MARINE SPECIES MONITORING

FOR THE

NAVAL SURFACE WARFARE CENTER PANAMA CITY DIVISION (NSWC PCD) STUDY AREA

Annual Report for 2011

Submitted To:

Office of Protected Resources
National Marine Fisheries Service (NMFS)
1315 East-West Highway
Silver Spring, MD 20910-3226

In accordance with:

January 21, 2011 Letter of Authorization for NSWC PCD Mission Activities; 50 CFR Part 218, Subpart S

September 2011

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ACRONYMS AND ABBREVIATIONS

AMR	Adaptive Management Review
BO	Biological Opinion
BSS	Beaufort Sea State
CFR	Code of Federal Regulations
CNO	Chief of Naval Operations
DON	Department of the Navy
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ft	Feet
FY	Fiscal Year
HFAS	High-frequency Active Sonar
ICMP	Integrated Comprehensive Monitoring Program
ID	Identification
ITA	Incidental Take Authorization
JAX	Jacksonville
km	Kilometer(s)
LMMO	Liaison Marine Mammal Observer
LO	Lookout
LOA	Letter of Authorization
m	Meter(s)
MFAS	Mid-frequency Active Sonar
MMC	Marine Mammal Commission
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
NM	Nautical Mile(s)
NMFS	National Marine Fisheries Service
NSWC PCD	Naval Surface Warfare Center Panama City Division
NUWCDIVNPT	Naval Undersea Warfare Center Division, Newport
OEIS	Overseas Environmental Impact Statement
OPAREA	Operating Area
ONR	Office of Naval Research
PAM	Passive Acoustic Monitoring
RDT&E	Research, Development, Test, and Evaluation
U.S.	United States
yd	Yard(s)

I. INTRODUCTION

Background

The United States (U.S.) Navy developed range-complex monitoring plans to provide marine mammal and sea turtle monitoring as required by the Final Rules issued by the National Marine Fisheries Service (NMFS) under the Marine Mammal Protection Act (MMPA) of 1972 and the Endangered Species Act (ESA) of 1973. In order to issue an Incidental Take Authorization (ITA) for an activity, Section 101(a)(5)(a) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking." The MMPA implementing regulations at 50 Code of Federal Regulations (CFR) Section 216.104(a)(13) note that requests for Letters of Authorization (LOAs) must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present. While the ESA does not have specific monitoring requirements, recent Biological Opinions (BOs) issued by NMFS also have included terms and conditions requiring the U.S. Navy to develop a monitoring program. In addition to range-complex monitoring plans, a monitoring plan for Naval Surface Warfare Center Panama City Division (NSWC PCD) mission activities was developed for protected marine species, primarily marine mammals and sea turtles, as part of the environmental planning and regulatory compliance process associated with a variety of research, development, test, and evaluation (RDT&E) activities. As part of the issuance of the NSWC PCD Mission Activities LOA in 2010 (NMFS, 2010a), the U.S. Navy published the NSWC PCD Mission Activities Monitoring Plan (Department of the Navy [DON], 2010a).

Based on discussions with NMFS, range-complex and study-area monitoring plans were designed as a collection of focused "studies" to gather data that will attempt to address the following questions, which are described more fully in the NSWC PCD Mission Activities Monitoring Plan:

1. What are the behavioral responses of marine mammals and sea turtles that are exposed to mid-frequency active sonar (MFAS)/high-frequency active sonar (HFAS) and explosives?

2. Is the Navy's suite of mitigation measures for MFAS/HFAS and explosives effective at avoiding injury and mortality of marine mammals and sea turtles?

Monitoring methods proposed for the NSWC PCD Study Area, similar to the range-complex monitoring plans, include a combination of research elements designed both to support study area-specific monitoring and to contribute information to a larger U.S. Navy-wide science-based program. These research elements include visual surveys from vessels or airplanes and passive acoustic monitoring (PAM), as well as Navy marine mammal observers (MMOs) aboard platforms participating in the test event. Each monitoring technique has advantages and disadvantages that vary temporally and spatially, as well as support one particular study objective better than another. The U.S. Navy uses a combination of techniques so that detection

and observation of marine animals is maximized, and meaningful information can be derived to answer the research questions proposed above.

In addition to the NSWC PCD Missions Activities Monitoring Plan and the Fleet-funded Monitoring Plans described above, the Chief of Naval Operations (CNO) Energy and Environmental Readiness Division (N45) and the Office of Naval Research (ONR) have developed a coordinated Science & Technology and Research & Development programs focused on marine mammals and sound. Total investment in these programs for fiscal year (FY) 2011 was approximately $16 million, and continued funding at levels greater than $14 million is foreseen in subsequent years. Several significant projects relative to potential U.S. Navy operational impact to marine mammals are currently funded and ongoing within some U.S. Navy Range Complexes.

Integrated Comprehensive Monitoring Program

The Integrated Comprehensive Monitoring Program (ICMP) provides the overarching framework for coordination of the U.S. Navy monitoring program (DON, 2009a, 2010b). It has been developed in direct response to Navy Range permitting requirements established in the various MMPA Final Rules, ESA Consultations, BOs, and applicable regulations. As a framework document, the ICMP applies by regulation to those activities on ranges and operating areas (OPAREAs) for which the U.S. Navy sought and received ITAs.

The ICMP is intended for use as a planning tool to focus U.S. Navy monitoring priorities pursuant to ESA and MMPA requirements. Top priority will always be given to satisfying the mandated legal requirements across all ranges. Once legal requirements are met, any additional monitoring-related research will be planned and prioritized using guidelines provided by the ICMP, consistent with availability of both funding and scientific resources. As a planning tool, the ICMP is a "living document." It will be routinely updated as the Program matures. Initial areas of focus for maturing the document in 2010/2011 included further refinement of monitoring goals and adding a characterization of the unique attributes associated with each study area and range complex/study area to aid in shaping future monitoring projects. Focus was also placed on generating a broader description of the data management organization and access procedures.

The ICMP is evaluated annually through the Adaptive Management Review (AMR) process to: (1) assess progress, (2) provide a matrix of goals for the following year, and (3) make recommendations for refinement and analysis of the monitoring and mitigation techniques. This process includes conducting an annual AMR at which the U.S. Navy and NMFS jointly consider the prior year goals, monitoring results, and related science advances to determine if modifications are needed to more effectively address monitoring program goals. Modifications to the ICMP that result from AMR decisions are incorporated by an addendum or revision to the ICMP. Official ICMP updates are provided to NMFS by December 31 annually (e.g., DON, 2010b).

Under the ICMP, monitoring measures prescribed in range-/project-specific monitoring plans and U.S. Navy-funded research relating to the effects of U.S. Navy testing activities on protected

marine species should be designed to accomplish one or more of the following top-level goals as currently prescribed in the 2010 ICMP update (DON, 2010b):

a) An increase in our understanding of the likely occurrence of marine mammals and/or ESA-listed marine species in the vicinity of the action (i.e., presence, abundance, distribution, and/or density of species).

b) An increase in our understanding of the nature, scope, or context of the likely exposure of marine mammals and/or ESA-listed species to any of the potential stressor(s) associated with the action (e.g., sound, explosive detonation, or expended materials), through better understanding of one or more of the following: 1) the nature of the action and its surrounding environment (e.g., sound source characterization, propagation, and ambient noise levels); 2) the affected species (e.g., life history or dive patterns); 3) the likely co-occurrence of marine mammals and/or ESA-listed marine species with the action (in whole or part); and/or 4) the likely biological or behavioral context of exposure to the stressor for the marine mammal and/or ESA-listed marine species (e.g., age class of exposed animals or known pupping, calving or feeding areas).

c) An increase in our understanding of how individual marine mammals or ESA-listed marine species respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible, e.g., at what distance or received level).

d) An increase in our understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: 1) the long-term fitness and survival of an individual; or 2) the population, species, or stock (e.g., through effects on annual rates of recruitment or survival).

e) An increase in our understanding of the effectiveness of mitigation and monitoring measures, including increasing the probability of detecting marine mammals (through improved technology or methodology), particularly within the safety zone (thus allowing for more effective implementation of the mitigation), to better achieve the above goals. Improved detection technology resulting from these goals will be rigorously and scientifically validated prior to being proposed for mitigation, and meet practicality considerations (engineering, logistic, fiscal).

f) A better understanding and record of the manner in which the authorized entity complies with the ITA and incidental take statement (ITSs).

OPNAV (N45) maintains and updates the ICMP, as necessary, reflecting the results of current regulatory agency rulemaking, AMRs, best available science, improved assessment methodologies, and more effective protective measures. This is done in consultation with U.S. Navy technical experts, Fleet Commanders, and Echelon II Commands as appropriate, and as part of the AMR process. The ICMP (updated in December 2010) is provided in Appendix A.

Report Objective

The design of the NSWC PCD Monitoring Plan represented part of a new U.S. Navy-wide and regional assessment, and as with any new program, there are many coordination, logistic, and technical details that continue to be refined. The scope of the range-complex monitoring plans was to lay out the background for monitoring, as well as define initial procedures to be used in meeting certain study objectives derived from NMFS-U.S. Navy agreements.

Overall, and in support of the above statement, this report's main objective is to:

- Present information on U.S. Navy-funded marine mammal and sea turtle monitoring conducted in the NSWC PCD Study Area under the NSWC PCD Mission Activities LOA during the period from August 2, 2010 to August 1, 2011. Due to time required to consolidate data and generate an annual monitoring report, this report covers a time period that includes the last half of the previous year's LOA (August 2, 2010-January 21, 2011) as well as the first half of the current year LOA (January 22, 2011-August 1, 2011). Primary focus over the first years of the monitoring program has been on establishing initial monitoring commitments, initiating data-collection efforts, and overall organization and coordination of the Navy-wide monitoring program. This report will focus on summarizing collected data and providing a brief description of the major accomplishments from techniques used this year.

This report has been prepared in accordance with the requirements of the MMPA regulations (NMFS, 2010b [50 C.F.R. §§ 218.184]) and the LOA for NSWC PCD Mission Activities (NMFS, 2010a [Section 7]).

II. NSWC PCD MISSION ACTIVITIES

The NSWC PCD Study Area includes military warning areas W-151 (includes Panama City OPAREA), W-155 (includes Pensacola OPAREA), and W-470 (Figure 1), and St. Andrew Bay (Figure 2). The NSWC PCD RDT&E activities may be conducted anywhere within the existing military warning areas and St. Andrew Bay from the mean high-water line (average high-tide mark) out to 222 kilometers (km) (120 nautical miles [NM]) offshore.

Thirty species of marine mammals potentially occur in the NSWC PCD Study Area. These species include whales, dolphins, and the manatee. Twenty-four species regularly occur here and were evaluated in the NSWC PCD Mission Activities Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) (DON, 2009b). All marine mammals are afforded protection under the MMPA. Of the 24 common marine mammal species, the sperm whale (*Physeter macrocephalus*) and the West Indian manatee (*Trichechus manatus*) are also protected under the ESA. Additionally, five species of threatened and endangered sea turtles can be found in the NSWC PCD Study Area: leatherback turtle (*Dermochelys coriacea*); loggerhead turtle (*Caretta caretta*); green turtle (*Chelonia mydas*); hawksbill turtle (*Eretmochelys imbricata*); and Kemp's ridley turtle (*Lepidochelys kempii*). The distribution and habitat preferences of these marine protected species are reviewed in the U.S. Navy's Marine Resources Assessment for the Gulf of Mexico (DON, 2007).

NSWC PCD Monitoring Plan Accomplishments

NSWC PCD Study Questions Overview

The goal of the NSWC PCD Monitoring Plan is to implement field methods chosen to address the long-term monitoring objectives outlined on page 5. In the NSWC PCD Monitoring Plan (DON, 2010a; Appendix B), the U.S. Navy proposed to implement a variety of field methods to gather monitoring data on marine mammals and sea turtles in the NSWC PCD Study Area. Specifically, the U.S. Navy proposed to use visual surveys (aerial or vessel); to deploy PAM devices when possible; and to put MMOs aboard U.S. Navy vessels to meet its goals for the NSWC PCD monitoring program for RDT&E activities that involve underwater explosive detonation, projectile firing, and sonar testing. Studies were specifically designed to address the questions outlined on page 3**.** Table 1 shows the FY 2011 monitoring objectives agreed upon by NMFS and the U.S. Navy from the NSWC PCD Monitoring Plan (DON, 2010a; Appendix B).

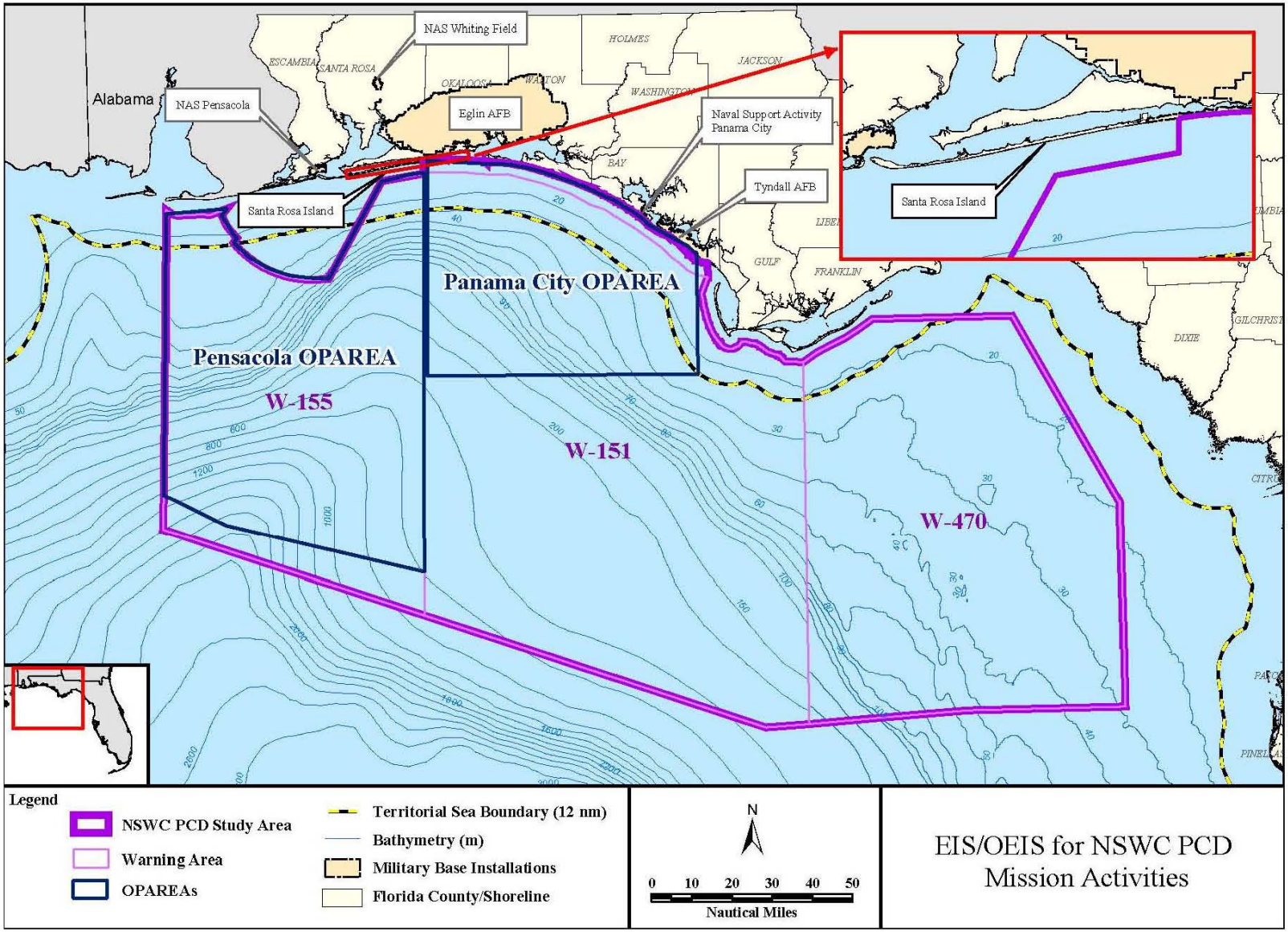

Figure 1. NSWC PCD Study Area: Gulf of Mexico.

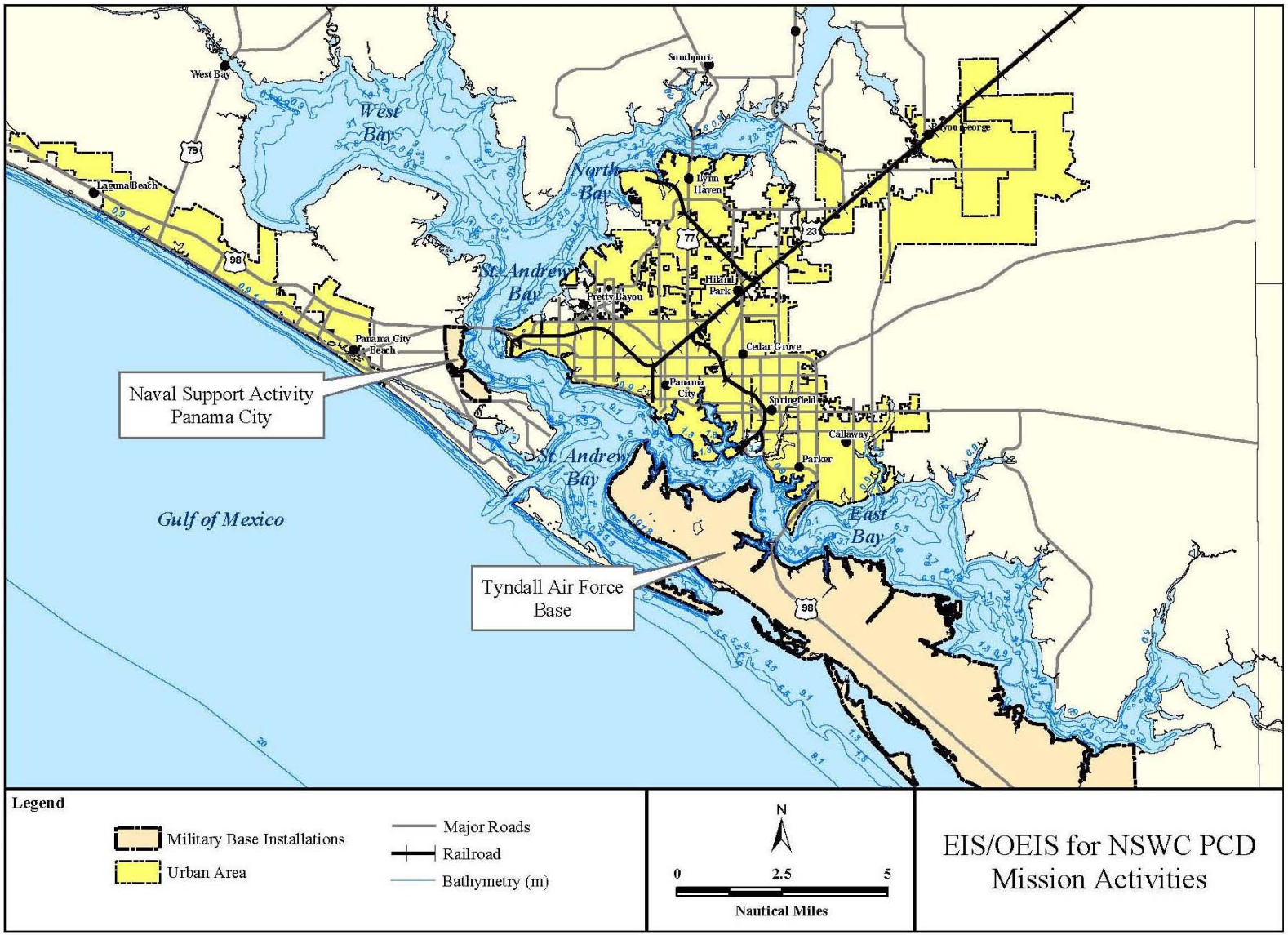

Figure 2. NSWC PCD Study Area: Nearshore and St. Andrew Bay.

Table 1. Monitoring Commitments under NSWC PCD Final Rule, LOA, and BO for FY 2011-2014.

	Events monitoring	FY 2011 Status
STUDY 1 (behavioral responses)		
Aerial or Vessel Surveys	Two sonar activities and two explosive events per year	Completed two sonar events; Not applicable for explosives*
Marine Mammal Observers (MMOs)	One explosive event per year	Not applicable*
STUDY 2 (mitigation effectiveness)		
MMO/Lookout Comparison	One explosive event per year	Not applicable*
Vessel or Aerial Surveys Before And After Test Events	Two sonar activities and two explosive events per year	Completed two sonar events; Not applicable for explosives*

* No monitoring took place for explosive events in the NSWC PCD Study Area as none of these activities were conducted.

III. NSWC PCD MONITORING ACCOMPLISHMENTS FOR THE REPORTING PERIOD

During the August 2, 2010 – August 1, 2011 reporting period, NSWC PCD implemented the Monitoring Plan as part of the first full year of monitoring since the January 2010 promulgation of the NSWC PCD Mission Activities LOA. Major accomplishments from the 2010-2011 compliance monitoring in the NWSC PCD Study Area included the completion of aerial surveys before, during, and after two sonar test events. There were no monitoring opportunities available for explosive events in the NSWC PCD Study Area as no detonations were conducted during this period. NSWC PCD also incorporated MMOs into the AN/AQS-20 sonar test events from November 2010 through July 2011.

Monitoring During Sonar Test Events

Monitoring events are one of the primary components being used to address specific monitoring questions posed in the NSWC PCD Monitoring Plan and to fulfill the requirements of the NMFS-issued LOA for RDT&E activities that involve underwater detonations, sonar systems, and projectile firing. NSWC PCD conducted tests of the AN/AQS-20 sonar system during the reporting period. The AN/AQS-20 is an HFAS mine-hunting system. No monitoring opportunities were available for explosive events in the NSWC PCD Study Area as none of these activities were conducted during this reporting period.

Aerial Surveys

NSWC PCD conducted two aerial monitoring events for tests of the AN/AQS-20 sonar system during the reporting period. A summary of survey effort and sightings is provided in Table 2. Complete survey and sighting details for each test event are included in Appendices C and D. Observers searched for and subsequently recorded any present cetacean and sea turtle species during pre-test, during-test, and post-test monitoring for both sonar events. No stranded or injured marine mammals or sea turtles were observed during either aerial monitoring effort.

- Aerial monitoring was conducted July 5-9, 2011 in good to fair sighting conditions, with all sightings made in Beaufort sea states between 1 and 4. The monitoring included two pre-test flights; two flights during the test; and one post-test flight (Appendix C). Focal-follow behavioral data were collected during two of the sightings. Observers visually surveyed 2,067 km (1,116 NM) of systematic (on-effort) trackline and 2,749 km (1,484 NM) of total trackline (including the systematic transects, cross-legs between transects, and circling for focal follows or species identification) during five days for approximately 14.3 hours of total survey effort (combined on- and off-effort). Twenty-one cetacean sightings were recorded: thirteen groups of bottlenose dolphins; one group of Atlantic spotted dolphins; and seven groups of unidentified dolphins. There were eighty-seven sightings of sea turtles; forty-four sightings of loggerhead turtles; twenty-seven sightings of leatherback turtles; three sightings of Kemp's ridley turtles; and thirteen sightings of unidentified turtles. There was also one sighting of an ocean sunfish (*Mola mola*).
- The second monitoring event took place July 23-26, 2011 in good to fair sighting conditions, with sightings made in Beaufort sea states between 1 and 4. This monitoring

included two pre-test flights; one flight during the test; and one post-test flight (Appendix D). Focal-follow behavioral data were collected during two of the sightings. Observers visually surveyed 1,475 km (796 NM) of systematic (on-effort) trackline and 1,937 km (1,046 NM) of total trackline (including the systematic transects, cross-legs between transects, and circling for focal follows or species identification) during four days for approximately 7.8 hours of on-effort status (combined on- and off-effort). Seventeen cetacean sightings were recorded: fifteen groups of bottlenose dolphins and two groups of Atlantic spotted dolphins. There were 65 sightings of sea turtles: 32 sightings of loggerhead turtles, 16 sightings of leatherback turtles, and 17 sightings of unidentified turtles.

Table 2. On-Effort Visual Survey and Marine Mammal Observation Summary for AN/AQS-20 Sonar System Tests in the NSWC PCD Study Area.

Date	Km Surveyed	Hours Surveyed	Cetacean Sightings	Total Number of Cetaceans Sighted	Turtle Sightings	Total Number of Turtles Sighted
5-July-2011 (aerial)	321	2.3	3	4	6	6
6 July-2011 (aerial)	572	3.8	9	69	39	43
7-July-2011 (aerial)	292	2.6	8	130	22	22
8-July-11 (aerial)	429	2.8	1	2	7	7
9-July-11 (aerial)	453	2.7	0	0	13	13
23-July-11(aerial)	378	2.4	4	10	17	17
24-July-11 (aerial)	303	2.7	8	48	27	29
25-July-11 (aerial)	400	2.8	4	8	14	14
26-July-11 (aerial)	394	2.4	1	1	7	7

NSWC PCD MMO Activities

U.S. Navy MMOs participated in 29 days of AN/AQS-20 sonar testing events during RDT&E activities from November 23, 2010 through July 25, 2010. MMOs conducted visual observations from the bridge of the vessel conducting the sonar tests. Effort and environmental information was collected on multiple occasions, including when the MMOs began observing (i.e., "on effort"), at each rotation, as weather changes occurred, and when the MMOs went off effort. Two observers were posted during virtually all of the on-effort hours. Table 3 summarizes U.S. Navy MMO sighting data from the test events, while Appendix C provides further details on those recorded sightings.

Table 3. U.S. Navy MMO Sighting Data from Sonar Test Events in the NSWC PCD Study Area.

Species	Independent MMO Sightings	Group Size (range)
Atlantic spotted dolphin (*Stenella frontalis*)	17	1-10
Bottlenose dolphin (*Tursiops truncatus*)	5	1-6
Unidentified dolphin	3	4-16
Green turtle (*Chelonia mydas*)	1	1
Leatherback turtle (*Dermochelys coricea*)	2	1
Unidentified sea turtle	2	1
Total	**30**	

*Detailed sighting information is included in Appendix E

Navy Lookout Effectiveness Study

The U.S. Navy undertakes monitoring of marine mammals during RDT&E events and has mitigation procedures designed to minimize risk to these animals. One key component of this monitoring and mitigation is the shipboard lookouts (LOs, also known as watchstanders), who are part of the standard operating procedure that ships use to detect objects (including marine mammals) within a specific area around the ship during events. The watchstanders are an element of monitoring requirements specified by NMFS in the MMPA Letters of Authorizations. The goal is to detect mammals entering standoff ranges of 200, 500 and 1,000 yards around the vessel, which correspond to distances at which various mitigation actions should be performed. In addition to LOs, personnel on the bridge search visually during RDT&E events. We refer to all of these observers together as the "observation team" (OT). The aim of the study is to determine the OT effectiveness in terms of detecting and identifying marine mammals. Of particular interest is the probability of an animal getting within a defined range of the vessel without being observed by the OT, as well as determining the accuracy of the OT (primarily the LO) in determining species group (whale, dolphin, etc.), group size, and position. In order to achieve this, experienced MMOs search and collect information on marine mammals that both they and the OT detect.

The lookout effectiveness study for the NSWC PCD Monitoring Plan specifically requires the analysis to occur during detonation events. No detonations have been conducted in the NSWC PCD Study Area to date. Therefore, emphasis will be placed on the protocol for events in the next reporting year. A summary of the work conducted by the U.S. Navy-wide ICMP on effectiveness and in which NSWC PCD anticipates participating as part of the requirements for the next FY during proposed detonations is provided in the following paragraphs.

Work was previously conducted to design and test a protocol for determining the effectiveness of the LOs in visually detecting marine mammals. The field protocol for the experiments was developed in consultation with members of the Naval Undersea Warfare Center Division,

Newport (NUWCDIVNPT); U.S. Fleet Forces; Naval Facilities Engineering Command; Commander, U.S. Pacific Fleet; and NMFS. The basic concept is that trained MMOs Trials were conducted during three at-sea exercises (one in Kauai and two in Jacksonville [JAX]; see DON, 2010c for details on the effectiveness studies conducted off JAX), and lessons learned from these trials resulted in the protocol being further refined. The basic concept is that trained MMOs are situated on board a vessel during daylight at-sea RDT&E events, in locations where they can watch for marine mammals and communicate with one another, but not cue the LO. The MMOs then work to set up opportunistic trials, where they detect a surfacing of a marine mammal at a measured location, and record whether that surfacing was also detected (a successful trial) or not (an unsuccessful trial) by the LO.

It was found to be necessary to have an additional "liaison" MMO (LMMO) stationed with the LO, and in communication with the other MMOs, to help report when and where LOs detected surfacings. It was also necessary to have an additional team member tasked solely with data recording. In addition to recording surfacing events, MMOs attempted to keep track of which surfacings belonged to the same school or animals. The revised protocol (Burt and Thomas, 2010) was applied to one further at-sea exercise (off Southern California), making four datasets in total.

In parallel with field protocol development, methods are being developed for using the data generated during these experiments to estimate the probability of animals entering the stand-off range undetected. An analysis method to allow for intermittent availability is also being developed, since many marine mammal species remain on (or close to) the surface for significant portions between dives, and so are "intermittently available" for detection. The extended methods currently only use information about the location of LO detections, but could conceivably be extended further to use information from the MMO LO trials. As a proof-of-concept, both the instantaneous and intermittent availability models to data collected in the at-sea experiments will be applied.

Recommendations for future data-collection efforts focus on a single vessel type and an area where the number of trials per cruise is likely to be maximized. Resources would be devoted to extending the intermittent availability models so that they use both the locations of observed animals and the outcomes of the MMO trials, thereby unifying the models developed to date for instantaneous and intermittent availability.

Major accomplishments related to this project to date include initial development of data collection protocols and analytic methods; data collection trials; completion of a proof of concept for detection functions; consultation with NMFS technical staff for input on analysis methods; and investment in continued refinement of the analytic methods and focus on additional data collection in 2011/2012.

U.S. Navy Fleet training organizations are currently evaluating the preliminary results from the proof of concept phase to determine if improvements in lookout training programs are warranted. Initial steps in progress include evaluating incorporation of marine mammal survey techniques into watchstander training and revision of Marine Species Awareness Training. As more data becomes available other options for improving lookout training will be evaluated as appropriate.

Summary

The U.S. Navy has both followed and developed a suite of requirements and techniques identified in the MMPA and ESA permits for RDT&E activities. These included collecting longitudinal baseline data on marine species; behavioral response studies to MFAS; monitoring immediately before, during, and after RDT&E activities; and evaluating the effectiveness of the mitigations implemented such as the use of LOs during U.S. Navy training exercises.

In addition to increasing the amount of essential baseline research, efforts have continued to support the requirements outlined in the NSWC PCD LOA with regards to monitoring during RDT&E activities. Visual monitoring occurred during two RDT&E events. Species sighted were consistent with those expected for the area.

Finally, the U.S. Navy has completed a portion of the initial work required to execute a lookout effectiveness study. A field protocol has been developed and current work focuses on refining methods to examine the likelihood of a marine mammal entering stand-off ranges undetected. Additional data will be collected in 2011 and 2012.

IV. ADAPTIVE MANAGEMENT RECOMMENDATIONS

Adaptive management is an iterative process of optimal decision-making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. Within the natural resource management community, adaptive management involves ongoing, real-time learning and knowledge creation, both in a substantive sense and in terms of the adaptive process itself. Adaptive management focuses on learning and adapting, through partnerships among managers, scientists, and other stakeholders who learn together how to create and maintain sustainable ecosystems. Adaptive management helps managers maintain flexibility in their decisions, knowing that uncertainties exist, and provides managers the latitude to change direction to improve understanding of ecological systems in achieving management objectives. Another function of adaptive management is to take action to improve progress towards desired outcomes.

A 2010 U.S. Navy-sponsored monitoring meeting in Arlington, Virginia initiated a process to critically evaluate the current U.S. Navy monitoring plans and to begin refining and updating existing region-specific plans, as well as the ICMP. Discussions at that meeting, coupled with the October 2010 annual adaptive-management meeting, established a way forward to continue refining the U.S. Navy's monitoring program. This process included establishing the need for a Scientific Advisory Group (SAG) composed of leading marine mammal scientists, with the initial task of developing recommendations that would serve as the basis for a Strategic Plan for U.S. Navy monitoring. The Strategic Plan is intended to be a primary component of the ICMP and provide a "vision" for U.S. Navy monitoring across geographic regions. This guidance would help determine how to most efficiently and effectively invest the resources designated for marine species monitoring to address ICMP priorities and satisfy the MMPA regulatory requirements. The objective of the Strategic Plan is to continue working towards a single integrated program for Navy marine species monitoring. Additional goals include incorporating SAG recommendations into the ICMP and establishing a more transparent framework to solicit, evaluate, and implement monitoring work across the range complexes and study areas. The U.S. Navy is currently developing the Strategic Plan in coordination with input from NMFS Headquarters and the Marine Mammal Commission. The Plan will establish the process to solicit, review, and select the most appropriate monitoring projects in which to invest across the U.S. Navy. Some current efforts will continue, but the level of effort and investment may be allocated differently across U.S. Navy ranges and study areas.

The U.S. Navy officially established the SAG in 2011 with the initial task of evaluating current Navy monitoring approaches under the ICMP and existing LOAs to develop objective scientific recommendations that would form the basis for the Strategic Plan. While recommendations were fairly broad and not prescriptive from a range complex/study area perspective, the SAG provided specific programmatic recommendations that serve as guiding principles for the continued evolution of the U.S. Navy Marine Species Monitoring Program and provide direction for Strategic Plan development. The SAG provided three general recommendations that apply broadly across the U.S. Navy's monitoring program and are relevant to the NSWC PCD Mission Activities Monitoring Plan:

- Dispensing with the previous broad "study questions" and instead working within a conceptual framework of knowledge, from basic information on the occurrence of species within each range complex/study area, to more specific matters of exposure, response, and consequences;
- Striving to move away from a "box-checking" mentality and design monitoring studies according to scientific objectives rather than cataloging effort expended; and
- Approaching the U.S. Navy Marine Species Monitoring Program holistically and selecting projects that offer the best opportunity to advance understanding of the issues, as opposed to establishing range- and study area-specific requirements.

In June 2011, the U.S. Navy, with guidance and support from NMFS, hosted a Marine Mammal Monitoring Workshop that included scientific experts and representatives of environmental non-governmental organizations (NGOs). The purpose of the workshop was to present a consolidated overview of monitoring activities accomplished in 2009 and 2010 pursuant to the MMPA Final Rules currently in place, including outcomes of selected monitoring-related research and lessons learned, and to seek feedback on future directions. A significant outcome of this workshop was to continue consolidating monitoring efforts from individual range-complex and study-area plans and to develop a single Strategic Plan for Navy Monitoring that will improve the return on investment by focusing specific objectives and projects where they can most efficiently and effectively be addressed throughout the U.S. Navy range complexes and study areas. The Strategic Plan is currently in development, and will be incorporated as a primary component of the ICMP.

At this time, no changes have been planned for NSWC PCD Marine Species Monitoring. The efforts will continue to be carried out as identified in Table 1 on page 10 of this document.

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