be disturbed to some degree during amphibious vehicle and small boat activities. In-water detonations, planned and targeting error, both underwater and at the surface would affect seabirds in adjacent waters at various distances, depending on the size of the ordnance. Several of the sensitive species are nocturnal foragers, using waters more than 1 km offshore. Xantus's murrelet, ashy storm-petrel, and black storm-petrel are not likely to be affected, but California brown pelicans and cormorants are likely to be disturbed.

Both single charge and large underwater detonations take place at Northwest Harbor. All Mine Warfare and Mine Countermeasures Operations using explosive charges must include exclusion zones for marine mammals and sea turtles to prevent physical or acoustic effects to those species. These exclusion zones will extend in a 700-yard radius arc around the detonation site. Personnel are instructed not to detonate when birds are near ordnance activities. Operations are mostly single charges or closely spaced to allow for minimal time between detonations and to avoid seabird ingress.

Detonations at Northwest Harbor could affect nearby seabirds on or under the water at the time of the activity. In-water ordnance detonations would have lethal effects on foraging seabirds if pressure waves exceed 36 psi/msec for birds underwater and 100 psi/msec for birds at the surface (Yelverton et al. 1973). Northwest Harbor is a sandy beach, bordered by a rocky headland to the west, where seabirds roost. Adequate habitat for seabird roosting is adjacent to the facility, but frequent noise events may redistribute transient seabird species to less-disturbed areas of SCI.

Bombardments in SHOBA Impact areas I and II encompass the coastline of SCI, including rocky headlands and sandy beaches. Due to errors in targeting, detonations could occur in the nearshore waters adjacent to Impact Areas I and II. In-water detonations of incoming ordnance have the greatest potential of being lethal to seabirds. No site-specific data are available on roosting or foraging seabird populations in the SHOBA impact areas, but primary roosting and foraging habitat associated with rocky headlands and outcroppings is abundant within both areas. Considering the regular and persistent use of SHOBA Impact Areas I and II as target areas for ocean bombardments, the likelihood of detonations occurring in near coastal waters is high. Whether seabird species are present at the time of bombardment is uncertain. The probability that ocean activities would substantially affect seabird populations is low. Lethal effects on seabirds from in-water ordnance detonations have a low potential to occur, considering the infrequency of targeting errors and the low potential for seabirds to be foraging or roosting near explosions.

Potential effects on seabirds from entanglement by debris or materials resulting from ocean training activities are low, because most of the materials are negatively buoyant and large in size (i.e. rockets, ordnance, sonobuoys).

Information on the effects from sonar on seabirds is virtually unknown. Exposure of aquatic birds to anthropogenic underwater sounds is limited due to their short time under water. In general, birds are less susceptible to both TTS and PTS than are mammals (Saunders and Dooling 1974). Also, relatively severe acoustic overexposures that would lead to irreparable damage and large permanent threshold shifts in mammals are moderated somewhat in birds by subsequent hair cell regeneration. Reviewing the probability of explosions or sonar occurring near seabirds, and specifically diving seabirds, effects on seabird species would be infrequent.

The proposed Shallow Water Training Range (SWTR) encompasses a large area that supports various breeding and foraging seabird colonies, including roosting and breeding such as Brandt's cormorants, ashy storm- petrels, and Xantus's murrelets. Potential effects on seabird species from increased operational frequency and expansion of the SWTR range are related to noise and motion disturbance of roosting and foraging seabird species. Effects on migratory seabird species using offshore ranges for foraging are difficult to assess, in part, because few data are available on foraging patterns. The likelihood of lethal effects on seabirds from direct aircraft strikes and in-water detonations remains low.

Seabirds inhabiting SCI and mainland coastal areas near Camp Pendleton and Naval Air Station, North Island forage in the nearshore waters of the Range Complex on a daily basis. Increases in low-elevation helicopter and fixed winged aircraft activities in nearshore waters could increase the probability of seabirds being disturbed while foraging. Primary foraging habitat is expansive near SCI and along the mainland between Camp Pendleton and San Diego Bay. Disturbance of foraging seabirds by aviation activities is likely to increase in the SOCAL OPAREAs from increased activities, but would not alone reduce individual seabirds' breeding success.

The expansion of the SWTR extends the training range to the shoreline of SCI from near Eel Point south to the SHOBA boundary. The new SWTR boundary line encompasses a large area known to support various breeding and foraging seabird colonies, including roosting and breeding Brandt’s cormorants, ashy storm- petrels, and Xantus’s murrelets. Depending on the parameters of ocean training activities and their proximity, seabird colonies could be affected.

Construction of SWTR and the shallow water minefield involves the installation of moorings, cables, and hydrophones in waters more than 250 ft (80 m) depth. Potential effects on seabird species would be minimal. Potential effects of construction would be from disturbance by vessel traffic and drilling noise. Occurrences of seabirds foraging within the proposed construction footprint are not well documented, and any effect attributed to construction would be temporary and local.

Federally Threatened and Endangered Species

Marbled Murrelet (*Brachyramphus marmoratus*)

Marbled murrelets (*Brachyramphus marmoratus)* breed in northern California and the Pacific Northwest. Classified as rare migrants within the Range Complex, individuals have been infrequently sighted along coastal regions as far south as northern Baja, Mexico. This small bird flies close to the sea surface during non-breeding migrations between June and December, and does not use land areas within SOCAL Range Complex.

In coastal areas, foraging takes place in the SOCAL OPAREAs. Limited foraging overlap with Range Complex activities does not measurably increase the bird’s chance to interface with ocean operations because of the species’ limited time spent in the water and the infrequency of operations in nearshore waters. Marbled murrelets fly close to the sea surface and have limited potential of conflicting with aircraft transiting the SOCAL Range Complex. The spatial and temporal variability of both the occurrence of a marbled murrelet and the operations within SOCAL Range Complex (conducted within nearshore locations or at low elevation levels) combines to produce low probability of a direct or indirect effect on this species. SOCAL Range Complex operations would have no effect on marbled murrelet.

Xantus’s Murrelet (*Synthliboramphus hypoleucus*)

Xantus’s murrelets fly close to the sea surface and have limited potential for conflicting with aircraft transiting SOCAL Range Complex. Potential effects of range operations during the breeding season are most likely to occur from low-elevation aviation and land-based activities associated with offshore islands rather than open ocean training activities. Low-elevation aviation training activities and land based training activities are not performed near Santa Barbara Island or Santa Catalina Island. Santa Barbara Island, home of the largest documented breeding colony in southern California (2,264 in 1996), is part of Channel Island National Park and Channel Island National Marine Sanctuary. Santa Catalina Island is privately owned and supports private residents, vacation resorts, and a commercial airport.

Considering the limited number of individuals at SCI (20 in 1992), the isolated locations of their nests (Seal Cove and China Cove), and their nocturnal foraging habits, only a few training operations have a limited potential to affect Xantus’s murrelets. Conversely, the small size of the

San Clemente Island Xantus's murrelet population makes any mortality a substantial impact to the island population. Nesting sites near Seal Rock have some level of protection from operations since no live-fire activities would occur in that area, and only recently has the SWTR expanded the nearshore extension to include the shoreline near Seal Cove. Nesting sites near China Cove and Seal Cove are not specifically identified by location, and were estimated only by night time mist net captures and vocalizations documented by researchers performing population estimates in adjacent nearshore waters (Carter et al. 1992). Considering the species' high susceptibility to predation from introduced species, and the fact that no nests have been documented in the last two decades on SCI or Santa Catalina Island, it is possible that Xantus's murrelets only actively nest on remote isolated sea cliffs in this area.

China Cove is located in SHOBA Impact Area II, and is regularly targeted by ordnance launched from aviation and ocean platforms. Any explosion near (distance depends on size of the ordnance) nesting sites during breeding season could cause mortality or nest abandonment. Low-elevation aircraft transiting the area of Seal Cove or China Cove are not likely to have adverse effects on Xantus's murrelets unless the described aircraft hovers nearby for an extended period or emits bright lights at night.

Ocean or aviation operations have a low chance of directly or indirectly affecting breeding populations due to the species' habits, low elevation foraging, and the Navy's infrequent use of training areas adjacent to potential nesting sites. Impacts of ocean or aviation operations taking place in offshore waters used by foraging Xantus's murrelets would probably not occur due to the sheer size of potential foraging habitat and the bird's ability to avoid such disturbance. SOCAL Range Complex operations would have no effect on the Xantus's murrelet.

Californian Brown Pelican (*Pelecanus occidentalis californicus*)

Californian brown pelicans (*Pelecanus occidentalis californicus*) use SOCAL Range Complex for breeding, roosting and foraging. Documented breeding colonies in SOCAL Range Complex, occur only at SBI, a conservation management zone, thus, operations conducted within the Range Complex would likely have no effect on California brown pelican breeding colonies. Brown pelicans roosting or foraging within Range Complex boundaries use rocky headlands and nearshore waters at SCI, San Nicolas Island, SBI, and Santa Catalina Island; no previously displayed adverse effects from range operations have been documented. Any disturbance impacts during foraging or roosting away from the breeding colony would be insufficient to affect breeding success.

Summary

The Navy's proposed activities would have minimal effects on seabird populations, in general, and on special-status seabirds. Breeding areas would not be affected. Therefore, the proposed activities would maintain biological productivity as it pertains to seabirds.

3.3.2.1.2.3.5 Marine Mammals

Baseline Description of the Resource

Cetaceans

Twenty-seven species of cetaceans could be encountered in the SOCAL OPAREAs (Table 3-3), not including species considered to be extralimital in the SOCAL OPAREAs. They include both toothed whales (odontocetes) and baleen whales (mysticetes). At least ten species generally can be found in the SOCAL OPAREAs in moderate or high numbers, either year-round or during annual migrations into or through the area. Other species are represented by either small numbers, moderate numbers during part of the year, occasional sightings, or strandings. Five species of endangered or threatened cetaceans occur in the SOCAL OPAREAs. The blue whale

(*Balaenoptera musculus*), fin whale (*B. physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*B. borealis*), and sperm whale (*Physeter macrocephalus*) are listed as endangered species and are protected under the ESA.

A comparison of cetacean abundance in 1979-1980 with abundance in 1991 indicated that numbers of mysticetes and odontocetes increased in offshore California waters during that period. The status of cetacean stocks and their abundance estimates for California are summarized in Table 3-5 from marine mammal stock assessments prepared by Barlow et al. (1997), Forney et al. (2000), and Carretta et al. (2001 and 2004). The life histories of the cetaceans found in SOCAL Range Complex are described in Section 3.9 of the SOCAL Range Complex Draft EIS/OEIS.

Table 3-5: Marine Mammal Species Found in Southern California Waters

Common Name Species Name	Abundance in Southern California (number)	Stock (SAR)	ESA/ MMPA Status	Population Trend
Blue whale *Balaenoptera musculus*	842	Eastern North Pacific	E, D, S	May be increasing
Fin whale *Balaenoptera physalus*	359	California, Oregon, & Washington	E, D, S	May be increasing
Humpback whale *Megaptera novaeangliae*	36	California, Oregon, & Washington	E, D, S	Increasing 6-7%
Sei whale *Balaenoptera borealis*	0 (7 Bryde's or Sei)[3]	Eastern North Pacific	E, D, S	May be increasing
Sperm whale *Physeter macrocephalus*	607	California, Oregon, & Washington	E, D, S	Unknown
Guadalupe fur seal *Arctocephalus townsendi*	San Miguel Is. is in southern California, but is outside of the SOCAL Range Complex	Mexico	T, D, S	Increasing 13.7%
Southern Sea Otter *Enhydra lutris*	~29 (ground surveys)	California	T, D	Increasing
Bryde's whale *Balaenoptera edeni*	0 (7 Bryde's or Sei)[3]	California		Unknown
Gray whale *Eschrichtius robustus*	Population migrates through SOCAL Range Complex	Eastern North Pacific		Increasing ~ 2.5%
Minke whale *Balaenoptera acutorostrata*	226	California, Oregon, & Washington		Unknown
Baird's beaked whale *Berardius bairdii*	127	California, Oregon, & Washington		Unknown
Bottlenose dolphin coastal *Tursiops truncatus*	323	California Coastal		Stable
Bottlenose dolphin offshore *Tursiops truncatus*	1,831	California Offshore		Unknown
Cuvier's beaked whale *Ziphius cavirostris*	911	California, Oregon, & Washington		Unknown
Dall's porpoise *Phocoenoides dalli*	727	California, Oregon, & Washington		Unknown
Dwarf sperm whale *Kogia sima*	0	California, Oregon, & Washington		Unknown
False killer whale *Pseudorca crassidens*	Unknown	Eastern Tropical Pacific		Unknown
Killer whale offshore *Orcinus orca*	30	Eastern North Pacific		Unknown
Killer whale transient *Orcinus orca*	Unknown	Eastern North Pacific		Unknown
Long-beaked common dolphin *Delphinus capensis*	17,530	California		Unknown – seasonal

Table 3-5: Marine Mammal Species Found in Southern California Waters (continued)

Common Name Species Name	Abundance in Southern California (number)	Stock (SAR)	ESA/ MMPA Status	Population Trend
Mesoplodont beaked whales *Mesoplodon spp.*	132	California, Oregon, & Washington		Unknown
Northern right whale dolphin *Lissodelphis borealis*	1,172	California, Oregon, & Washington		No Trend
Pacific white-sided dolphin *Lagenorhynchus obliguidens*	2,196	California, Oregon, & Washington		No Trend
Pantropical spotted dolphin *Stenella attenuate*	Unknown	Eastern Tropical Pacific		Unknown
Pygmy sperm whale *Kogia breviceps*	0	California, Oregon, & Washington		Unknown
Risso's Dolphin *Grampus griseus*	3,418	California, Oregon, & Washington		No Trend
Rough-toothed dolphin *Steno bredanensis*	Unknown	Tropical and warm temperate		Unknown
Short-beaked common dolphin *Delphinus delphis*	165,400	California, Oregon, & Washington		Unknown – seasonal
Short-finned pilot whale *Globicephala macrorhynchus*	118	California, Oregon, & Washington		Unknown
Spinner dolphin *Stenella longirostris*	Unknown	Tropical and warm temperate		Unknown
Striped dolphin *Stenella coeruleoalba*	12,529	California, Oregon, & Washington		No Trend
Harbor seal *Phoca vitulina*	5,271 (All age classes from aerial counts)	California		Stable
Northern elephant seal *Mirounga angustirostris*	SNI 9,794 pups in 2000. SCI up to 16 through 2000	California		Increasing
California sea lion *Zalophus californianus*	All pupping occurs in southern California	U.S. Stock		Increasing 6.1%
Northern fur seal *Callorhinus ursinus*	7,784	San Miguel Island		Increasing 8.3%

Stock or population abundance estimates and the associated correlation of variance (CV) from NMFS Stock Assessment Reports (SAR), their status under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA), the population trend, and relative abundance in each range area. E=Endangered under the ESA; D = Depleted under the MMPA; and S=Strategic Stock under the MMPA. Due to lack of information, several of the Mesoplodont beaked whales have been grouped together.

Of the 27 species of cetaceans expected to be present in the SOCAL Range Complex areas, only one (bottlenose dolphin) is expected to be regularly present in the CZ (see Table 3-6). Another two species (gray whale, long-beaked common dolphin) are expected to be present in the CZ occasionally, either seasonally for the gray whale, or periodically during foraging or regular movement for long-beaked common dolphin.

After a review of published scientific literature, it was determined that the other 24 cetaceans within Southern California water are more typically open ocean species not normally found in or near the CZ (Forney et al. 1995, Forney and Barlow 1998, Carretta et al. 2000, Soldevilla et al. 2006, Barlow and Forney 2007). Many of these species also have seasonal occurrence within the offshore waters of SOCAL and may not be present during certain times of the year (Forney and Barlow 1998, Barlow and Forney 2007). Because these species are not found in the CZ on a regular or cyclical basis, they are not coastal resources and will not be considered further in this analysis [See 40 C.F.R. § 930.11(b)]. No ESA-listed cetaceans are expected to be present in or near the CZ within the area of the proposed activities.

Pinnipeds

Five species of pinnipeds (northern fur seal, Guadalupe fur seal, California sea lion, Pacific harbor seal, northern elephant seal) may occur in the offshore waters of the SOCAL Range Complex. While all five species may be considered common to occasional in the CZ, only four species potentially use CZ resources within SOCAL Range Complex (California sea lion, Guadalupe fur seal, northern elephant seal, and Pacific harbor seal). The only southern California breeding area for northern fur seals is at San Miguel Island in the northern Channel Islands, which is outside of SOCAL Range Complex; any effects of SOCAL Range Complex activities on this species would be temporary and, due to distance, would not result in effects felt within the Coastal Zone .

Table 3-6: Southern California Marine Mammal Species Occurrences in Coastal Zone

Common Name Species Name	SOCAL Range Complex Occurrence	Seasonal Occurrence		Coastal Zone Occurrence (√)	
		May-Oct (warm)	Nov-Apr (cold)	Resident	Occasional
Gray whale *Eschrichtius robustus*	Transient during seasonal migrations	NO	YES		√
Bottlenose dolphin coastal *Tursiops truncatus*	Limited, small population within one km of shore	YES	YES	√	
Long-beaked common dolphin *Delphinus capensis*	Common; more inshore distribution	YES	YES		√
Harbor seal *Phoca vitulina*	Common; Channel Islands haul-outs including SCI	YES	YES	√	
Northern elephant seal *Mirounga angustirostris*	Common; Channel Island haul-outs of different age classes; including SCI Dec-Mar and Apr-Aug; spend 8-10 months at sea	YES	YES	√	
California sea lion *Zalophus californianus*	Common; most common pinniped, Channel Islands breeding sites in summer	YES	YES	√	
Guadalupe fur seal *Arctocephalus townsendi*	Rare; Occasional visitor to northern Channel Islands; mainly breeds on Guadalupe Is., Mexico, May-Jul	UNK	UNK		√
Southern Sea Otter *Enhydra lutris*	Main distribution at San Nicolas Island on the northern end of the SOCAL Range Complex is translocated population of approximately 29 animals, is experimental population not considered endangered	YES	YES	√ At SNI	

Note: UNK - unknown

The California sea lion (*Zalophus californianus*), is abundant in the Southern California Bight. A small rookery is located on Santa Barbara Island (SBI). Guadalupe Island, just south of the SOCAL OPAREAs, is a major haul-out site (DoN 2005). Large colonies of California sea lions are found on San Nicolas Island (SNI) and San Miguel Island (SMI). Harbor seals (*Phoca vitulina*) and northern elephant seals (*Mirounga angustirostris*) haul out regularly in small numbers, and occasionally pup on SCI. The harbor seal occupies haul-out sites on mainland beaches and all of the Channel Islands, including SBI, Santa Catalina, and SNI (DoN 2005). Small colonies of northern elephant seals breed and haul out on SBI with large colonies on SNI and SMI (DoN 2005). The Guadalupe fur seal (*Arctocephalus townsendi*) also is found, rarely, in the SOCAL OPAREAs. This species is listed as threatened under the ESA, and is considered to be depleted and strategic under the MMPA.

The overall abundance of pinnipeds increased rapidly on the Channel Islands between the end of commercial exploitation in the 1920s and the mid-1980s. The growth rates of populations of some species appear to have declined after the mid-1980s, and some survey data suggested that local populations of some species were declining. The populations may have declined from interspecific competition or from populations exceeding the carrying capacity of the environment (Stewart et al. 1993; Hanan 1996). More recently, most populations are increasing (Carretta et al. 2004). In some cases, seals have recently occupied new rookeries and haul-out areas.

Fissipeds (Southern Sea Otter)

The southern sea otter is listed as threatened under the ESA. Sea otters once ranged throughout the northern Pacific Coastal region, from Russia and Alaska to Mexico (Kenyon 1969). The southern sea otter's current range is restricted to coastal central California, from Point Año Nuevo to south of Point Conception (Orr and Helm 1989; USFWS 1996, 2005), plus a small, translocated population at SNI.

Sea otters are rarely sighted in SOCAL Range Complex except for the experimental population around San Nicolas Island. Only three sea otter sightings have been reported near SCI (Leatherwood et al. 1978). All of those sightings were about 3 mi (5 km) from SCI during the NMFS/SWFSC 1998–1999 surveys (Carretta et al. 2000). Except for the small SNI population, this species is not expected to be significantly present within the SOCAL Range Complex. Therefore density information cannot meaningfully be calculated, and thus sea otters are not included in subsequent underwater effects modeling. As described in Section 1.2.3, the only activities included in this CD for the Point Mugu Sea Range (PMSR), which includes the area around San Nicolas Island, are the mid frequency active sonar operations conducted during major exercises. Other Navy activities are addressed in a previous CD and associated EIS.

Approach to Analysis of Acoustic Effects

Analytical Framework for Assessing Marine Mammal Response to Sonar

Conceptual Framework

Marine mammals respond to various types of man-made sounds introduced in the ocean environment. Responses are typically subtle, and can include shorter surfacings, shorter dives, fewer blows per surfacing, longer intervals between blows (breaths), ceasing or increasing vocalizations, shortening or lengthening vocalizations, and changing frequency or intensity of vocalizations (NRC 2005). However, it is not known how these responses relate to significant effects (e.g., long-term effects or population consequences) (NRC 2005). Assessing whether a sound may disturb or injure a marine mammal involves understanding the characteristics of the acoustic sources, the marine mammals that may be present in the vicinity of the sound, and the effects that sound may have on the physiology and behavior of those marine mammals. Although it is known that sound is important for marine mammal communication, navigation and foraging (NAS 2003; NRC 2005), there are many unknowns in assessing the effects and significance of marine mammals responses to sound exposures. For this reason, the Navy enlisted the expertise of National Marine Fisheries Service (NMFS) as the cooperating agency. NMFS's input assisted the Navy in developing a conceptual analytical framework for evaluating what sound levels marine mammals might receive as a result of Navy training actions, whether marine mammals might respond to these exposures, and whether that response might have a mode of action on the biology or ecology of marine mammals such that the response should be considered a potential harassment. From this framework of evaluating the potential for harassment incidents to occur, an assessment of whether acoustic sources might impact populations, stocks or species of marine mammals can be conducted.

The conceptual analytical framework (Figure 3-1) presents an overview of how the mid-frequency active sonar sources used during training are assessed to evaluate the potential for marine mammals to be exposed to an acoustic source, the potential for that exposure to result in a physiological effect or behavioral response by an animal.

The first step in the conceptual model is to estimate the potential for marine mammals to be exposed to a Navy acoustic source.

- What action will occur? Identify all acoustic sources that would be used in the exercises and the specific outputs of those sources (this information is provided in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]).
- Where / when will the action occur? Species occurrence and density data determine the subset of marine mammals that may be present when an acoustic source is operational.
- What underwater acoustic environment will be encountered? The acoustic environment here refers to environmental factors that influence the propagation of underwater sound. Acoustic parameters influenced by the place, season, and time are described in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]).
- How many marine mammals would be exposed to sound from the acoustic sources? Sound propagation models are used to predict the received exposure level from an acoustic source, and these are coupled with species distribution and density data to estimate the accumulated received energy and sound pressure level that might be received at a level that could be harmful or affect behavior. The acoustic modeling is described in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]).

The next steps in the analytical framework evaluate whether the sound exposures predicted by the acoustic model might cause a response in a marine mammal, and if that response might injure an animal or affect its behavior. To analyze the potential impacts of sound in the water relative to CCC enforceable policies, categories of physical and behavioral responses of marine mammals to sound must be defined and correlated with quantitative levels of underwater sound. In this CD, the Marine Mammal Protective Act (MMPA) measures of Level A Harassment, which correlates with potential injury, and Level B Harassment, which correlates with behavioral effects, will be used to support this analysis. The MMPA measures of Level A and Level B Harassment are designed to evaluate effects on individual animals, however, so the results of this quantitative analysis must then be generalized to the entire local population of each affected species.

The response assessment portion of the analytical framework examines the following question: Which potential acoustic exposures might result in harassment of marine mammals?

The predicted acoustic exposures are first considered within the context of the species biology (e.g., can a marine mammal detect the sound, and is that mammal likely to respond to that sound?). If a response is predicted, is that response potentially ‘harassment’ in accordance with the definitions presented above? For example, if a response to the acoustic exposure has a mode of action that results in a consequence for an individual, such as interruption of feeding, that response or repeated occurrence of that response could be a significant alteration of natural behavioral patterns, and therefore would be Level B harassment.

The flow chart below (Figure 3-1) represents the general analytical framework used in applying the thresholds discussed in this section. The flow chart is organized from left to right, and is compartmentalized according to the phenomena that occur within each. These phenomena include:

- the physics of sound propagation (Physics),
- the potential physiological processes associated with sound exposure (Physiology),

- the potential behavioral processes that might be affected as a function of sound exposure (Behavior), and
- the immediate effects these changes may have on functions the animal is engaged in at the time of exposure (Life Function – Proximate).

These compartmentalized effects are extended to longer-term life functions and into population-level and species-level effects. In the flow chart, dotted and solid lines connect related events. Solid lines designate those effects that “will” happen; dotted lines designate those that “might” happen but must be considered (including those hypothesized to occur but for which there is no direct evidence).

Some boxes on the flow chart are colored according to how they relate to the definitions of harassment. Red boxes correspond to events that are injurious (Level A harassment). Yellow boxes correspond to events that qualify as Level B harassment; the onset of TTS is Level B harassment. Boxes that are shaded from red to yellow have the potential for injury and behavioral disturbance. The analytical framework outlined in the flow chart acknowledges that physiological responses must always precede behavioral responses (i.e., there can be no behavioral response without first some physiological effect of the sound). Each functional block only occurs once, and all relevant inputs and outputs flow to or from a single instance.

Physiology

Potential auditory effects are assessed by considering the characteristics of the received sound (e.g., amplitude, frequency, duration) and the sensitivity of the exposed animals. Some of these assessments are numerical (e.g., TTS, permanent threshold shift [PTS], perception). Others are necessarily qualitative, due to lack of information, or will need to be extrapolated from other species for which information exists. Potential physiological responses to sound are ranked in descending order, with the most severe impact (auditory trauma) at the top and the least severe impact at the bottom (the sound is not perceived).

- Auditory trauma represents direct mechanical injury to auditory structures, including tympanic membrane rupture, disarticulation of the middle ear ossicles, and trauma to the inner ear structures. Auditory trauma is always injurious but could be temporary and not result in PTS. Auditory trauma is always assumed to result in a stress response.

- Sounds with sufficient amplitude and duration to be distinguished from background ambient noise are considered to be perceived. This category includes sounds from the threshold of audibility through the normal dynamic range of hearing. To determine whether an animal perceives the sound, the received level, frequency, and duration of the sound are compared to what is known of the species’ hearing sensitivity.

Audible sounds may interfere with an animal’s ability to detect other sounds at the same time, so perceived sounds can cause auditory masking. Unlike auditory fatigue, which always results in a stress response, masking may or may not result in a stress response, depending on the degree and duration of the masking effect. Masking may also cause an animal’s ability to detect other sounds to be compromised without the animal’s knowledge. This could result in sensory impairment and subsequent behavior change; in this case, the change in behavior is the *lack of a response* that would normally be made if sensory impairment did not occur. For this reason, masking also may lead directly to behavior change without first causing a stress response.

The features of perceived sound (e.g., amplitude, duration, temporal pattern) are also used to judge whether the sound exposure is capable of producing a stress response. Factors to consider in this decision include the probability of the animal being naïve or experienced with the sound (i.e., what are the known/unknown consequences of the exposure).

Potential impacts on tissues other than those of the auditory system are assessed by considering the characteristics of the sound (e.g., amplitude, frequency, duration) and the known or estimated response characteristics of non auditory tissues. Some of these assessments can be numerical (e.g., exposure required for rectified diffusion). Others will be necessarily qualitative, due to lack of information. Each of the potential responses may or may not result in a stress response.

- Direct tissue effects – Direct tissue responses to sound stimulation may range from tissue shearing (injury) to mechanical vibration with no resulting injury. Any tissue injury would produce a stress response, whereas non-injurious stimulation may or may not.

Indirect tissue effects – Based on the amplitude, frequency, and duration of the sound, it must be assessed whether exposure is sufficient to indirectly affect tissues. The probability of any other indirect tissue effect will necessarily be based on what is known about the specific process involved. No tissue effects – the received sound is insufficient to cause either direct mechanical or indirect effects on tissues. No stress response occurs.

Stress Response

The acoustic source is considered a potential stressor if, by its action on the animal, via auditory or non auditory means, it may produce a stress response in the animal. With respect to the later discussions of allostasis and allostatic loading, stress response will mean an increase in energy expenditures that result from exposure to the stressor, and which are characterized by either the stimulation of the sympathetic nervous system (SNS) or the hypothalamic-pituitary-adrenal (HPA) axis (Reeder and Kramer 2005). The SNS response to a stressor is immediate and acute, and results in a release of specific hormones. These hormones elevate heart and respiration rates, increase awareness, and increase the availability of glucose and lipids. The HPA response is ultimately defined by increases in secretion of glucocorticoid steroid hormones, predominantly cortisol in mammals. The amount of this increase above baseline may indicate the overall severity of a stress response (Hennessy et al. 1979).

The presence and magnitude of a stress response in an animal depends on several factors, such as the animal's life history stage, environmental conditions, reproductive or developmental state, and experience with the stressor. These factors will be subject to individual variation, and will also vary within an individual over time.

The stress response may or may not result in a behavioral change**,** depending on the characteristics of the exposed animal. However, if a stress response occurs, then a contribution is made to the animal's allostatic load. Allostasis is the ability of an animal to maintain stability through change by adjusting its physiology in response to predictable or unpredictable events (McEwen and Wingfield 2003). The hormones associated with the stress response vary naturally over an animal's life, supporting particular life events (e.g., pregnancy) and predictable environmental conditions (e.g., seasonal changes). The allostatic load is the cumulative cost of allostasis to an animal, and is characterized by an animal's energetic expenditures. Perturbations in an animal that may occur with the presence of a stressor, either biological (e.g., predator) or anthropogenic (e.g., construction), can contribute to the allostatic load (McEwen and Wingfield 2003). Additional costs are cumulative, and additions to the allostatic load over time may reduce the probability of achieving ultimate life history functions (e.g., survival, maturation, reproductive effort, and success) by producing pathophysiological states. The contribution to the allostatic load from a stressor requires estimating the magnitude and duration of the stress response, as well as any secondary contributions that might result from a change in behavior.

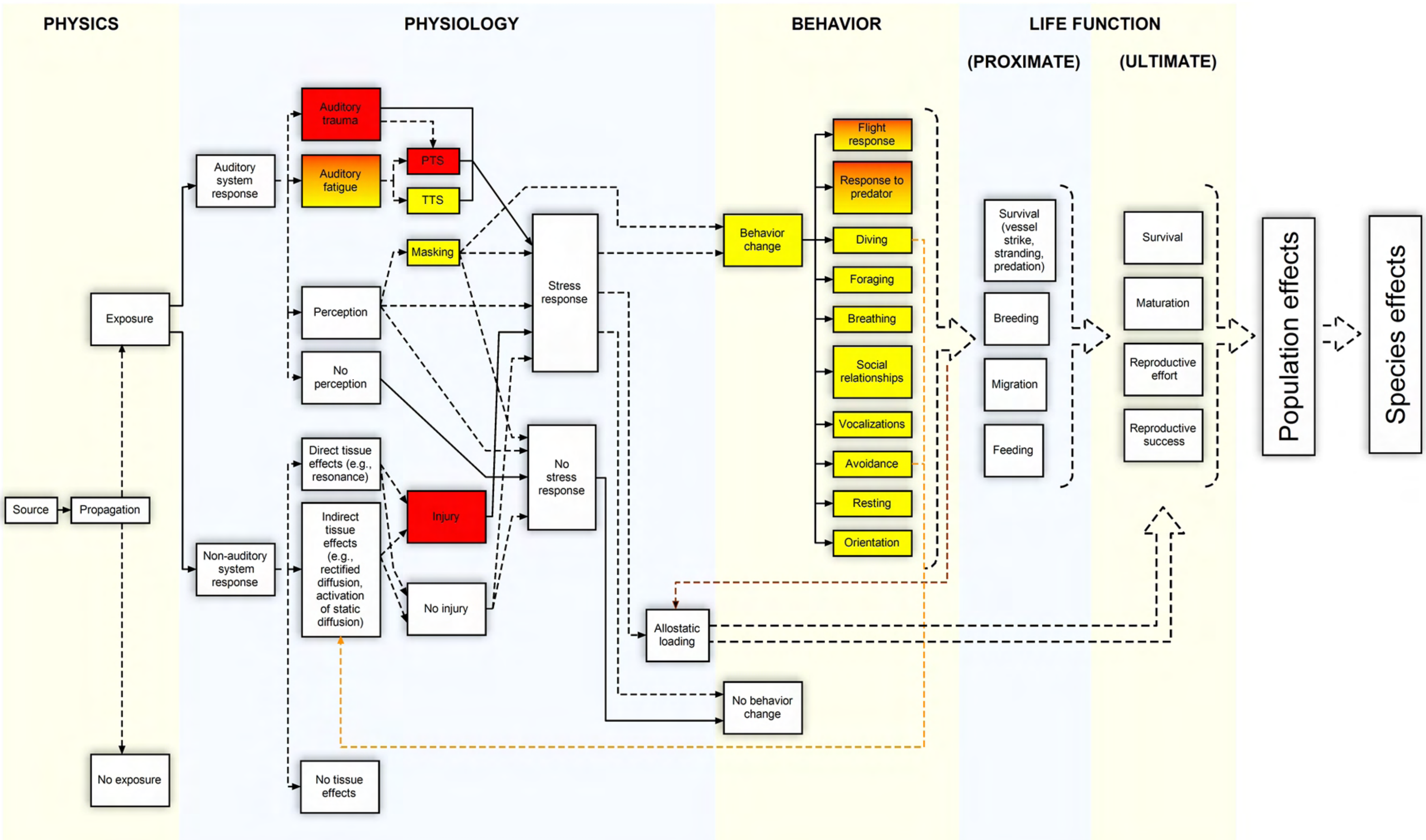


Figure 3-1: Conceptual Model for Assessing Effects of MFA Sonar Exposures on Marine Mammals.

If the acoustic source does not produce tissue effects, is not perceived by the animal, or does not produce a stress response by any other means, then the exposure does not contribute to the allostatic load. Additionally, without a stress response or auditory masking, there can be no behavioral change. Conversely, any immediate effect of exposure that produces an injury is assumed to also produce a stress response and contribute to the allostatic load.

Behavior

Acute stress responses may or may not cause a behavioral reaction. However, all changes in behavior are expected to result from an acute stress response. Some sort of physiological trigger must exist to change any behavior that is already being performed. The exception to this rule is masking. The presence of a masking sound may not produce a stress response, but may interfere with the animal's ability to detect and discriminate biologically relevant signals. The inability to detect and discriminate biologically relevant signals hinders the potential for normal behavioral responses to auditory cues and is thus considered a behavioral change.

Numerous behavioral changes can result from a stress response. For each potential behavioral change, the magnitude of the change and the severity of the response need to be estimated. Conditions such as stampeding (flight response) or fleeing a predator might result in injury. Such an event would be considered a Level A harassment. Each altered behavior may also disrupt biologically significant events (e.g., breeding or nursing), and may be a Level B harassment. All behavioral disruptions can contribute to the allostatic load. This secondary potential is signified by the feedback from the collective behaviors to allostatic loading.

Special considerations are given to the potential for avoidance and disrupted diving patterns. Due to past incidents of beaked whale strandings associated with sonar operations, feedback paths are provided between avoidance and diving and indirect tissue effects. This feedback accounts for the hypothesis that variations in diving behavior or avoidance responses can result in nitrogen tissue supersaturation and nitrogen off-gassing, and possibly deleterious vascular bubble formation. Although hypothetical, this hypothesis is currently popular and hotly debated.

Life Function

PROXIMATE LIFE FUNCTIONS. Proximate life history functions are the functions that the animal is engaged in at the time of acoustic exposure. The disruption of these functions, and the magnitude of the disruption, is something that must be considered in determining how the ultimate life history functions are affected. Consideration of the magnitude of the effect to each of the proximate life history functions is dependent upon the life stage of the animal.

ULTIMATE LIFE FUNCTIONS. Ultimate life functions enable an animal to contribute to the population (or stock, or species, etc.). The impact on ultimate life functions will depend on the nature and magnitude of the perturbation to proximate life history functions. Depending on the severity of the response to the stressor, acute perturbations may have nominal to profound impacts on ultimate life functions. Assessment of the magnitude of the stress response from the chronic perturbation would require an understanding of how and whether animals acclimate to a specific, repeated stressor and whether chronic elevations in the stress response (e.g., cortisol levels) produce fitness deficits.

The proximate life functions are loosely ordered in decreasing severity of impact. Mortality (survival) has an immediate effect, in that no future reproductive success is feasible and there is no further addition to the population resulting from reproduction. Severe injuries may also lead to reduced survivorship (longevity) and prolonged alterations in behavior. The latter may further affect an animal's overall reproductive success and reproductive effort. Disruptions of breeding have an immediate impact on reproductive effort and may impact reproductive success. The magnitude of the effect will depend on the duration of the disruption and the type of behavior change that was provoked. Disruptions to feeding and migration can affect all of the ultimate life functions; however, the impacts to reproductive effort and success are not likely to be as severe or immediate as those incurred by mortality and breeding disruptions.

Physiological Effects

TTS in Marine Mammals

A number of investigators have measured TTS in marine mammals. These studies measured hearing thresholds in trained marine mammals before and after exposure to intense sounds. Some of the more important data obtained from these studies are onset-TTS levels – exposure levels sufficient to cause a just-measurable amount of TTS, often defined as 6 dB of TTS (for example, Schlundt et al. 2000). The existing cetacean and pinniped TTS data for underwater exposure are summarized in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]). The existing TTS data show that, for the species studied and sounds (non- impulsive) of interest, the following is true:

- The growth and recovery of TTS are analogous to those in land mammals. Marine mammal TSs depend on the amplitude, duration, frequency content, and temporal pattern of the sound exposure. Threshold shifts will generally increase with the amplitude and duration of sound exposure. For continuous sounds, exposures of equal energy will lead to approximately equal effects (Ward 1997). For intermittent sounds, less TS will occur than from a continuous exposure with the same energy (Kryter et al. 1965; Ward 1997).
- SPL is not a good predictor of onset-TTS; TTS depends on both SPL and duration.
- Exposure Level (EL) is correlated with the amount of TTS, and is a good predictor for onset-TTS for single, continuous exposures with different durations.
- An energy flux density level of 195 dB re 1 μPa^2-s is the most appropriate predictor for onset-TTS from a single, continuous exposure.

Relationship Between TTS and PTS

Marine mammal PTS data do not exist, so onset-PTS levels for these animals are estimated from TTS data and relationships between TTS and PTS. Much of the early human TTS work was directed at relating TTS after 8 hours of sound exposure to PTS after years of daily exposures (e.g., Kryter et al. 1966). It is now known that susceptibility to PTS cannot be reliably predicted from TTS measurements, but TTS data do provide insight into the amount of TS that may be induced with no PTS. Experimental studies of the growth of TTS may also be used to relate changes in exposure level to changes in the amount of TTS induced. Onset-PTS exposure levels may therefore be predicted by:

- Estimating the largest amount of TTS that may be induced without PTS. Exposures causing a TS greater than this value are assumed to cause PTS.
- Estimating the additional exposure, above the onset-TTS exposure, necessary to reach the maximum allowable amount of TTS that, again, may be induced without PTS.

Experimentally induced TTSs, from short-duration sounds (1-8 seconds) in the range of 3.5-20 kHz, in marine mammals have generally been limited to around 2 to 10 dB, well below TSs that result in some PTS. Experiments with terrestrial mammals have used much larger TSs and provide more guidance on how high a TS may rise before some PTS results. Early human TTS studies reported complete recovery of TTSs as high as 50 dB after exposure to broadband sound (Ward 1960; Ward et al. 1958, 1959). These data indicate that TSs up to 40 to 50 dB may be induced without PTS, and that 40 dB is a reasonable upper limit for TS to prevent PTS.

The small amounts of TTS produced in marine mammal studies also limit the applicability of these data to estimates of the growth rate of TTS. Fortunately, data do exist for the growth of

TTS in terrestrial mammals. For moderate exposure durations (a few minutes to hours), TTS2 (TTS measured 2 minutes after exposure) varies with the logarithm of exposure time (Ward et al. 1958, 1959; Quaranta et al. 1998). For shorter exposure durations, the growth of TTS with exposure time appears to be less rapid (Miller 1974; Keeler 1976). For very long-duration exposures, increasing the exposure time may not produce any additional TTS.

Ward et al. (1958, 1959) provided detailed information on the growth of TTS in humans. Ward et al. presented the amount of TTS measured after exposure to specific SPLs and durations of broadband sound. Since the relationships among EL, SPL, and duration are known, these data could be presented in terms of the amount of TTS produced by exposures with different ELs.

An estimate of 1.6 dB TTS2 per dB increase in exposure EL is the upper range of values from Ward et al. (1958, 1959), and gives the most conservative estimate – it predicts a larger amount of TTS from the same exposure compared to the lines with smaller slopes. The difference between onset-TTS (6 dB) and the upper limit of TTS before PTS (40 dB) is 34 dB. To move from onset-TTS to onset-PTS, therefore, requires an increase in EL of 34 dB divided by 1.6 dB/dB, or approximately 21 dB. An estimate of 20 dB between exposures sufficient to cause onset-TTS and those capable of causing onset-PTS is a reasonable approximation.

To summarize:

- In the absence of marine mammal PTS data, onset-PTS exposure levels may be estimated from marine mammal TTS data and PTS/TTS relationships observed in terrestrial mammals. This involves:
    - Estimating the largest amount of TTS that may be induced without PTS. Exposures causing a TS greater than this value are assumed to cause PTS.
    - Estimating the growth rate of TTS – how much additional TTS is produced by an increase in exposure level.
- A variety of terrestrial mammal data sources point at 40 dB as a reasonable estimate of the largest amount of TS that may be induced without PTS. A conservative estimate is that continuous-type exposures producing TSs of 40 dB or more always result in some PTS.
- Data from Ward et al. (1958, 1959) reveal a linear relationship between TTS2 and exposure EL. A value of 1.6 dB TTS2 per dB increase in EL is a conservative estimate of how much additional TTS is produced by an increase in exposure level for continuous- type sounds.
- There is a 34 dB TS difference between onset-TTS (6 dB) and onset-PTS (40 dB). The additional exposure above onset-TTS required to reach PTS is 34 dB divided by 1.6 dB/dB, or approximately 21 dB.

Exposures with ELs 20 dB above those producing TTS may be assumed to produce a PTS. This number is used as a conservative simplification of the 21 dB number derived above.

Use of Exposure Levels to Determine Physiological Effects

Effect thresholds are expressed in terms of total received EL. Energy flux density (EFD) is a measure of the flow of sound energy through an area. Marine and terrestrial mammal data show that, for continuous-type sounds of interest, TTS and PTS are more closely related to the energy in the sound exposure than to the exposure SPL.

The EL for each individual ping is calculated from the following equation:

$$EL = SPL + 10\log10(duration)$$

The EL includes both the ping SPL and duration. Longer-duration pings and/or higher-SPL pings will have a higher EL.

If an animal is exposed to multiple pings, the energy flux density in each individual ping is summed to calculate the total EL. Since mammalian TS data show less effect from intermittent exposures compared to continuous exposures with the same energy (Ward 1997), basing the effect thresholds on the total received EL is a conservative approach for treating multiple pings; in reality, some recovery will occur between pings and lessen the effect of a particular exposure. Therefore, estimates are conservative because recovery is not taken into account – intermittent exposures are considered comparable to continuous exposures.

The total EL depends on the SPL, duration, and number of pings received. The TTS and PTS thresholds do not imply any specific SPL, duration, or number of pings. The SPL and duration of each received ping are used to calculate the total EL and determine whether the received EL meets or exceeds the effect thresholds.

Cetaceans predicted to receive a sound exposure with EL of 215 dB re 1 μPa^2-s or greater are assumed to experience PTS and are counted as Level A harassment. Cetaceans predicted to receive a sound exposure with EL greater than or equal to 195 dB re 1 μPa^2-s but less than 215 dB re 1 μPa^2-s are assumed to experience TTS and are counted as Level B harassment.

Unlike cetaceans, the TTS and PTS thresholds used for pinnipeds vary with species. Otariids have thresholds of 206 dB re 1 μPa^2-s for TTS and 226 dB re 1 μPa^2-s for PTS. Northern elephant seals are similar to otariids (TTS = 204 dB re 1 μPa^2-s, PTS = 224 dB re 1 μPa^2-s) but are lower for harbor seals (TTS = 183 dB re 1 μPa^2-s, PTS = 203 dB re 1 μPa^2-s).

Summary of Physiological Effects Thresholds

PTS and TTS are the criteria for physiological effects resulting in injury (Level A harassment) and disturbance (Level B harassment), respectively. Sound exposure thresholds for TTS and PTS are 195 dB re 1 μPa^2-s received EL for TTS and 215 dB re 1 μPa^2-s received EL for PTS. The TTS threshold is primarily based on cetacean TTS data from Schlundt et al. (2000). Since these tests used short-duration tones similar to sonar pings, they are the most directly relevant data. The PTS threshold is based on a 20-dB increase in exposure EL over that required for onset-TTS. The 20-dB value is based on extrapolations from terrestrial mammal data indicating that PTS occurs at 40 dB or more of TS, and that TS growth occurring at a rate of approximately 1.6 dB/dB increase in exposure EL.

Table 3-7 Physiological Effects Thresholds for TTS and PTS: Cetaceans and Pinnipeds

Physiological Effects			
Animal	**Criteria**	**Threshold (re 1μPa^2-s)**	**MMPA Effect**
Cetacean	TTS PTS	195 215	Level B Harassment Level A Harassment
Pinnipeds			
Northern Elephant Seal	TTS PTS	204 224	Level B Harassment Level A Harassment
Pacific Harbor Seal	TTS PTS	183 203	Level B Harassment Level A Harassment
California Sea Lion	TTS PTS	206 226	Level B Harassment Level A Harassment
Guadalupe Fur Seal	TTS PTS	226 206	Level B Harassment Level A Harassment
Northern Fur Seal	TTS PTS	206 226	Level B Harassment Level A Harassment

Behavioral Effects

Based on available evidence, marine animals may exhibit any of a suite of potential behavioral responses or combinations of behavioral responses upon exposure to sonar transmissions. Potential behavioral responses include, but are not limited to: avoiding exposure or continued exposure; behavioral disturbance (including distress or disruption of social or foraging activity); habituation to the sound; becoming sensitized to the sound; or not responding to the sound.

Existing studies of behavioral effects of human-made sounds in marine environments remain inconclusive, partly because many of those studies have lacked adequate controls, applied only to certain kinds of exposures (which are often different from the exposures being analyzed in the study), and had limited ability to detect behavioral changes that may be significant to the biology of the animals that were being observed. These studies are further complicated by the wide variety of behavioral responses that marine mammals exhibit, and the fact that those responses can vary significantly by species, individuals, and the context of an exposure. In some circumstances, some individuals will continue normal behavioral activities in the presence of high levels of human-made noise. In other circumstances, the same individual or other individuals may avoid an acoustic source at much lower received levels (Richardson et al. 1995; Wartzok et al. 2003). These differences within and between individuals appear to result from a complex interaction of experience, motivation, and learning that are difficult to quantify and predict.

NMFS and other commentators recommended an alternate methodology to evaluate when sound exposures might result in behavioral effects without corresponding physiological effects. Therefore, the Navy and NMFS have developed the Risk-Function approach to estimate potential behavioral effects from mid frequency active sonar. The behavioral response exposures presented below were estimated using the risk function methodology described below.

Development of the Risk Function

The Navy and NMFS developed a dose methodology to assess the probability of Level B behavioral harassment from the effects of MFA and high-frequency active (HFA) sonar on marine mammals. NMFS presented two methodologies to six scientists (marine mammalogists and acousticians from within and outside the federal government) for an independent review (NMFS 2008). Two scientists, including one from the NMFS Office of Science and Technology, then synthesized the reviews from the six scientists and developed a recommendation.

One of the methods was a normal curve fit to a “mean of means” calculated from the mean of: (1) the mean of the lowest received levels from the 3 kHz data that the Navy classified as altered behavior from Finneran and Schlundt (2004); (2) the estimated mean received level produced by the reconstruction of the USS SHOUP event of May 2003 in which killer whales were exposed to MFA sonar (DoN 2004); and (3) the mean of the five maximum received levels at which Nowacek et al. (2004) observed significantly different responses of right whales to an alert stimuli.

The second method was a derivation of a mathematical function used for assessing the percentage of a marine mammal population experiencing the risk of harassment under the MMPA associated with the Navy’s use of the Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS LFA) sonar (DoN 2001). This function is appropriate for instances with limited data (Feller 1968), and this method is subsequently identified as “the risk function” in this document.

NMFS decided to use the risk function and applicable input parameters to estimate the risk of behavioral harassment associated with exposure to MFA sonar. This determination was based on the recommendation of the two NMFS scientists, consideration of the independent reviews from six scientists, and NMFS MMPA regulations affecting the Navy’s use of SURTASS LFA sonar (Federal Register [FR] 67:48145-48154, 2002; FR 72: 46846-46893, 2007).

Applying the Risk Function Methodology

To assess the potential effects on marine mammals associated with active sonar used during training activities, the Navy and NMFS investigated mathematical models and methods that estimate the number of times individuals of the different species of marine mammals might be exposed to MFA sonar at different received levels. The Navy effects analyses assumed that the potential consequences of exposure to MFA sonar on individual animals would be a function of the received sound pressure level (decibels re 1 micropascal [dB re 1 µPa]). These analyses assume that MFA sonar poses no risk, that is, does not constitute harassment to marine mammals if they are exposed to sound pressure levels from the MFA sonar below a certain basement value.

The second step of the assessment procedure required the Navy and NMFS to identify how marine mammals are likely to respond when they are exposed to active sonar. Marine mammals can experience a variety of responses to sound including sensory impairment (permanent and temporary threshold shifts and acoustic masking), physiological responses (particular stress responses), behavioral responses, social responses that might result in reducing the fitness of individual marine mammals and social responses that would not result in reducing the fitness of individual marine mammals.

Previously, the Navy and NMFS used acoustic thresholds to identify the number of marine mammals that might experience hearing losses (temporary or permanent) or behavioral harassment upon being exposed to MFA sonar. These acoustic thresholds were represented by either sound exposure level (related to sound energy, abbreviated as SEL), sound pressure level (SPL), or other metrics, such as peak pressure level and acoustic impulse. The general approach was to apply these threshold functions so that a marine mammal is counted as behaviorally harassed or experiencing hearing loss when exposed to received sound levels above a certain threshold, and not counted as behaviorally harassed or experiencing hearing loss when exposed to received levels below that threshold. The left panel in Figure 3-2 illustrates a typical step-function or threshold that might relate a sonar exposure to the probability of a response. As this figure illustrates, past Navy/NMFS acoustic thresholds assumed that every marine mammal above a particular received level would exhibit identical responses to a sonar exposure. The responses of marine mammals were assumed not to be affected by differences in acoustic conditions; differences between species and populations: differences in gender, age, reproductive status, or social behavior; or the prior experience of the individuals.

In this figure, for the typical step function (left panel) the probability of a response is depicted on the y-axis and received exposure on the x-axis. The right panel illustrates a typical risk continuum-function using the same axes.

The Navy and NMFS agree that the studies of marine mammals in the wild and in experimental settings do not support these assumptions—different species of marine mammals and different individuals of the same species respond differently to sonar exposure. Additionally, there are specific geographic/bathymetric conditions that dictate the response of marine mammals to sonar that suggest that different populations may respond differently to sonar exposure. Further, studies of animal physiology suggest that gender, age, reproductive status, and social behavior, among other variables, probably affect how marine mammals respond to sonar exposures (Wartzok et al. 2003; Southall et al. 2007).

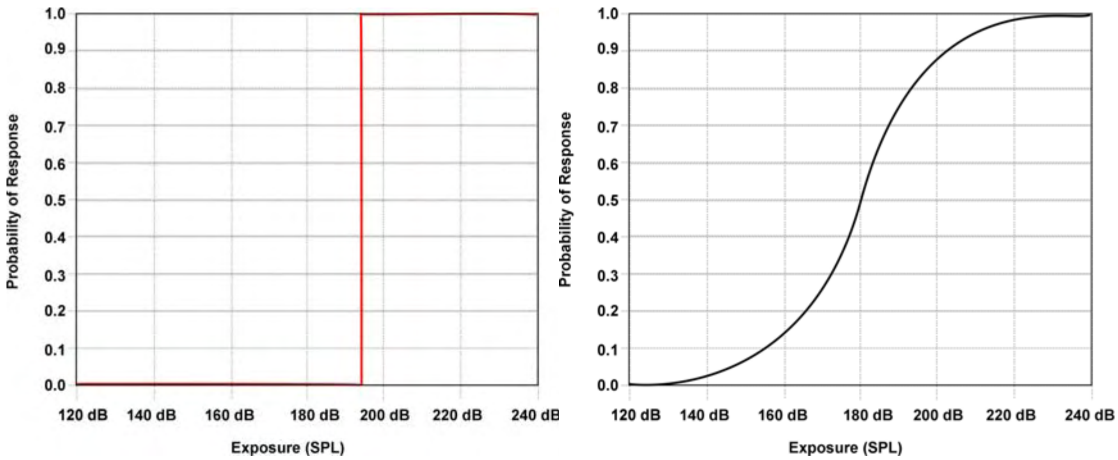


Figure 3-2: Typical step function (left) and typical risk continuum-function (right).

Over the past several years, the Navy and NMFS have developed an MFA sonar acoustic risk function to replace the acoustic thresholds used in the past to estimate the probability of marine mammals being behaviorally harassed by received levels of MFA sonar. The Navy and NMFS will continue to use acoustic thresholds to estimate temporary or permanent threshold shifts using SEL as the appropriate metric. Unlike acoustic thresholds, acoustic risk continuum functions assume that the probability of a response depends first on the "dose" (in this case, the received level of sound), and that the probability of a response increases as the "dose" increases. The probabilities associated with acoustic risk functions do not represent an individual's probability of responding. Rather, the probabilities identify the proportion of an exposed population that is likely to respond to an exposure.

The right panel in Figure 3-2 illustrates a typical acoustic risk function that might relate an exposure to the probability of a response. As the exposure receive level increases, the probability of a response increases as well, but the relationship between an exposure and a response is "linear" only in the center of the curve. In the "tails" of an acoustic risk function curve, unit increases in exposure produce smaller increases in the probability of a response. Based on observations of various animals, including humans, the relationship represented by an acoustic risk function is a more robust predictor of the probable behavioral responses of marine mammals to sonar and other acoustic sources.

The Navy and NMFS previously used the acoustic risk function to estimate the probable responses of marine mammals to acoustic exposures for other training and research programs. Examples include the Navy Final EISs on the SURTASS LFA sonar (DoN 2001); the North Pacific Acoustic Laboratory experiments conducted off the Island of Kauai (Office of Naval Research 2001), and the Supplemental EIS for SURTASS LFA sonar (DoN 2007a).

The Navy and NMFS used two metrics to estimate the number of marine mammals that could be subject to Level B harassment (behavioral harassment and TTS) during training exercises. The agencies used acoustic risk functions with the metric of received SPL (dB re 1 µPa) to estimate the number of marine mammals that might be at risk for Level B behavioral harassment as a result of being exposed to MFA sonar. The agencies will continue to use acoustic thresholds ("step-functions") with the metric of SEL (dB re 1 μPa^2-s) to estimate the number of marine mammals that might be "taken" through sensory impairment (i.e., Level A – PTS and Level B – TTS) as a result of being exposed to MFA sonar.

The particular acoustic risk function developed by the Navy and NMFS estimates the probability of behavioral responses that NMFS would classify as harassment, given exposure to specific received levels of MFA sonar. The mathematical function is derived from a solution in Feller (1968) as defined in the SURTASS LFA Sonar Final OEIS/EIS (DoN 2001), and relied on in the Supplemental SURTASS LFA Sonar EIS (DoN 2007a) for the probability of MFA sonar risk for Level B behavioral harassment with input parameters modified by NMFS for MFA sonar for mysticetes, odontocetes, and pinnipeds.

To represent a probability of risk, the function should have a value near zero at very low exposures, and a value near one for very high exposures. One class of functions that satisfies this criterion is cumulative probability distributions, a type of cumulative distribution function. In selecting a particular functional expression for risk, several criteria were identified:

- The function must use parameters to focus discussion on areas of uncertainty;
- The function should contain a limited number of parameters;
- The function should be capable of accurately fitting experimental data; and
- The function should be reasonably convenient for algebraic manipulations.

As described in U.S. Department of the Navy (2001), the mathematical function below is adapted from a solution in Feller (1968).

$$R = \frac{1 - \left(\frac{L - B}{K}\right)^{-A}}{1 - \left(\frac{L - B}{K}\right)^{-2A}}$$

Where: R = risk (0 – 1.0);

L = Received Level (RL) in dB;

B = basement RL in dB; (120 dB);

K = the RL increment above basement in dB at which there is 50 percent risk;

A = risk transition sharpness parameter (10) (explained in 3.1.5.3).

To use this function, the values of the three parameters (B, K, and A) need to be established. The values used in this CD analysis are based on three sources of data: TTS experiments conducted at SSC and documented in Finneran, et al. (2001, 2003, and 2005; Finneran and Schlundt, 2004); reconstruction of sound fields produced by the USS SHOUP associated with the behavioral responses of killer whales observed in Haro Strait and documented in Department of Commerce NMFS (2005); DoN (2004); and Fromm (2004a, 2004b); and observations of the behavioral response of North Atlantic right whales exposed to alert stimuli containing mid-frequency components documented in Nowacek et al. (2004). The input parameters, as defined by NMFS, are based on very limited data that represent the best available science at this time. These data sources are described in detail in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]).

Input Parameters for the Risk Function

The values of B, K, and A need to be specified to use the risk function. The risk continuum function approximates the dose-response function in a manner analogous to pharmacological risk assessment (DoN 2001). In this case, the risk function is combined with the distribution of sound exposure levels to estimate aggregate impact on an exposed population.

BASEMENT VALUE FOR RISK—THE B PARAMETER. The B parameter defines the basement value for risk, below which the risk is so low that calculations are impractical. This

120 dB level is taken as the estimate received level (RL) below which the risk of significant change in a biologically important behavior approaches zero for the MFA sonar risk assessment. This level is based on a broad overview of the levels at which multiple species have been reported responding to a variety of sound sources, both mid-frequency and other, was recommended by the scientists, and has been used in other publications. The Navy recognizes that for actual risk of changes in behavior to be zero, the signal-to-noise ratio of the animal must also be zero. However, the present convention of ending the risk calculation at 120 dB for MFA sonar has a negligible impact on the subsequent calculations, because the risk function does not attain appreciable values at received levels that low.

THE K PARAMETER. NMFS and the Navy used the mean of the following values to define the midpoint of the function: (1) the mean of the lowest received levels (185.3 dB) at which individuals responded with altered behavior to 3 kHz tones in the SSC data set; (2) the estimated mean received level value of 169.3 dB produced by the reconstruction of the USS SHOUP incident in which killer whales exposed to MFA sonar (range modeled possible received levels: 150 to 180 dB); and (3) the mean of the 5 maximum received levels at which Nowacek et al. (2004) observed significantly altered responses of right whales to the alert stimuli than to the control (no input signal) is 139.2 dB SPL. The arithmetic mean of these three mean values is 165 dB SPL. The value of K is the difference between the value of B (120 dB SPL) and the 50 percent value of 165 dB SPL; therefore, K=45.

RISK TRANSITION—THE A PARAMETER. The A parameter controls how rapidly risk transitions from low to high values with increasing receive level. As A increases, the slope of the risk function increases. For very large values of A, the risk function can approximate a threshold response or step function. NMFS has recommended that Navy use A=10 as the value for odontocetes, and pinnipeds (Figure 3-3) (NMFS 2008). This is the same value of A that was used for the SURTASS LFA sonar analysis. As stated in the SURTASS LFA Sonar Final OEIS/EIS (DoN 2001), the value of A=10 produces a curve that has a more gradual transition than the curves developed by the analyses of migratory gray whale studies (Malme et al. 1984). The choice of a more gradual slope than the empirical data was consistent with other decisions for the SURTASS LFA Sonar Final OEIS/EIS to make conservative assumptions when extrapolating from other data sets (see Subchapter 1.43 and Appendix D of the SURTASS LFA Sonar EIS [NMFS 2008]).

Based on NMFS' direction, the Navy used a value of A=8 for mysticetes to allow for greater consideration of potential harassment at the lower received levels based on Nowacek et al., 2004 (Figure 3-4) (NMFS 2008).

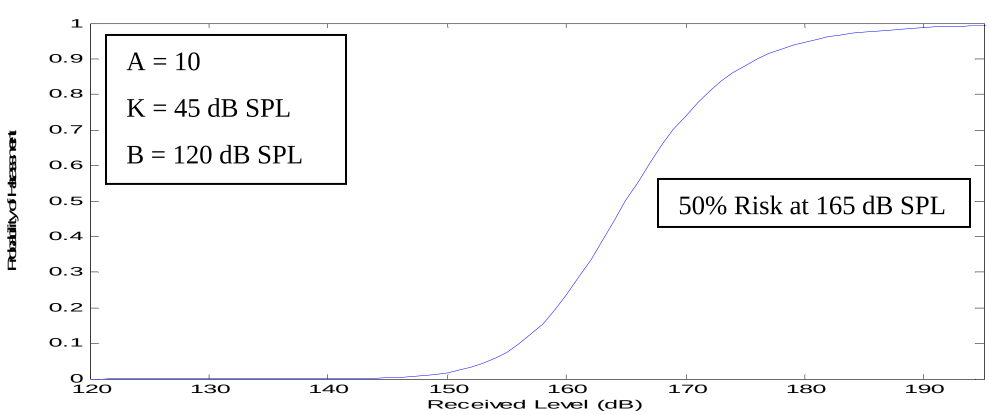


Figure 3-3: Risk Function Curve for Odontocetes (Toothed Whales) and Pinnipeds

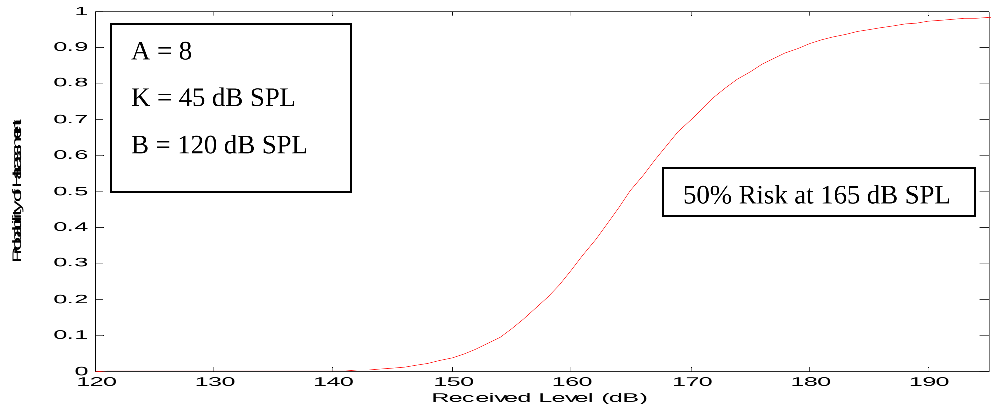


Figure 3-4: Risk Function Curve for Mysticetes (Baleen Whales)

Application of the Risk Function

The risk function is used to estimate the percentage of an exposed population that is likely to exhibit behaviors that would qualify as harassment at a given received level of sound. For example, at 165 dB SPL (dB re: 1µPa rms), the risk (or probability) of harassment is defined according to this function as 50 percent, and Navy/NMFS applies that by estimating that 50 percent of the individuals exposed at that received level are likely to respond by exhibiting behavior that NMFS would classify as behavioral harassment. The risk function is not applied to individual animals, only to exposed populations.

The data used to produce the risk function were compiled from four species that had been exposed to sound sources in a variety of different circumstances. As a result, the risk function represents a general relationship between acoustic exposures and behavioral responses that is then applied to specific circumstances. That is, the risk function represents a relationship that is deemed to be generally true, based on the limited, best-available science, but may not be true in specific circumstances. In particular, the risk function, as currently derived, treats the received level as the only variable that is relevant to a marine mammal’s behavioral response. However, we know that many other variables—the marine mammal’s gender, age, and prior experience; the activity it is engaged in during an exposure event, its distance from a sound source, the number of sound sources, and whether the sound sources are approaching or moving away from the animal—can be critically important in determining whether and how a marine mammal will respond to a sound source (Southall et al. 2007). The data that are currently available do not allow for incorporation of these other variables in the current risk functions; however, the risk function represents the best use of the data that are available.

As more specific and applicable data become available, the Navy can use these data to modify the outputs generated by the risk function to make them more realistic. If data become available that suggest animals are less likely to respond to certain levels beyond certain distances, or that they are more likely to respond at certain closer distances, the Navy will re-evaluate the risk function to incorporate any additional variables into the “take” estimates.

The Navy and NMFS would expect an animal exposed to the levels at the bottom of the risk function to exhibit behavioral responses that are less likely to adversely affect the longevity, survival, or reproductive success of the animals that might be exposed, based on received level, and the fact that the exposures will occur in the absence of some of the other contextual variables that would likely be associated with increased severity of effects, such as the proximity of the sound source(s) or the proximity of other vessels, aircraft, submarines, etc. maneuvering in the vicinity of the exercise. NMFS will consider all available information (other variables, etc.), but all else being equal, takes that result from exposure to lower received levels and at greater distances from the exercises would be less likely to contribute to population level effects.

Navy Protocols for Acoustic Modeling Analysis of Marine Mammal Exposures

For this CD, the acoustic modeling results include additional analysis to account for the model's overestimation of potential effects. The model overestimated effects because:

- Acoustic footprints for sonar sources near land are not reduced to account for the land mass where marine mammals would not occur.
- Acoustic footprints for sonar sources were added independently and, therefore, did not account for overlap they would have with other sonar systems used during the same active sonar activity. As a consequence, the area of the total acoustic footprint was larger than the actual acoustic footprint when multiple ships are operating together.
- Acoustic exposures do not reflect implementation of mitigation measures, such as reducing sonar source levels when marine mammals are present.
- Marine mammal densities were averaged across specific active sonar activity areas and, therefore, are evenly distributed without consideration for animal grouping or patchiness.
- Acoustic modeling did not account for limitations of the NMFS-defined refresh rate of 24 hours or less depending on the exercise or activity. This time period represents the amount of time in which individual marine mammals can be harasses no more than once.

Table 3-8 provides a summary of the modeling protocols used in the analysis. Additional detailed information about the methods applied to estimate acoustic effects of Navy activities on marine mammals in SOCAL Range Complex is provided in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]).

Table 3-8: Navy Protocols Providing for Modeling Quantification of Marine Mammal Exposures

Historical Data	Sonar Positional Reporting System (SPORTS)	Annual active sonar usage data will be obtained from the SPORTS database to determine the number of active sonar hours and the geographic location of those hours for modeling purposes.
Acoustic Parameters	AN/SQS-53 and AN/SQS-56	Model the AN/SQS-53 and the AN/SQS-56 active sonar sources separately to account for the differences in source level, frequency, and exposure effects.
	Submarine Sonar	Submarine active sonar use will be included in effects analysis calculations using the SPORTS database.
Post Modeling Analysis	Land Shadow	For sound sources within the acoustic footprint of land, subtract the land area from the marine mammal exposure calculation.
	Multiple Ships	Correction factors will be used to address overestimates of exposures to marine mammals resulting from multiple counting when more than one ship is operating in the vicinity.
	Multiple Exposures	The following refresh rates for SOCAL Range Complex training events will be included to account for multiple exposures: • Unit-level Training, Coordinated Events, and Maintenance – 4 hours • Integrated Anti-submarine Warfare (ASW) Course- – 16 hours • Major Exercises / Major Range Events– 12 hours • Sustainment Training Exercises – 12 hours.

Acoustic Sources

The Southern California (SOCAL) acoustic sources are categorized as either broadband (producing sound over a wide frequency band) or narrowband (producing sound over a frequency band that that is small in comparison to the center frequency). In general, the narrowband sources in this exercise are ASW sonars and the broadband sources are explosives. This delineation of source types has a couple of implications. First, the transmission loss used to determine the impact ranges of narrowband ASW sonars can be adequately characterized by model estimates at a single frequency. Broadband explosives, on the other hand, produce significant acoustic energy across several frequency decades of bandwidth. Propagation loss is sufficiently sensitive to frequency as to require model estimates at several frequencies over such a wide band.

Second, the types of sources have different sets of harassment metrics and thresholds. Energy metrics are defined for both types. However, explosives are impulsive sources that produce a shock wave that dictates additional pressure-related metrics (peak pressure and positive impulse). Detailed descriptions of both types of sources are provided in the following subsections.

To estimate impacts of mid- and high-frequency sonar, five types of narrowband sonars representative of those used in activities in SOCAL Range Complex were modeled. Exposure estimates are calculated for each sonar according to the manner in which it operates. For example, the SQS-53C is a hull-mounted, surface ship sonar that emits brief pings, widely spaced for short time periods over a total duration of up to potentially many hours at a time so it is most useful to calculate and report SQS-53C exposures per hour of operation. The SQS-56C is a hull-mounted, surface ship sonar (not as powerful as the SQS-53C) that operates for many hours at a time, so it is most useful to calculate and report SQS-56C exposures per hour of operation. The AQS-22 is a helicopter-deployed sonar, which is lowered into the water, pings a number of times, and then moves to a new location. For the AQS-22, it is most helpful to calculate and report exposures per dip. Table 3-9 presents the deploying platform, frequency class, and the reporting metric for each sonar.

Note that the MK-48 source described here is the active torpedo sonar; the explosive source of the detonating torpedo is described in the next subsection.

Table 3-9: Active Sonars Employed in SOCAL Range Complex

Sonar	Description	Frequency Class	Exposures Reported
MK-48	Torpedo sonar	High frequency	Per torpedo
AN/SQS-53C	Surface ship sonar	Mid-frequency	Per hour
AN/SQS-56C	Surface ship sonar	Mid-frequency	Per hour
AN/SSQ-62	Sonobuoy sonar	Mid-frequency	Per sonobuoy
AN/AQS-22	Helicopter-dipping sonar	Mid-frequency	Per dip

The acoustic modeling that is necessary to support the exposure estimates for each of these sonars relies upon a generalized description of the manner of the sonar's operating modes. This description includes the following:

- "Effective" energy source level – The total energy across the band of the source, scaled by the pulse length ($10 \log_{10}$ [pulse length]), and corrected for source beam width so that it reflects the energy in the direction of the main lobe. The beam pattern correction consists of two terms:
    - Horizontal directivity correction: $10 \log_{10}$ (360 / horizontal beam width)

- Vertical directivity correction: $10 \log_{10} (2 / [\sin(\theta_1) - \sin(\theta_2)])$, where θ_1 and θ_2 are the 3-dB down points on the main lobe.

- Source depth – Depth of the source in meters.
- Nominal frequency – Typically the center band of the source emission. These are frequencies that have been reported in open literature and are used to avoid classification issues. Differences between these nominal values and actual source frequencies are small enough to be of little consequence to the output impact volumes.
- Source directivity – The source beam is modeled as the product of a horizontal beam pattern and a vertical beam pattern. Two parameters define the horizontal beam pattern:
  - Horizontal beam width – Width of the source beam (degrees) in the horizontal plane (assumed constant for all horizontal steer directions).
  - Horizontal steer direction – Direction in the horizontal in which the beam is steered relative to the direction in which the platform is heading

  The horizontal beam is rectangular with constant response across the width of the beam and with flat, 20-dB down sidelobes. (Note that steer directions ϕ, $-\phi$, $180^o - \phi$, and $180^o + \phi$ all produce equal impact volumes.)

  Similarly, two parameters define the vertical beam pattern:
  - Vertical beam width – Width of the source beam (degrees) in the vertical plane measured at the 3-dB down point. (The width is that of the beam steered towards broadside and not the width of the beam at the specified vertical steer direction.)
  - Vertical steer direction – Direction in the vertical plane that the beam is steered relative to the horizontal (upward looking angles are positive).

  To avoid sharp transitions that a rectangular beam might introduce, the power response at vertical angle θ is

$$\max \{ \sin^2 [n(\theta_s - \theta)] / [n \sin (\theta_s - \theta)]^2, \; 0.01 \}$$

  where $n = 180^o / \theta_w$ is the number of half-wavelength-spaced elements in a line array that produces a main lobe with a beam width of θ_w. θ_s is the vertical beam steer direction.

- Ping spacing – Distance between pings. For most sources this is generally just the product of the speed of advance of the platform and the repetition rate of the sonar. Animal motion is generally of no consequence as the source motion is modeled to be greater than the speed of the animal. For stationary (or nearly stationary) sources such as sonobuoys, the source “moves” in that different buoys are pinged as the target moves through the sonobuoy pattern. In the case of both moving and stationary sources, the animals are assumed to be stationary.

Analytical Framework for Assessing Marine Mammal Response to Underwater Detonations

Criteria

The criterion for mortality for marine mammals used in the CHURCHILL Final EIS (DoN 2001) is “onset of severe lung injury.” This is conservative in that it corresponds to a 1 percent chance of mortal injury, and yet any animal experiencing onset severe lung injury is counted as a lethal exposure. The threshold is stated in terms of the Goertner (1982) modified positive impulse with value “indexed to 31 psi-ms.'” Since the Goertner approach depends on propagation, source /

animal depths, and animal mass in a complex way, the actual impulse value corresponding to the 31-psi-ms index is a complicated calculation. Again, to be conservative, CHURCHILL used the mass of a calf dolphin (at 12.2 kg), so that the threshold index is 30.5 psi-ms (Table 3-10).

Table 3-10: Effects Analysis Criteria for Underwater Detonations

	Criterion	Metric	Threshold	Comments	Source
Mortality & Injury	Mortality Onset of extensive lung hemorrhage	Shock Wave Goertner modified positive impulse	30.5 psi-msec*	All marine mammals (dolphin calf)	Goertner 1982
Mortality & Injury	Slight Injury Onset of slight lung hemorrhage	Shock Wave Goertner modified positive impulse	13.0 psi-msec*	All marine mammals (dolphin calf)	Goertner 1982
Mortality & Injury	Slight Injury 50% TM Rupture	Shock Wave Energy Flux Density (EFD) for *any single exposure*	205 dB re:1µPa^2-sec	All marine mammals	DoN 2001
Harassment	Temporary Auditory Effects TTS	Noise Exposure greatest EFD in any 1/3-octave band *over all exposures*	182 dB re:1µPa^2-sec	For odontocetes greatest EFD for frequencies ≥100 Hz and for mysticetes ≥10 Hz	NMFS 2005, NMFS 2006a
Harassment	Temporary Auditory Effects TTS	Noise Exposure Peak Pressure for *any single exposure*	23 psi	All marine mammals	DoN 2001
Behavioral	Behavioral Modification (sequential detonations only)	Noise Exposure greatest EFD in any 1/3-octave band *over all exposures*	177 dB re:1µPa^2-sec	For odontocetes greatest EFD for frequencies ≥100 Hz and for mysticetes ≥10 Hz	NMFS

Notes: (For explosives < 2000 lbs Net Explosive Weight (NEW), based on CHURCHILL FEIS (DON 2001) and Eglin Air Force Base IHA (NMFS 2005h) and LOA (NMFS 2006a).

Goertner, J.F. 1982. Prediction of underwater explosion safe ranges for sea mammals. Naval Surface Weapons Center, White Oak Laboratory, Silver Spring, MD. NSWC/WOL TR-82-188. 25 pp.

DoN. 2001. USS Churchill Shock Trail FEIS- February 2001.

NMFS 2005. Notice of Issuance of an Incidental Harassment Authorization, Incidental to Conducting the Precisions Strike Weapon (PSW) Testing and Training by Eglin Air Force Base in the Gulf of Mexico. Federal Register,70:48675-48691.

NMFS 2006. Incidental Takes of Marine Mammals Incidental to Specified Activities; Naval Explosive Ordnance Disposal School Training Operations at Eglin Air Force Base, Florida, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. Federal Register 71(199):60693-60697

NMFS. Briefed to NMFS for VAST-IMPASS; U.S. Air Force uses 176 dB for permit applications at Eglin Gulf Test and Training Range (EGTTR)

EFD = Energy Flux Density

Two criteria are used for injury: onset of slight lung hemorrhage and 50 percent eardrum rupture (tympanic membrane [TM] rupture). These criteria are indicative of the onset of injury.

The threshold for onset of slight lung injury is calculated for a small animal (a dolphin calf weighing 27 lb), and is given in terms of the “Goertner modified positive impulse,” indexed to 13 psi-ms in the (DoN 2001a). This threshold is conservative since the positive impulse needed to cause injury is proportional to animal mass, and therefore, larger animals require a higher impulse to cause the onset of injury.

- The threshold for TM rupture corresponds to a 50 percent rate of rupture (i.e., 50 percent of animals exposed to the level are expected to suffer TM rupture); this is stated in terms of an EL value of 205 dB re 1 μPa^2-s. The criterion reflects the fact that TM rupture is not necessarily a serious or life-threatening injury, but is a useful index of possible injury that is well correlated with measures of permanent hearing impairment (e.g., Ketten 1998 indicates a 30 percent incidence of permanent threshold shift [PTS] at the same threshold).

The following criterion is considered for non-injurious harassment temporary threshold shift (TTS), which is a temporary, recoverable, loss of hearing sensitivity (NMFS 2001; DoN 2001a).

- A threshold of 12 pounds per square inch (psi) peak pressure was developed for 10,000 pound charges as part of the CHURCHILL Final EIS (DoN 2001a, [FR70/160, 19 Aug 05; FR 71/226, 24 Nov 06]). It was introduced to provide a more conservative safety zone for TTS when the explosive or the animal approaches the sea surface (for which case the explosive energy is reduced but the peak pressure is not). Navy policy is to use a 23 psi criterion for explosive charges less than 2,000 lb and the 12 psi criterion for explosive charges larger than 2,000 lb. This is below the level of onset of TTS for an odontocete (Finneran et al. 2002). All explosives modeled for the SOCAL Range Complex CD are less than 1,500 lb.

Very Shallow Water Underwater Detonations

Measurements of pressure-wave propagation are available for detonations in deep and shallow water, but only fragmentary data exist for propagation in Very Shallow Water (VSW) near shorelines between the shoreline and 50-foot (ft) depth. The lack of data is due to the complicated nature of the VSW environment, as well as to substantial differences between different VSW sites. In VSW, surface- and bottom-boundary effects have more influence on propagation than in deeper water. At the point of detonation, the geometry of the short water column dictates that a charge must be close to one or both of these boundaries. More likely surface blowout can dissipate energy and diminish bubble formation with its attendant oscillation effects while detonations closer to the bottom may have considerable energy absorbed by the bottom as well. Further, as pressure waves propagate laterally through the VSW column, they reflect off surface and bottom boundaries more often over a given distance than in deeper waters and thus, VSW boundaries exert their influence relatively more frequently over that distance. Refraction of the pressure waves, determined by differences in sound velocity at different depths – i.e., the sound velocity profile (SVP) - acts as it does in deeper water, but thermal layering and mixing of layers that determine the SVP may be more complicated and dynamic in VSW. In summary, reliable prediction of pressure wave propagation in all situations requires knowledge of the charge size, type, and position as well as boundary and water column conditions, but in VSW, the relative contributions of these variables may differ considerably from those in deeper waters.

The best mathematical models of underwater explosive-pressure propagation take into account the variables just described. However, the lack of empirical validation data for VSW has allowed the use of less complete models with untested assumptions as well as more complete models with untested assumptions and extreme values of those variables. Occasionally, these practices produced extreme over- and underestimation of propagation and consequent effects on marine mammals, neither of which facilitate realistic, practical regulatory compliance policy. To address the variables of concern and garner an understanding of the affects of underwater detonations, the Navy collected and analyzed empirical data from underwater detonations conducted during training events. Because bottom conditions factor heavily into the amount energy propagating through the water column, explosive tests were conducted at actual ordnance training sites so that, in addition to providing basic data to test theoretical issues, the tests would also provide applied knowledge about the acoustic properties of specific beach approaches in which explosive training and tests are conducted.

The principle objectives of the tests were to measure the pressure waves at various distances seaward of single-charge underwater explosions in VSW and, subsequently evaluate the predictions of existing underwater explosion-propagation models. A model of particular interest is the Reflection and Refraction in Multi-Layered Ocean/Ocean Bottoms with Shear Wave Effects (REFMS), but the test results may be used to evaluate other models of underwater explosive propagation as well. A second objective was to record waveform propagation information for specific single-charge sizes on the specific beach approaches where underwater ordnance training is conducted by Navy Special Warfare (NSW) and Explosive Ordinance Disposal (EOD) personnel in routine underwater ordinance training. The report deals with single charges of up to 15 lb on those beach approaches. Additionally, two configurations of multiple larger charges are used on the SCI range for training of NSW personnel. As there are no standard models for multiple-charge detonations, the pressure waves at various distances seaward of these charges were measured. The multiple charge sizes, configurations, locations, empirical measurements, and analyses of these detonations are described in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]).

Effects of the Proposed Activities

This section discusses the potential environmental effects associated with the use of active sonar and other Navy activities within the SOCAL Range Complex. The methodology for analyzing potential effects from sonar and explosives is presented below and in further detail in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]), which explains the model process in detail, describes how the impact threshold derived from Navy-NMFS consultations are derived, and discusses relative potential impact based on species biology.

Model Results Explanation

Acoustic exposures are evaluated based on their potential direct effects on marine mammals, and these effects are then assessed in the context of the species biology and ecology to determine if there is a mode of action that may result in the acoustic exposure warranting consideration as a harassment level effect.

A large body of research on terrestrial animal and human response to airborne sound exists, but results from those studies are not readily extendible to the development of behavioral criteria and thresholds for marine mammals. At the present time there is no general scientifically accepted consensus on how to account for behavioral effects on marine mammals exposed to anthropogenic sounds, including military sonar and explosions (NRC 2003, NRC 2005). While the first three blocks in Figure 3-5 can be easily defined (source, propagation, receiver) the remaining two blocks (perception and behavior) are not well understood given the difficulties in studying marine mammals at sea (NRC 2005). NRC (2005) acknowledges "there is not one case in which data can be integrated into models to demonstrate that noise is causing adverse affects on a marine mammal population."

From: NRC. 2003. Ocean Noise And Marine Mammals. National Research Council of the National Academies. National Academies Press, Washington, DC.

Figure 3-5: Required Steps Needed to Understand Effects or Non-Effects of Underwater Sound on Marine Species

For predicting potential acoustic and explosive effects on marine mammals, the Navy uses an acoustic impact model process with numeric criteria agreed upon with NMFS. This process is described in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]). Some caveats are necessary to put these exposures in context.

For instance, 1) significant scientific uncertainties are implied and carried forward in any analysis using marine mammal density data as a predictor for animal occurrence within a given geographic area; 2) there are limitations to the actual model process based on information available (animal densities, animal depth distributions, animal motion data, impact thresholds, and supporting statistical model); and 3) determination and understanding of what constitutes a significant behavioral effect is still unresolved.

The marine mammal densities used in the SOCAL CD are derived from NMFS broad scale West Coast Surveys. These shipboard surveys cover significant distances along the California coast to the extent of the U.S. EEZ. Although survey design includes statistical placement of survey tracks, however, the survey can only cover so much ocean area and post-survey statistics are used to calculate animal abundances and densities (Barlow and Forney 2007). There is often significant statistical variation inherit within the calculation of the final density values, depending on how many sightings were available during a survey.

Occurrence of marine mammals within any geographic area, including southern California, is highly variable and strongly correlated to oceanographic conditions, bathymetry, and ecosystem level patterns rather than changes in reproduction success and survival (Forney 2000, Ferguson and Barlow 2001, Benson et al. 2002, Moore et al. 2002, Tynan 2005, Redfern 2006). For some species, distribution may be even more highly influenced by relative small-scale features over both short and long-term time scales (Ballance et al. 2006, Etnoyer et al. 2006, Ferguson et al. 2006, Skov et al. 2007). Unfortunately, the scientific level of understanding of some large-scale and most small-scale processes thought to influence marine mammal distribution is incomplete.

Given the uncertainties in marine mammal density estimation and localized distributions, the Navy's acoustic impact models cannot be use to predict occurrence of marine mammals within specific regions of southern California. To resolve this issue and allow modeling to precede, animals are "artificially and uniformly distributed" within the modeling provinces described in Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]). This process does not account for animals that move into or out of the region, based on foraging and migratory patterns, and adds a lot of variability to the model predictions.

Results from acoustic impact exposure models, therefore, should be regarded as exceedingly conservative estimates strongly influenced by limited biological data. While numbers generated allow establishment of predicted marine mammal exposures for consultation with NMFS, the short duration and limited geographic extent of most sonar and explosive events does not necessarily mean that these exposures will ever be realized.

Comparison with SOCAL Range Complex After Action Report Data

From exercise after-action reports of major SOCAL Range Complex exercises in 2007, marine mammal sightings ranged from 289 to 881 animals per event over four events. Approximately, 77 to 96 percent of these animals were dolphins. From all four exercises, only approximately 226 of 2,303 animals were observed during mid-frequency activities, and sonar was secured or powered down in all cases upon initial animal sighting and until the animal had departed the vicinity of the ship, or the ship moved from the vicinity of the animal. At no time were any of these animals potentially exposed to SEL of greater than 189 dB, with the exception of two groups of dolphins that closed with a ship to ride the bow wake while MFAS was in use, and one group of four whales observed at 50 yards during MFAS transmission and that could have been exposed to RL of 201 dB. Like other sighting, MFAS was secured when these marine mammals were first observed within 200 yards of the ship. Of interest in this evaluation, even accounting for marine mammals not detected visually, the numbers of animals potentially exposed during

2007, as reported in the after action reports provided to NMFS, are significantly below what was predicted by the SOCAL Range Complex Draft EIS/OEIS acoustic impact modeling.

Behavioral Responses

Behavioral responses to exposure from mid- and high-frequency active sonar and underwater detonations can range from no observable response to panic, flight, and possibly stranding (Figure 3-6). The intensity of the behavioral responses exhibited by marine mammals depends on a number of factors, including the age, reproductive condition, experience, behavior, species, received sound level, type of sound, and duration of sound (reviews by Richardson et al., 1995; Wartzok et al. 2004; Cox et al. 2006, Nowacek et al. 2007; Southall et al. 2007). Most behavioral responses are short-term and of little consequence for the animal, although certain responses may lead to a stranding or mother-offspring separation. Active sonar exposure is brief as the ship is constantly moving and the animal will likely be moving as well.

Generally the louder the sound source, the more intense the response, although duration is also very important (Southall et al. 2007). According to the Southall et al. (2007) response spectrum, responses from 0-3 are brief and minor, 4-6 have a higher potential to affect foraging, reproduction or survival and 7-9 are likely to affect foraging, reproduction and survival.

Mitigation measures would likely prevent animals from being exposed to the loudest sonar sounds that could cause PTS, TTS, and more intense behavioral reactions. There are few data on the consequences of sound exposure on vital rates of marine mammals. Several studies have shown the effects of chronic noise (either continuous or multiple pulses) on marine mammal presence in an area (e.g. Malme et al. 1984; McCauley et al. 1998; Nowacek et al. 2004).

Even for more cryptic species, such as beaked whales, the main determinant of causing a stranding appears to be exposure in a narrow channel with no egress thus animals are exposed for prolonged period rather than just several sonar pings over a several minutes (see Appendix F of the SOCAL Range Complex Draft EIS/OEIS [DoN 2008]). Such a narrow channel is defined as an area surrounded by land masses, separated by less than 35 nm and at least 10 nm in length, or an embayment, wherein activities involving multiple ships/subs (≥ 3) employing mid-frequency active sonar near land may produce sound directed toward the channel or embayment that may cut off the lines of egress for marine mammals. There are no such narrow channels in the SOCAL Range Complex, so it is unlikely that mid-frequency active sonar would cause beaked whales to strand. In fact, no beaked whale strandings associated with MFAS have ever occurred in the SOCAL Range.

Ship Noise

Increased number of ships operating in the area will result in increased sound from vessel traffic. Marine mammals react to vessel-generated sounds in a variety of ways. Some respond negatively by retreating or engaging in antagonistic responses while other animals ignore the stimulus altogether (Watkins 1986; Terhune and Verboom 1999). Most studies have ascertained the short-term response to vessel sound and vessel traffic (Watkins et al. 1981; Baker et al. 1983; Magalhães et al. 2002); however, the long-term implications of ship sound on marine mammals is largely unknown (NMFS 2007). Anthropogenic sound, especially around regional commercial shipping hubs has increased in the marine environment over the past 50 years (Richardson, et al. 1995; Andrew et al. 2002; NRC 2003; Hildebrand 2004; NRC 2005). This sound increase can be attributed primarily to increases in vessel traffic, as well as sound from other human sources (Richardson, et al. 1995; NRC 2005). NRC (2005) has a thorough discussion of both human and natural underwater sound sources.

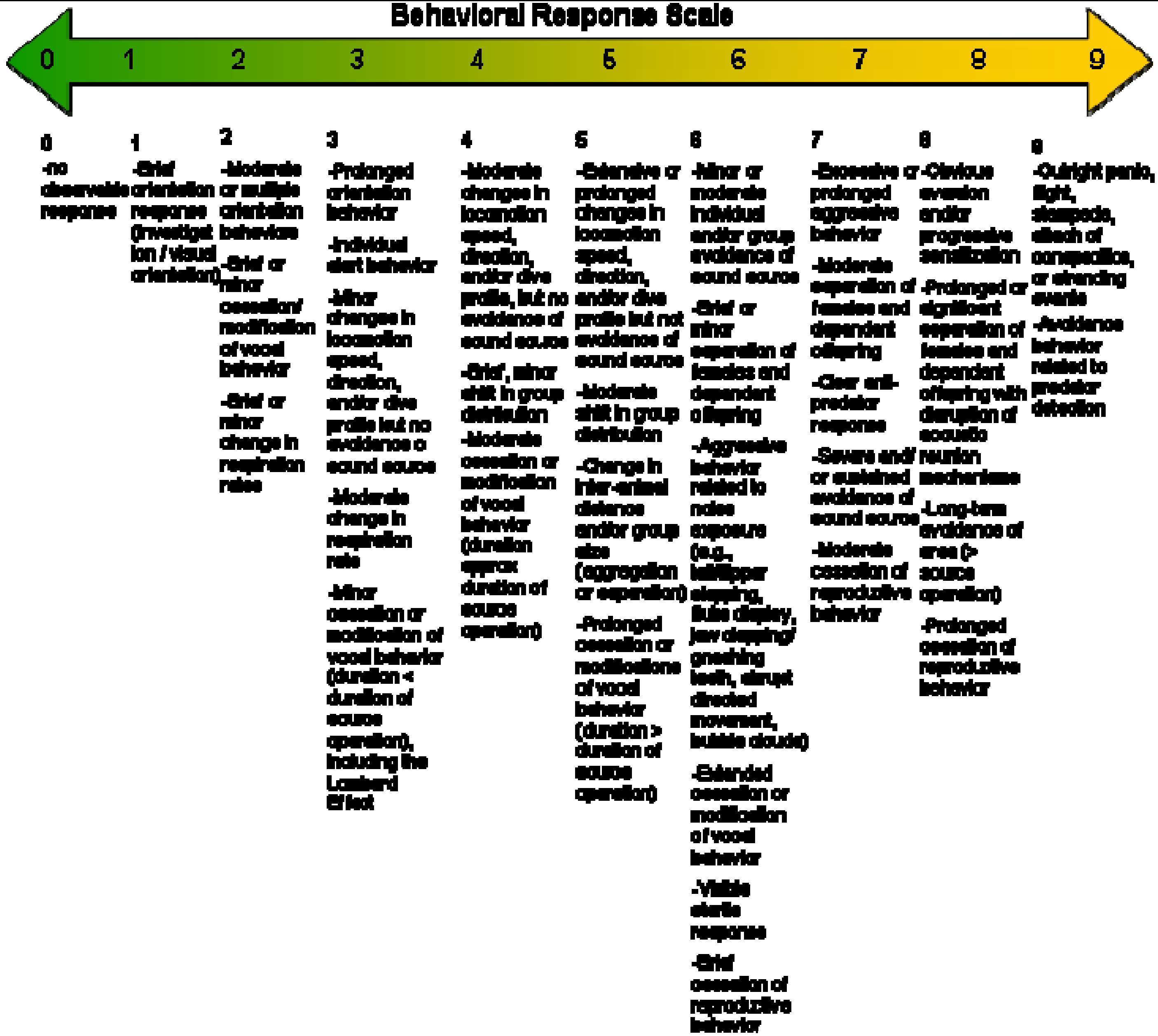


Figure 3-6: Numbered severity scale for ranking observed behaviors from Southall et al. 2007.

Given the current ambient sound levels in the southern California marine environment, the amount of sound contributed by the use of Navy vessels in the proposed exercises is very low. In addition, as opposed to commercial vessels, Navy ships are purposely designed and engineered for the lowest underwater acoustic signature possible given the limits of current naval shipbuilding technology. The goal with ship silencing technology is to limit the amount of sound a Navy vessel radiates that could be used by a potential adversary for detection. Given these factors, any marine mammals exposed may exhibit either no reactions or only short-term reactions, and would not suffer any long-term consequences from ship sound.

Potential Mid- and High Frequency Active Sonar Effects

Table 3-11 presents estimated marine mammal exposures for potential non-injurious (Level B) harassment, as well as potential onset of injury (Level A) to cetaceans and pinnipeds expected to be found in the CZ, or to migrate in and out of the CZ. Specifically, under this assessment for MFAS, the risk function methodology estimates 66,217 potential annual risk function exposures for coastal marine mammals in SOCAL OPAREAs as a whole that could result in behavioral sub-TTS (Level B Harassment). Approximately 82% of these 66,217 exposures are to California sea lions. The model estimates 5,546 annual potential exposures that could result in TTS (Level B Harassment). Approximately 82 percent of these 5,546 exposures are to Pacific harbor seals. The model estimates 11 annual potential exposures could result in injury as PTS (Level A Harassment). Approximately 82 percent of these 11 exposures are to Pacific harbor seals.

Table 3-11: Annual Sonar Exposures

SPECIES	SONAR EXPOSURES		
	Level B		Level A
	Risk Function	TTS	PTS
Gray whale	4,903	544	1
Bottlenose dolphin	1,257	191	0
Long beaked common dolphin	4,049	432	1
Northern elephant seal	833	5	0
Pacific harbor seal	1,014	4,559	9
California sea lion	54,346	3	0
Guadalupe fur seal	870	190	0
Total	67,272	5,924	11

NOTES:

1. TTS and PTS thresholds shown in Table 3-7.

2. Exposure values come from SOCAL LOA Supplement #2 submitted to NMFS in May 2008. This Supplement contained model revisions based on refined operational information and interpretation requested by NMFS.

These exposure modeling results are statistically derived estimates of potential marine mammal sonar exposures without consideration of standard mitigation and monitoring procedures. The caveats to interpretations of model results were explained previously, and are summarized briefly here.

When analyzing the results of the acoustic exposure modeling to provide an estimate of effects, there are limits to the ecological data (diving behavior, migration or movement patterns and population dynamics) used in the model, and the model results must be interpreted within the context of a given species' ecology. As described previously, this analysis assumes that short-term non-injurious sound exposure levels predicted to cause TTS or temporary behavioral disruptions qualify as Level B harassment. This approach is overestimating because there is no established scientific correlation between mid-frequency active sonar use and long-term abandonment or significant alteration of behavioral patterns in marine mammals. Because of the time delay between pings, and platform speed, an animal encountering the sonar will accumulate energy for only a few sonar pings over the course of a few minutes. Therefore, exposure to sonar would be a short-term event, minimizing any single animal's exposure to sound levels approaching the harassment thresholds.

In addition, the majority of the non-physiological Level B exposures would occur well below 195 dB (see Figure 3-7). As the figure shows, the Level B exposures occurring between approximately 135 and 195 dB would be roughly normally distributed around a mean exposure level of about 165 dB.

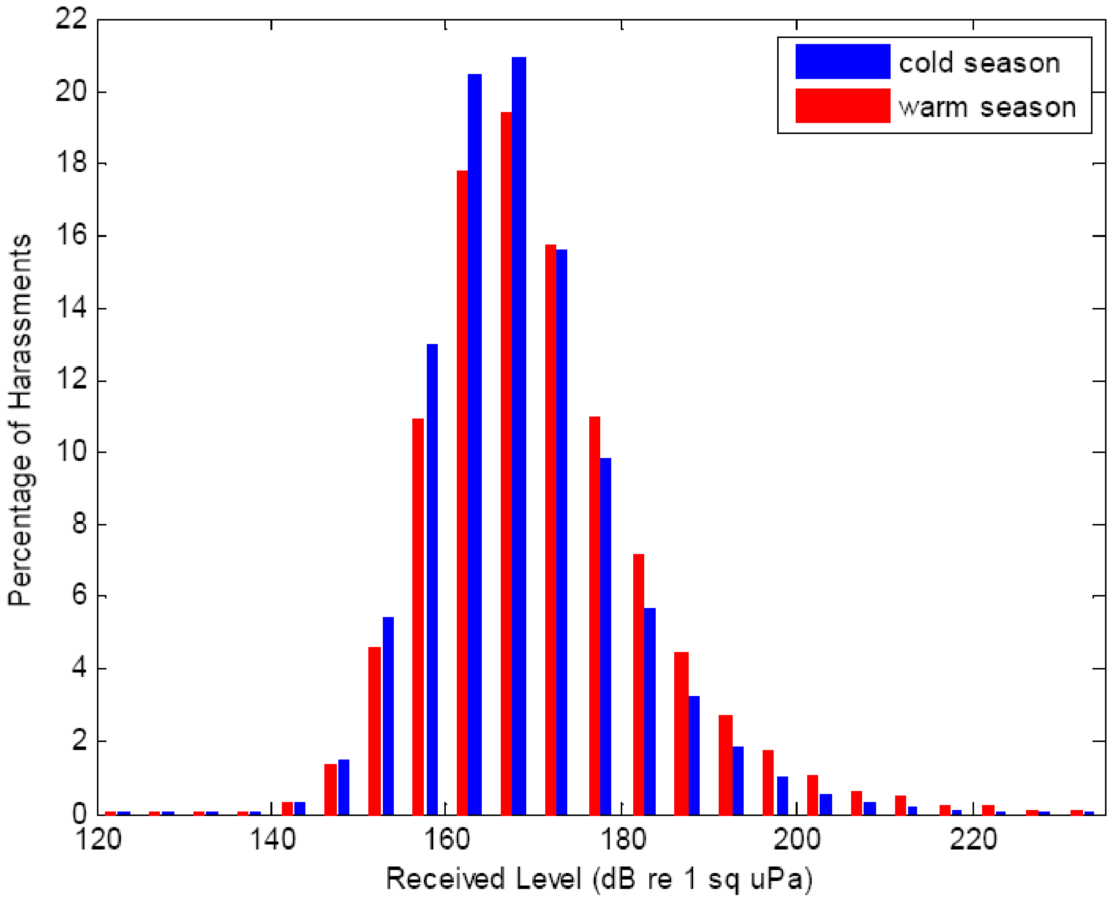


Figure 3-7: The Percentage of Behavioral Harassments Resulting from the Risk Function for Every 5 dB of Received Level

The implementation of the mitigation and monitoring procedures described in Section 2 will minimize the potential for marine mammal exposures to MFAS. When reviewing the acoustic exposure modeling results, it is also important to understand that the estimates of marine mammal sound exposures are presented without consideration of standard protective measure operating procedures. Section 2 presents details of the mitigation measures currently used for ASW activities, including detection of marine mammals and power-down procedures if marine mammals are detected within one of the safety zones.

Figure 3-8 demonstrates that the Navy's mitigation measures provide an adequate safety margin to marine mammals and allows for effective realistic ASW training. More restrictive power reduction and safety zone schemes, however, do not show appreciable further protection of exposure levels of marine mammals to MFAS but greatly reduce the ability of the sonar to detect submarines. The Temporary Threshold Shift (195 dB) is a scientifically measured, peer-reviewed value that identifies a causal relationship between MFAS exposure level and a temporary harm to marine mammals. A temporary diminishment of hearing acuity is associated with a received underwater sound exposure level (SEL) of 195 dB. The mitigation procedures are not expected to expose marine mammals to more than 179 dB at 200 yards. For a 1 second pulse, this is just about 3% of the SEL associated with a temporary reduction in hearing acuity, meaning the mammal only receives 3% of the energy required to cause temporary harm. Therefore, the Navy's power-down mitigation measure includes a significant safety margin.

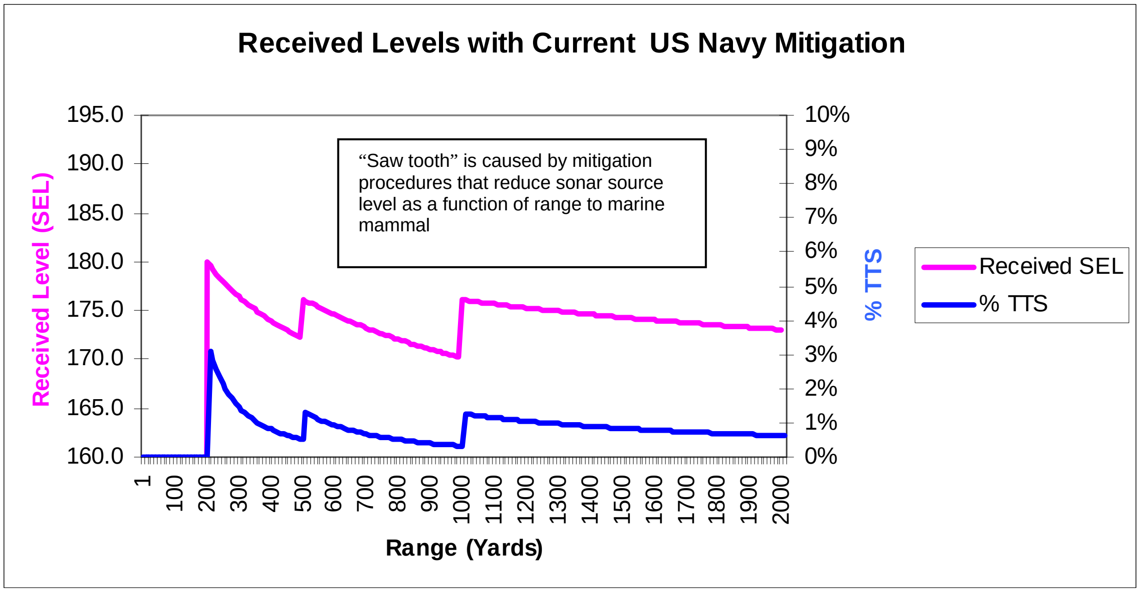


Figure 3-8: Received Levels with Current U.S. Navy Mitigation

Maximum received level (top line) to which a marine mammal would be exposed using the mitigation procedures is 179 dB. This occurs just outside the 200 yard shutdown range. The maximum received level just before 6 dB power down at 1000 yards is 175 dB and the maximum dB just before 10 dB power down at 500 yards is 175 dB. At the 500 and 200 yard points, the primary concern is not behavioral disturbance (because the animal is not likely being disturbed and may be drawn to the sonar ping), but the potential for injury due to exposure to MFA sonar or vessel strike. The 500 and 200 yard measures have a large safety margin to prevent injury. The Navy mitigation procedures allow a maximum single ping exposure of about 2.5% (or about 1/40) of the amount of energy (bottom line above) known to cause the onset of temporary diminished audio acuity in some marine mammals. Placed in perspective, the level to which the Navy already mitigates (169 dB when reducing 6dB at 1000 yards) is even lower than humpback whale's vocalization at 190 dB (.4 to 4.0 kHz frequency). Marine mammals are often exposed to higher sound levels in their own communications.

After action reports for recent exercises in SOCAL indicate that protective measures have resulted in the minimization of sonar exposure to detected marine mammals. There have been no known instances of marine mammals behaviorally reacting to the use of sonar during these exercises. The current measures are effective because the typical distances to a received sound energy level associated with temporary threshold shift (TTS) are typically within 200 m of the most powerful active sonar used in the SOCAL (the AN/SQS 53 MFA sonar); The current safety zone for implementation of power-down and shut-down procedures begins when marine mammals come within 1,000 yards of that sonar.

Underwater Detonation Effects

The modeled exposure harassment numbers for all training activities involving explosives are presented by species in Table 3-12. The model results indicate that 769 potential annual exposure for coastal marine mammals in the SOCAL Range Complex that could result in behavioral sub-TTS (Level B Harassment). Approximately 76 percent of these 769 exposures are to California sea lions. The model estimates 637 annual potential exposures that could result in TTS (Level B Harassment). Approximately 80 percent of these 637 exposures are to California sea lions. The model estimates 18 annual potential exposures could result in injury as 50 percent TM Rupture or Slight Lung Injury (Level A Harassment). Approximately 89 percent of these 18 exposures are to Pacific harbor seals. The model estimates 6 potential annual mortalities to California sea lions (Level A Harassment).

Training activities involving explosives include Mine Neutralization, Air to Surface Missile Exercise, Surface to Surface Missile Exercise, Bombing Exercise, Surface to Surface Gunnery exercise, and Naval Surface Fire Support. These exposure modeling results are estimates of marine mammal underwater detonation sound exposures without considering similar model limitations, as discussed in the summary of mid-frequency active sonar.

In the absence of mitigation, the predicted total harassments of bottlenose dolphins (assuming each exposure was of a different individual) from underwater detonations would affect approximately two percent of the local population. For the long-beaked common dolphin, the percentage would be 0.2 percent and, for the Pacific harbor seal, the percentage would be 0.5 percent. Although the local populations of gray whales, northern elephant seals, California sea lions, and Guadalupe fur seals are not known, the levels of harassment of these populations are expected to be similar. Such levels of harassment, most of which would consist of non-injurious behavioral disruptions, would have no population-level effects. Furthermore, the effects presented in Table 3-12 do not take into consideration the mitigation measures employed by the Navy. Implementation of the mitigation and monitoring procedures described in Section 2 will minimize the potential for individual marine mammal exposures to underwater detonations.

Table 3-12: Annual Underwater Detonation Exposures

SPECIES	EXPOSURES			
	Level B		Level A	
	Sub-TTS 177 dB re 1 µPa^2-s (Successive explosions)	TTS 182 dB/23 psi	50% TM Rupture 205 dB or Slight Lung Injury 13 psi-ms	Onset Massive Lung Injury or Mortality 31 psi-ms
Gray whale	6	7	0	0
Bottlenose dolphin	14	10	0	0
Long-beaked common dolphin	61	41	1	0
Northern elephant seal	76	41	0	0
Pacific harbor seal	26	26	1	0
California sea lion	584	510	16	6
Guadalupe fur seal	2	2	0	0
Total	769	637	18	6

NOTES: N/A: Not applicable – Based on a few historic observations, its habitat preference or overall distribution, a species may occur rarely in the SOCAL Range Complex, but no density estimates were available for modeling exposures

Effects by Species of Mid-Frequency Active Sonar and Underwater Detonations

Gray Whale

The most recent population estimate for gray whales is 26,635 animals (Anglis and Outlaw 2007). The potential MFAS risk function exposures of 4,903 animals represent 18 percent of that total, and the 544 TTS exposures represent 2 percent of that total. Potential underwater detonation exposure of 6 gray whales at sub-TTS Level B represents 0.02 percent of the total stock, and the potential exposure of 7 animals at TTS Level B represents 0.03 percent of the total stock.

Gray whale migration starts approximately in December, peaks in January (southbound), peaks again in March (northbound), and extends into May. There are two major migration routes, an inshore route along the mainland coast favored by mothers with calves, and an offshore route that extends in a straight line from Baja to Point Conception. SOCAL Range Complex is not a breeding or foraging area for gray whales, so the presence of an individual whale is limited to the duration of its travel through the area. At average migration swimming speeds of 3-5 knots, a gray whale is present in the offshore waters of SOCAL Range Complex for only hours or days.

As discussed previously, these exposure assessments also do not take into account the Navy's mitigation measures, which would further limit any potential exposure. Gray whales are large (up to 46 feet long), have a pronounced blow, and travel in groups of up to 16 animals (Leatherwood et al. 1982), so they are easily sighted - as determined by NMFS (Barlow 2003, 2006) - and it is very likely that lookouts would detect both individuals and groups of gray whales. Mitigation and monitoring are expected to avoid any Level A exposures.

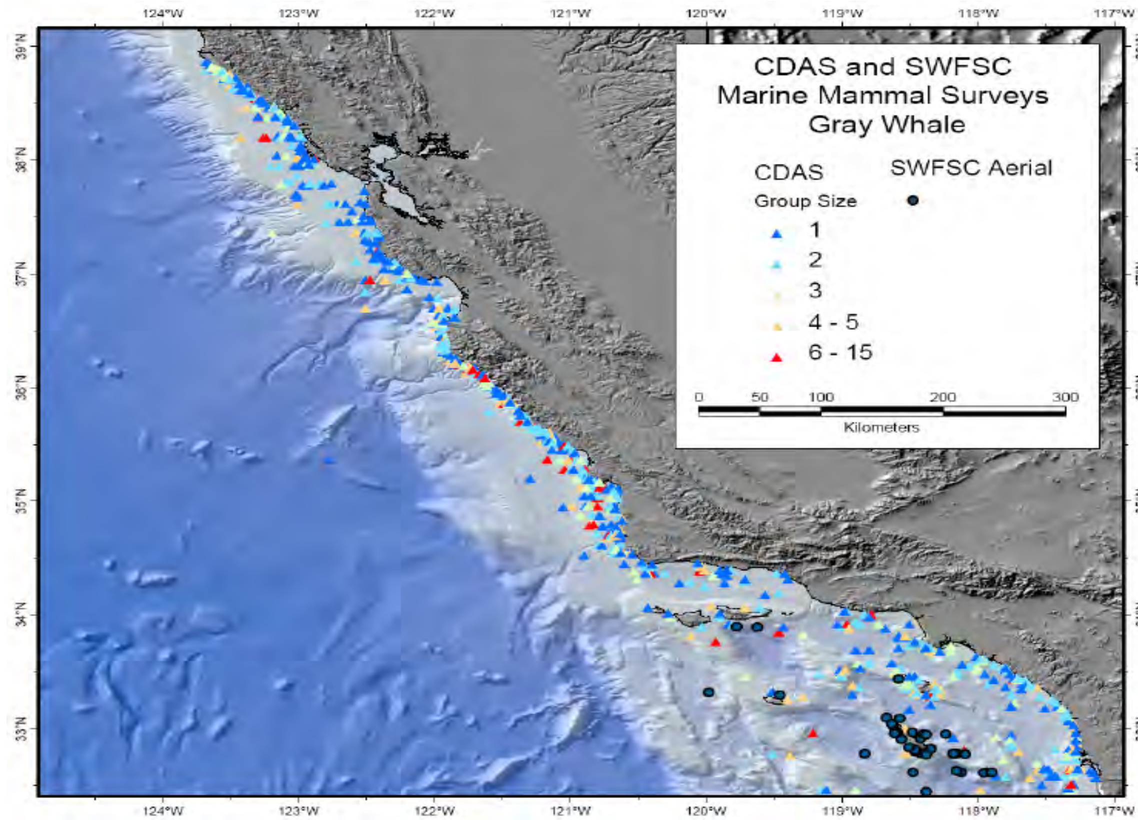
The remaining TTS and behavioral Level B exposures would only result in temporary effects to individual whales and would not result in any population level effects. Because most of these exposures would occur outside of the CZ, effects within the CZ would be insignificant. Further, there is no evidence of long term effects to the population as a result of these TTS and behavioral exposures in the long history of the Navy MFAS use in SOCAL Range Complex.

Figure 3-9 shows recent surveying of gray whales. Of note is that the thick cluster of aerial sightings in the lower right is surrounding San Clemente Island, whose nearby waters contain the instrumented undersea Navy ASW range. After four decades of operations, the whales continue to traverse waters frequently used for Navy sonar exercises and there have been no known stranding of gray whales associated with Navy activities in the SOCAL Range Complex.

Bottlenose Dolphin

The risk function and Navy post-modeling analysis estimates 1,257 bottlenose dolphins will exhibit behavioral responses NMFS will classify as harassment under the MMPA (Table 6-1). Modeling also indicates there would be 191 exposures to accumulated acoustic energy above 195 dB re 1 μPa2-s, which is the threshold established indicative of onset TTS. No bottlenose dolphins would be exposed to sound levels that could cause PTS.

Modeling indicates there would be 14 exposures to impulsive sound or pressures from underwater detonations of 177 db which is the threshold for sub-TTS behavioral response, 10 exposures to182 dB re 1 μPa2-s or 23 psi, which is the threshold indicative of onset TTS, and no exposures to impulsive sound or pressures from underwater detonations that would cause slight physical injury (Table 6-6).



Source: 2005 Biogeographic assessment of the Channel Islands National Marine Sanctuary: A Review of Boundary Expansion Concepts for NOAA's national Marine Sanctuary Program. NOAA National Centers for Coastal Ocean Science Biogeography team in cooperation with the National Marine Sanctuary Program. Silver Spring, MD. NOAA Technical Memorandum NOS NCCOS 21. 215 pp.

Figure 3-9: Gray Whale Survey

Given frequent surfacing, and aggregation of multiple animals (probability of trackline detection = 0.85 for small groups (<20) and 0.97 for large groups (>20); Barlow and Forney 2007), it is very likely that lookouts would detect a group of bottlenose dolphins at the surface. Additionally, mitigation measures call for continuous visual observation during operations with active sonar, therefore, bottlenose dolphins that migrate into the operating area would be detected by visual observers. Implementation of mitigation measures and probability of detecting bottlenose dolphins reduces the likelihood of exposure, such that effects would be discountable.

The remaining TTS and behavioral Level B exposures, which do not cause permanent physical damage to individual whales, are not expected to translate into behavior that could result in injury or mortality, and would not result in any population level effects. Further, there is no evidence of long term effects to the population as a result of these TTS and behavioral exposures in the long history of the Navy MFAS use in SOCAL Range Complex.

Long-Beaked Common Dolphin

Two species of common dolphin occur off California, the more coastal long-beaked dolphin and the more offshore short-beaked dolphin. The long-beaked common dolphin is less abundant, and only recently has been recognized as a separate species (Heyning and Perrin 1994). In general, the long-beaked common dolphin inhabits a narrow coastal band from Baja California (including the Gulf of California) northward to central California as well as the Channel Islands. Recent NMFS population estimates for the California Stock of long-beaked common dolphins is 17,530 individuals (CV=0.65) (Barlow and Forney, 2007). No information on trends in abundance are available for this stock because of high interannual variability in line-transect abundance estimates. Heyning and Perrin (1994) detected changes in the proportion of short-beaked to long-beaked common dolphins stranding along the California coast, with the short-beaked common dolphin stranding more frequently prior to the 1982-83 El Niño (which increased water temperatures off California), and the long-beaked common dolphin more commonly observed for several years afterwards. Thus, it appears that both relative and absolute abundance of these species off California may change with varying oceanographic conditions

Long-beaked common dolphins are usually found within 50 nm (92.5 km) of shore (Barlow et al. 1997, Bearzi 2005, 2006) and are generally not sighted further than 100 nm (185 km) from shore (Perrin et al. 1985; Barlow 1992 in Heyning et al. 1994).

Between the two common dolphin species, the short-beaked common dolphin is more abundant in the waters of the SOCAL Range Complex and the long-beaked common dolphin relatively less common, occurring mostly in the warm-water period. Long beaked common dolphins are found in the region throughout the year (Carretta et al. 2000), although abundance of common dolphins has been shown to change on both seasonal and inter-annual time scales in southern California (Dohl et al. 1986; Barlow 1995; Forney et al. 1995; Forney and Barlow 1998). The peak calving season thought to occur from spring and early summer (Forney 1994).

The risk function and Navy post-modeling analysis estimates 4,049 will exhibit behavioral responses NMFS will classify as harassment under the MMPA (Table 6-1). Modeling also indicates there would be 432 exposures to accumulated acoustic energy above 195 dB re 1 μPa2-s, which is the threshold established indicative of onset TTS. One long-beaked common dolphin would be exposed to sound levels that could cause PTS. The potential 4,049 MFAS risk function exposures for the offshore stock represents about 23 percent of the southern California population; the exposed coastal stock is expected to represent a similar portion of the overall population.

Modeling indicates there would be 61 exposures to impulsive sound or pressures from underwater detonations of 177 db which is the threshold for sub-TTS behavioral response, 41 exposures to 182 dB re 1 μPa2-s or 23 psi, which is the threshold indicative of onset TTS, and 1 exposure to impulsive sound or pressures from underwater detonations that would cause slight physical injury (Table 6-6). The potential TTS exposures are expected to be about 2.5 percent and PTS exposures are expected to be about 0.01. Underwater detonation activities are expected to expose 0.1 percent of the population to Level B and 0.01 percent of the coastal stock to Level A.

As discussed previously, these exposure assessments also do not take into account the Navy's mitigation measures, which would further limit any potential exposure. Specifically the frequent surfacing and aggregation of multiple animals make it very likely that lookouts would detect a group of long-beaked common dolphins at the surface. Further, Level A exposures from underwater detonations would very likely be precluded by the pre-exercise clearance procedures.

Any remaining TTS and behavioral Level B exposures would only result in temporary effects to individual dolphins which do not cause permanent physical damage to individual whales, are not expected to translate into behavior that could result in injury or mortality, and would not result in any population level effects. Further, there is no evidence of long term effects to the population as a result of these TTS and behavioral exposures in the long history of the Navy MFAS use in SOCAL Range Complex.

Northern Elephant Seal

The total population of northern elephant seals is estimated at over 100,000 animals, and the estimated growth rate of the population is variously estimated at from about 9 to about 30 percent per year, or about 9,000 to 30,000 seals per year. The potential MFAS risk function exposures of 833 animals for the entire SOCAL Range Complex represent about 0.8 percent of the total population and the potential 5 TTS exposures represent about 0.003 percent of the estimated population.

Modeling indicates there would be 76 exposures to impulsive sound or pressures from underwater detonations of 177 db which is the threshold for sub-TTS behavioral response, and 41 exposures to 182 dB re 1 μPa2-s or 23 psi, which is the threshold indicative of onset TTS. Underwater detonation activities are expected to expose 0.1 percent of the population to Level B and 0.001 percent of the coastal stock to Level A.

Northern elephant seals spend little time near shore, traversing offshore waters four times per year (two round-trips) traveling between pupping and molting beaches in California and Mexico and their preferred feeding areas in the north Pacific Ocean. Bulls tend to spend about 250 days/year (68 percent of the year) at sea and females about 300 days/year (82 percent of the year) at sea, but little of it near land. While ashore (32 percent of the year for adult males and 18 percent of the year for females), northern elephant seals do not feed. Thus, the duration of an individual's presence in the marine waters of SOCAL Range Complex may be on the order of a few weeks per year. As discussed previously, these exposure assessments also do not take into account the Navy's mitigation measures, which would further limit any potential exposure.

The remaining TTS and behavioral Level B exposures would only result in temporary effects to individual northern elephant seals which do not cause permanent physical damage to individual whales, are not expected to translate into behavior that could result in injury or mortality, and would not result in any population level effects. Further, there is no evidence of long term effects to the population as a result of these TTS and behavioral exposures in the long history of the Navy MFAS use in SOCAL Range Complex.

Pacific Harbor Seal

The world population of harbor seals is estimated at 400,000 - 500,000, and the California population is estimated at about 20,000 seals. The estimated growth rate of the population is about 6 percent per year, or about 1,200 seals per year. The most recent southern California population estimate for the Pacific harbor seal is about 5,270 animals. Because of the lower critieria for harbor seals (see Tabel 3-7), the potential MFAS risk function exposures of 1,014 animals for the entire SOCAL Range Complex represent about 19 percent of that total, the potential 4,559 TTS exposures represent 87 percent of the estimated population, and the potential 9 PTS exposures represent about 0.2 percent. Total potential underwater detonation exposures for the entire SOCAL Range Complex of 52 harbor seals at Level B represents about 1.0 percent of the total stock, and the potential Level A exposures of 1 animal represents about 0.02 percent of the total stock.

As discussed previously, these exposure assessments also do not take into account the Navy's mitigation measures, which would further limit any potential exposure. In particular, Level A exposures from underwater detonations would very likely be precluded by the pre-exercise clearance procedures.

The remaining TTS and behavioral Level B exposures would only result in temporary effects to individual pacific harbor seals which do not cause permanent physical damage to individual whales, are not expected to translate into behavior that could result in injury or mortality, and would not result in any population level effects. Further, there is no evidence of long term effects to the population as a result of these TTS and behavioral exposures in the long history of the Navy MFAS use in SOCAL Range Complex.

California Sea Lion

California sea lions are the second-most abundant marine mammal in California waters, with an estimated population of more than 200,000 animals. The percentage of this population inhabiting SOCAL Range Complex is not known. The potential MFAS risk function exposures of 54,346 animals for the entire SOCAL Range Complex represent about 27 percent of the entire California population, and the 3 TTS exposures represent 0.002 percent of the estimated population. Total potential underwater detonation exposures for the entire SOCAL Range Complex of 1,094 sea lions at Level B represents about 0.5 percent of the total California stock, and the potential Level A exposures of 16 animals represents 0.01 percent of the total stock.

As discussed previously, these exposure assessments do not take into account the Navy's mitigation measures, which would further limit any potential exposure. In particular, Level A exposures from underwater detonations - estimated at 16 animals per year - would very likely be precluded by the pre-exercise clearance procedures.

The remaining TTS and behavioral Level B exposures would only result in temporary effects to individual California sea lions harbor which do not cause permanent physical damage to individual whales, are not expected to translate into behavior that could result in injury or mortality, and would not result in any population level effects. Further, there is no evidence of long term effects to the population as a result of these TTS and behavioral exposures in the long history of the Navy MFAS use in SOCAL Range Complex.

Guadalupe Fur Seal

The most recent population estimate for the Guadalupe fur seal is about 7,000 animals. The potential MFAS risk function exposures of 870 animals for the entire SOCAL Range Complex represent about 12 percent of that total, and the 190 TTS exposures represent 3 percent of the estimated population. Total potential underwater detonation exposures for the entire SOCAL Range Complex of 4 fur seals at Level B represents about 0.06 percent of the total stock. No fur seals will experience Level A exposures.

This is a statistical comparison, however, that makes simplifying assumptions and does not factor in the all the biology of Guadalupe fur seals. For example, the model assumes a uniform density distribution, whereas the density of Guadalupe fur seals, which are non-migratory and breed only on Guadalupe Island, probably declines at a geometric rate with increasing distance from Guadalupe Island. As another example, the model assumes that pinnipeds are always in the water and capable of being exposed, whereas adult females with pups spend 9 - 13 days at sea feeding, followed by 5-6 days nursing their pups; thus, they are on land about one-third of the time.

As discussed previously, these exposure assessments also do not take into account the Navy's mitigation measures, which would further limit any potential exposure. In particular, Level A exposures from underwater detonations would very likely be precluded by the pre-exercise clearance procedures.

The remaining TTS and behavioral Level B exposures would only result in temporary effects to individual Guadalup fur seals harbor seals which do not cause permanent physical damage to individual whales, are not expected to translate into behavior that could result in injury or mortality, and would not result in any population level effects. Further, there is no evidence of long term effects to the population as a result of these TTS and behavioral exposures in the long history of the Navy MFAS use in SOCAL Range Complex.

Summary

It is highly unlikely that a marine mammal would experience any long-term effects because, given the size of SOCAL Range Complex, repeated or prolonged exposures of individual animals to high-level sonar signals are unlikely. The SOCAL Range Complex has been the location of training and testing with MFAS for decades and there have been no known incidents of effects to individual marine mammals associated with these activities and no evidence of impacts to marine mammal populations. The extensive measures undertaken by the Navy to avoid or limit marine mammal exposure to active sonar, detailed in the Section 2 ASW discussion would reduce the number of PTS and TTS exposures below those presented in Table 3-11. The remaining TTS and behavorial exposures would cause only temporary effects to individual whales. Therefore, long term effects on individuals, populations, or stocks are unlikely.

While marine mammals may detect sonar emissions, underwater detonations, or ship noise from a distance, these exercises are intermittent and of short duration. Minor effects on individuals within a species and substantial effects on a few individuals of a species would have no substantial effect on regional populations of these species; takes are regulated under both the Endangered Species Act and Marine Mammal Protection Act specifically to avoid population-level effects. The proposed training activities will not affect the biological productivity of populations of marine mammals that are CZ resources. Specifically with regard to marine mammals, the proposed activities are consistent to the maximum extent practicable with Section 30230.

3.3.2.2 Section 30231, Biological Productivity

3.3.2.2.1 California Policy

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

3.3.2.2.2 Coastal Zone Effects

The proposed activities are consistent to the maximum extent practicable with Section 30231. The proposed activities would include no waste water discharges, would use no ground water supplies, and would not interfere with surface water flows, except as needed for erosion control. Riparian habitats and streamside vegetation in the CZ would not be affected. The biological productivity of coastal waters and coastal water quality would be maintained, as discussed below.

Discussion

Two extensions of SOAR would be instrumented with transducer nodes and fiber optic cables to create a Shallow Water Training Range (SWTR). In addition, the Navy proposes to establish an offshore shallow water minefield on Tanner Banks. All equipment to be used for installation of the SWTR and the minefield would be properly maintained and monitored for leakage of fuel, oil, or other hazardous materials. Vessels and equipment used for cable deployment and installation would comply with regulatory requirements and best management practices for minimizing the inadvertent discharge of potential marine contaminants. Any effects on biological productivity would be temporary.

Installation of the nodes and cables would result in minor, temporary increases in turbidity from disturbances of bottom sediments. Disturbed sediments would rapidly disperse and settle back to the seabed. Cables would eventually become buried in bottom sediments. Cable materials (e.g., glass, plastic, nylon) would not leach contaminants into the water or sediments, but would - based on observations of existing cable arrays - become encrusted with benthic organisms. The nodes would have a total footprint of about 0.6 ac (0.24 ha) and the cable array would have a total footprint of about 11 ac (4.ha); their combined footprint would cover about 0.003 percent of the 500 nm^2 (926 km^2) SWTR. No substantial short-term or long-term effects on biological productivity would result from the installation of these new facilities.

Due to the temporary nature of these events, the lack of substantial food-chain effects, the absence of population-level effects, and the measures to protect threatened and endangered species (whose depleted populations could be affected by the loss of small numbers of individuals), the biological productivity of coastal waters will be maintained.

Summary

3.3.2.3 Section 30234.5 - Economic, Commercial, and Recreational Importance of Fishing

California Policy

The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

Coastal Zone Effects

Commercial fishing activities occur at various locations off the coast of southern California. Commercial fishing in the southern California area accounts for a substantial proportion of the fish and invertebrate catches in California, with an annual value of approximately $145 million (CDFG 2001). Sport fishing and tourism are important economic activities, supporting large numbers of charter operators and boaters in southern California.

Salt-water sport fishing is concentrated around the Channel Islands and in the shallower waters over the Cortes and Tanner Banks. Diving occurs year-round, although the number of trips to SCI and the Banks appears to peak during lobster season (October-March). Most boat trips originate from marinas and harbors along the southern California coast.

Potential effects of the proposed activities on economic, commercial, and recreational fishing have been evaluated by the Navy. The CZ around SCI accounts for a very small portion of the littoral waters available to commercial and recreational users and, as noted in Section 1, Navy training and testing activities under the proposed activities would not require exclusive use of the portions of the CZ along the mainland coast or those portions of the CZ surrounding other Channel Islands. The Navy's training and testing activities would not permanently modify the marine environment in the CZ such as would affect stocks of commercial or recreational fish species. Elements of the proposed activities that require exclusive use of an ocean area (e.g., those activities in which weapons are fired) could temporarily affect specific commercial and recreational fishing activities during the actual training event. Short-term adverse effects on individual commercial fishermen may result from temporary closures of specific ocean areas, but the overall regional commercial fishing industry would be unchanged.

Prior to conducting an at-sea training event with the potential to affect commercial or recreational fishing, NOTMARs and NOTAMs are issued, providing the public and commercial fishermen with sufficient notice of upcoming location and timing restrictions in specific training areas. In addition, SCORE maintains a public website depicting upcoming restrictions in designated Danger Zones around SCI. These notices provide details on the dates, durations, and locations of restricted access, so that commercial and recreational fishermen and divers can plan their activities accordingly. The restricted times only extend through the duration of the training activity, allowing the public to shift its activities to alternate areas during these temporary closures. Thus, the proposed activities are consistent to the maximum extent practicable with Section 30234.5.

3.4 PROPOSED ACTIVITIES CONTAINED IN THE COASTAL CONSISTENCY DETERMINATION ARE CONSISTENT TO THE MAXIMUM EXTENT PRACTICABLE WITH THE CALIFORNIA COASTAL MANAGEMENT PROGRAM'S ENFORCEABLE POLICIES.

The Navy's mission, explained in section 1.1.1 earlier, is to organize, train, equip, and maintain combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. This mission is mandated by federal law (Title 10 U.S. Code § 5062), which charges the Chief of Naval Operations with responsibility for ensuring the readiness of the Nation's naval forces. In determining what activities to conduct in the SOCAL Range Complex, the Navy must consider the training requirements that are necessary to meet its Title 10 responsibilities. The waters and land-based training ranges of Southern California have been critical to the Navy's ability to train generations of Sailors and Marines, and to conduct Research, Development, Testing & Evaluation activities. Those activities, including the certification of Carrier and Expeditionary Strike Groups, enable the Navy to meet its congressionally mandated obligations.

Section 1.1.2.2, above, explains in detail the strategic importance of the SOCAL Range Complex. The Complex is proximate to the homeport of San Diego, one of the Navy's largest fleet concentration areas. The SOCAL Range Complex contains waters of varying bathymetry and weather conditions, a centrally located island that supports a broad range of Strike Group and Unit Level training, an established communications system, and aerial and subsurface tracking systems. The Complex is located near other southwest ranges, allowing more realistic and diverse training. With training available nearby, our Sailors, Marines, and Coastguardsmen can prepare for deployment and operational missions while not spending any more time away from their families than is necessary for training. Extended operational deployments already require extended family separations. From unit level training to graduate level certification exercises, the capability and capacity of the SOCAL Range Complex is required to support the entire training continuum and it must be available when and as needed to meet the Navy mission.

The Navy's SOCAL Range Complex activities are being analyzed in an Environmental Impact Statement and will be subject to the terms and conditions of terrestrial and marine Biological Opinions under the Endangered Species Act. Regarding marine mammals, the Navy's activities will be subject to the requirements of the Marine Mammal Protection Act, as reflected in a Final Rule and subsequent Letters of Authorization. Commander, Navy Region Southwest and its tenant commands' staffs provide full-time natural and cultural resource support to the Range Complex, as does the environmental staff of the U.S. Pacific Fleet.

The CZMA requires that federal actions must be consistent to the maximum extent practicable with the enforceable policies of approved state coastal management programs. As described in the preceding sections, the Navy expects that its proposed activities will not harm marine mammal populations and may result in only temporary effects on coastal uses or resources. The waters in which the Navy has trained with mid-frequency sonar for decades, without the current mitigation measures the Navy employs, continue to be some of the richest and most diverse in marine mammal populations. The Navy now employs mitigation measures, which are described in detail in section 2.2.2 above. It is noteworthy that not a single or multiple marine mammal stranding in SOCAL has ever been attributed to the Navy's use of sonar in those waters, even prior to the Navy implementing mitigation measures. More restrictive training measures, exclusion zones, or seasonal restrictions could conflict with the Navy's ability to meet its training obligations under 10 U.S.C. § 5062. Moreover, additional mitigation measures are not necessary in light of the Navy's proven track record in SOCAL and the lack of any empirical data demonstrating that the Navy's MFA sonar training has harmed marine mammal populations in SOCAL. Therefore, considering these factors and the entirety of the Navy's analysis supporting this consistency determination and the Navy's related draft environmental impact statement, the Navy concludes that its proposed activities are consistent to the maximum extent practicable with the approved enforceable policies contained in Chapter 3 of the California Coastal Act.

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4 CONCLUSION

The Navy's proposed activities will be undertaken in a manner that is consistent to the maximum extent practicable with the enforceable policies of the California Coastal Management Program.

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