

Appendix B – NSWC PCD Monitoring Plan

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FINAL MONITORING PLAN



**NAVAL SURFACE WARFARE CENTER
PANAMA CITY DIVISION (NSWC PCD)**

**For Marine Mammal Protection Act
(MMPA) Authorization**

JANUARY 2009

List of Acronyms and Abbreviations

LIST OF ACRONYMS AND ABBREVIATIONS

AFAST	Atlantic Fleet Active Sonar Training
ATOC	Acoustic Thermometry of Ocean Climate
BO	Biological Opinion
CNO-N45	Chief of Naval Operations Environmental Readiness Division
ESA	Endangered Species Act
FY	Fiscal year
HRC	Hawaii Range Complex
ICMP	Integrated Comprehensive Monitoring Plan
ITA	Incidental Take Authorization
LOA	Letter of Authorization
MCM	Mine countermeasures
MFAS	Mid-frequency active sonar
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NSWC PCD	Naval Surface Warfare Center Panama City Division
R&D	Research and development
RDT&E	Research, development, test, and evaluation
SOCAL	Southern California
SURTASS	Surveillance Towed Array Sensor System
VACAPES	Virginia Capes

Introduction

Naval Surface Warfare Center Panama City Division (NSWC PCD) Monitoring Plan

INTRODUCTION

This monitoring plan for the Naval Surface Warfare Center Panama City Division (NSWC PCD) Study Area has been developed to provide marine mammal and sea turtle monitoring as required under the Marine Mammal Protection Act (MMPA) of 1972 and the Endangered Species Act (ESA).

In order to issue an Incidental Take Authorization (ITA) for an activity, Section 101(a)(5)(a) of the MMPA states that National Marine Fisheries Service (NMFS) must set forth "requirements pertaining to the monitoring and reporting of such taking." The MMPA implementing regulations at 50 CFR Section 216.104(a)(13) note that a request for a Letter of Authorization (LOA) 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 (NMFS, 2005).

While the Endangered Species Act (ESA) does not have specific monitoring requirements, recent Biological Opinions (BOs) issued by the NMFS have included terms and conditions requiring the Navy to develop a monitoring program.

In addition to the NSWC PCD Monitoring Plan, a number of Navy range complex monitoring plans are being 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 activities. The goals of these monitoring plans are to assess the impacts of testing activities on marine species and the effectiveness of the Navy's current mitigation practices.

Naval-wide Integrated Comprehensive Monitoring Program (ICMP):

The Integrated Comprehensive Monitoring Program (ICMP) is Navy-wide and will provide the overarching structure and coordination that compiles data from range-specific monitoring plans. The NSWC PCD Plan is one component of the ICMP and many similar studies outlined here will also be implemented in other range complexes (Figure 1). The overall objective of the ICMP is to assimilate relevant data collected across Navy range complexes and action areas to answer questions pertaining to the impact of mid-frequency active sonar (MFAS) and explosives on marine mammals and sea turtles.

The primary objectives of the ICMP are to:

- Coordinate monitoring of Navy events, particularly those involving MFAS and underwater detonations (explosives), for compliance with the terms and conditions of ESA Section 7 consultations or MMPA authorizations;
- Coordinate data collection to support estimating the number of individual marine mammals and sea turtles exposed to sound levels above current regulatory thresholds;
- Assess the adequacy of the Navy's current marine species mitigation;
- Add to the knowledge base on potential behavioral and physiological effects to marine species from MFAS and underwater detonations; and

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- Assess the practicality and effectiveness of a number of mitigation tools and techniques (some not yet in use).

Additional Navy funded research and development (R&D) studies and ancillary research collaborations with academia and other institutions will be integrated as available to enhance the data pool, and will be used in part to address objectives of the ICMP. Lastly, as an adaptive management strategy, the NSWC PCD Monitoring Plan will integrate elements from Navy-wide marine mammal research into the regional monitoring and data analysis proposed in this plan when new technologies and techniques become available.

NSWC PCD Monitoring Plan:

The NSWC PCD Monitoring Plan is one component of the overall effort the Navy is undertaking to understand its potential effects and the associated biological consequences to protected marine species. The NSWC PCD Monitoring Plan has been designed as a collection of focused “studies” to gather data that will allow NSWC PCD to address the following questions which are described fully in the following sections:

1. What are the behavioral responses of marine mammals and sea turtles that are exposed to mid-frequency active/high frequency active (MFA/HFA) sonar and explosives at specific levels?
2. Is the Navy’s suite of mitigation measures for MFA/HFA sonar and explosives effective at avoiding TTS, injury, and mortality of marine mammals and sea turtles?

Marine Species Within the NSWC PCD Study Area:

There are 20 marine mammal species or separate stocks with possible or confirmed occurrence in the NSWC PCD Study Area including whales, dolphins, and one manatee species (DON, 2007). The sperm whale is also protected under the ESA. Additionally, four species of threatened and endangered sea turtles exist in the NSWC PCD Study Area.

This monitoring plan has been designed to gather data on all species of marine mammals and sea turtles that are observed in the NSWC PCD Study Area. The plan recognizes that deep-diving and cryptic species of marine mammals such as beaked whales, sperm whales and minke whales, have low probabilities of visual detection (Barlow and Gisiner, 2006). Therefore, many methods will be utilized to attempt to address this issue (e.g., passive acoustic monitoring).

Data will be collected by Navy personnel, government contractors, academic institutions, or research organizations that will utilize qualified, professional marine mammal and sea turtle biologists. While annual reports will be prepared and provided to the NMFS in fulfillment of the MMPA LOA requirements, data collection, synthesis, and interpretation is expected to be an ongoing process over many years. It is not likely that firm conclusions can be drawn on most questions within a single year of monitoring effort due to the difficulty in achieving sufficient sample sizes for statistical analysis. The Navy will provide annual reports to the NMFS in fulfillment of the MMPA LOA requirements. The annual report will provide information on the amount and spatial/temporal distribution of monitoring effort as well as summaries of data collected and any preliminary results that may be available from analysis.

Monitoring Plan

MONITORING PLAN

The monitoring methods proposed for use during NSWC PCD research, development, test, and evaluation (RDT&E) activities include a combination of individual elements designed to allow a comprehensive assessment to be conducted. These elements include:

- Visual (vessel, and aerial surveys)
- Passive acoustic monitoring
- Marine mammal observers on Navy platforms

Sonar operations associated with NSWC PCD RDT&E activities are in the mid- (1kHz to 10kHz) and high (above 10kHz) frequency ranges. Over 90 percent of all NSWC PCD RDT&E sonar activities encompass high frequency active (HFA) sonar systems while less than 10 percent encompass mid-frequency active (MFA) sonar systems. The various sonar systems tested within the NSWC PCD Study Area range in frequencies of 1 kHz to 5,000 kHz. The types of explosive events that occur within the NSWC PCD Study Area include: underwater detonations associated with mine countermeasures (MCM) systems, line charges, and projectile firing operations.

The proposed effort for conducting the NSWC PCD monitoring is shown in Table 1. While the effort presented in Table 1 represents the most realistic prediction of the amount of monitoring that can be accomplished per year, there may be instances within any given year where test event schedules shift, survey crew availability becomes limited, or extreme weather precludes effective sampling. In case of monitoring delay based on these conditions, monitoring effort will be re-scheduled at the next available opportunity. In the event that a particular target activity is not available within the remainder of a particular year, monitoring may have to be made up in a following year.

Data collection and reporting will begin in FY10, once the NSWC PCD LOA is issued and the monitoring plan is finalized (See Table 1 for year by year implementation schedule). Data will also be collected from Navy range complex monitoring plans (i.e. Southern California [SOCAL] and Hawaii Range Complex [HRC]) and compiled in order to compare and analyze data from all the individual Navy monitoring efforts under the ICMP. All available data for the NSWC PCD Study Area will be included in the annual report to the NMFS including an evaluation of the effectiveness of any given element within the NSWC PCD monitoring program. All subsequent analysis shall be completed in time for Navy's five year report to NMFS.

The following subsections provide an overview for the studies to be performed through NSWC PCD monitoring.

STUDY 1

This study attempts to address the following question: What are the behavioral responses of marine mammals and sea turtles that are exposed to MFA/HFA sonar and explosives?

In order to address this question, there is a need to observe marine mammals and sea turtles not only at the surface, but to the extent possible in the water column. While shipboard surveys are preferable in many ways (slow speed, offshore survey ability and duration, close approaches), they do not allow for observation of animals that are below the ocean surface as do aerial surveys. Therefore, for this study, a combination of aerial surveys, vessel surveys, and passive acoustic monitoring may be used. For explosive events, current mitigation measures by Navy test event

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participants include monitoring the exclusion zone (size depends on the type and size of the explosives being used) prior to detonation and post detonation.

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Visual Surveys:

In order to conduct visual surveys, the following requirements must be met: 1) the ability to conduct aerial or shipboard surveys in the vicinity of the detonation point; and 2) testing events that occur close enough to shore that re-fueling does not become an issue with the aerial survey team.

Given that there may be significant annual variability in which test events occur more frequently within the NSWC PCD Study Area, the Navy proposes to visually survey two HFA/MFA sonar activities and two different types of explosive test events per year. If the AN/SQS-53 C sonar is to be operated, it would be monitored as one of the HFA/MFA sonar activities. If a multiple detonation event occurs, it would be monitored as one of the explosive events. Due to logistics and safety reasons this may not be possible; nevertheless, the Navy is committed to monitoring four test events per year.

For specified NSWC PCD RDT&E activities, aerial or vessel surveys will be used one to two days prior to, during (if safely possible), and one to five days post detonation. The variation in the number of days after a test activity allows for the detection of animals that gradually return to an area, if they indeed do change their distribution in response to underwater detonation events.

Surveys will include any specified exclusion zone around a particular detonation point plus 2,000 yards (1,829 meters) beyond the exclusion zone. For vessel-based surveys a passive acoustic system (hydrophone or towed array) could be used to determine if marine mammals are in the area before and/or after a detonation event. Depending on animals sighted, it may be possible to conduct visual surveys of animals outside of the exclusion zone (detonations could be delayed if marine mammals or sea turtles are observed within the exclusion zone) to record behavioral responses to the detonations.

When conducting a particular survey, the survey team will collect:

- 1) Species identification and group size
- 2) Location and relative distance from the detonation site
- 3) The behavior of marine mammals and sea turtles including standard environmental and oceanographic parameters
- 4) Date, time and environmental and oceanographic conditions associated with each observation
- 5) Direction of travel relative to the detonation site; and
- 6) Duration of the observation.

Animal sightings and relative distance from a particular detonation site will be used post-survey to determine potential received energy and pressure (dB re 1 micro Pa-sec and pounds per square inch). This data will be used, post-survey, to estimate the number of marine mammals and sea turtles exposed to different received levels (energy and pressure based on distance to the source, bathymetry, oceanographic conditions and the type and size of detonation) and their corresponding behavior.

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Brief aerial- or vessel-based surveys of the detonation area, taking into account local oceanographic currents, will be conducted for stranded animals over a two day period post detonation event. If any distressed, injured or stranded animals are observed, an assessment of the animal's disposition (alive, injured, dead, or degree of decomposition) will be reported immediately to the NSWC PCD Environmental Office Point of Contact (POC) for appropriate action (notification to the NMFS Regional Stranding Coordinator).

All available data will be included in the Navy's annual report to NMFS. All subsequent analysis shall be completed in time for Navy's five year report to the NMFS.

Passive Acoustic Monitoring:

The Navy's goal is to use a hydrophone or towed array whenever shipboard surveys are being conducted. The towed array would be deployed during daylight hours for each of the days the ship is at sea for survey operations.

A hydrophone or array is towed from the boat and can detect and localize marine mammals that vocalize and would be used to supplement the ship-based systematic line-transect surveys (particularly for species such as beaked whales that are rarely seen). The ability of the hydrophone to detect marine mammals will depend on the speed of the boat, as well as the length and the frequency range of the hydrophone or towed array. The hydrophone or towed array would need to detect low frequency vocalizations (< 1,000 Hz) for baleen whales (McDonald and Fox, 1999; Mellinger and Clark, 2003) and relatively high frequency (up to 30 kHz) for odontocetes such as sperm whales (Watkins, 1980).

Marine Mammal Observers on Navy Platforms:

Marine mammal observers (MMOs) will be placed on a Navy platform during one of the test events being monitored per year. Qualifications must include expertise in species identification of regional marine mammal and sea turtle species and experience collecting behavioral data. Experience as a NMFS marine mammal observer is preferred, but not required. Navy biologists and contracted biologists will be used; contracted MMOs must have appropriate security clearance to board Navy platforms. MMOs will not be placed aboard Navy platforms for every Navy testing event, but during specifically identified opportunities deemed appropriate for data collection efforts. Additionally, the events selected for MMO participation will take into account safety, logistics, and operational concerns.

MMOs will observe from the same height above water as the RDT&E marine observers. Of note, these MMOs will not be part of the Navy's formal reporting chain of command during their data collection efforts; RDT&E marine observers will continue to serve as the primary reporting means within the Navy chain of command for marine mammal sightings. The only exception is that if an animal is observed by an MMO within the shutdown zone that has not been observed by the RDT&E marine observer, the MMO will inform the RDT&E marine observer of the sighting to take the appropriate action through the chain of command.

The MMOs will collect species identification, behavior, direction of travel relative to the Navy platform, and distance first observed. All MMO sighting will be conducted according to a standard operating procedure (SOP).

STUDY 2

This study attempts to address the following question: Is the Navy's suite of mitigation measures for MFA/HFA sonar and explosives effective at avoiding injury and mortality of marine mammals and sea turtles?

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It is the Navy's position that the suite of mitigation measures for explosives are effective at avoiding exposures of marine mammals to levels of energy or pressure from explosives that would result in harm or mortality of marine mammals. Through several methods, this study will provide the scientific data needed to support that position. The Navy will conduct aerial surveys before and after two HFA/MFA sonar activities and two explosive test events per year to determine whether animals have been injured in the NSWC PCD Study Area, and conduct a comparison of professional MMOs and RDT&E marine observers.

Methods

RDT&E Marine Observer Comparison:

RDT&E marine observers are provided with extensive training to detect anything in the water 360 degrees around Navy platforms. This includes marine mammals and sea turtles. The Navy feels strongly that despite the fact that RDT&E marine observers are not biologists trained to identify specific marine animal species, they do have the skills to reasonably detect all marine mammals and sea turtles that are visible at the surface. In order to provide the scientific data to support this position, the Navy will initiate a side-by-side comparison of Navy RDT&E marine observer's ability to detect marine mammals at sea with sightings made by professional MMOs. It is assumed that the abilities of RDT&E marine observers and professional MMOs will vary; therefore, it is important that data be collected from many locations, in many environmental conditions, with many different RDT&E marine observers and MMOs. Therefore, as part of the overall Navy monitoring effort, some of the data will be collected within the NSWC PCD Study Area. The goal is to perform the RDT&E marine observer comparison during one test event per year.

MMO qualifications must include expertise in species identification of regional marine mammal and sea turtle species and experience collecting behavioral data. Experience as a NMFS marine mammal observer is preferred, but not required. Navy biologists and contracted biologists will be used; contracted MMOs must have appropriate security clearance to board Navy platforms. As noted above, MMOs will not be placed aboard Navy platforms for every NSWC PCD RDT&E activity, but during specifically identified opportunities deemed appropriate for data collection efforts. Additionally, the activities selected for MMO participation will take into account safety, logistics, and operational concerns associated with such an endeavor. MMOs will observe from the same height above water as the RDT&E marine observers. RDT&E marine observers will officially be on duty and will maintain the same responsibilities (no more, no less). MMOs will not be part of the Navy's formal reporting chain of command during their data collection efforts; RDT&E marine observers will continue to serve as the primary reporting means within the Navy chain of command for marine mammal sightings. The only exception would be if an animal is observed by the MMO within the shutdown zone that has not been observed by the RDT&E marine observer, the MMO will inform the RDT&E marine observer of the sighting to take the appropriate action through the chain of command.

To the extent practicable, the MMO and test marine observer will avoid cueing each other when they observe a marine mammal. The MMOs will collect species identification, behavior, direction of travel relative to the Navy platform, and distance first observed. All MMO sighting will be conducted according to a SOP to allow for consolidation of data from all range complex monitoring plans. If needed based on NSWC PCD RDT&E requirements, two MMOs and/or RDT&E marine observers will be aboard, and work on rotating two hour shifts to avoid fatigue.

The following comparisons will be made between MMOs and the RDT&E marine observers:

1. Rate of detection: Comparison of the number of animals sighted per hour (or other appropriate sighting period)

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2. Distance of sighting: Comparison of the distance where the sighting was first made
3. Distance estimation: Consistency of sighting distance estimates
4. Animal size estimation: Comparison of animal size estimation (either by actual length or by grouping – small or dolphin size, medium and large)
5. Direction of travel relative to the ship or by compass bearing
6. Behavior categorization: Comparison of the categorized behaviors.

Aerial surveys:

An aerial survey team will conduct pre- and post-aerial surveys, taking local oceanographic currents into account, of the NSW PCD Study Area. These aerial surveys will be the same as those conducted for other NSW PCD monitoring studies. However, for this study in particular, survey data will include identification of any distressed, injured or stranded animals in the NSW PCD Study Area. The Navy proposes to conduct this type of monitoring during two sonar activities and two explosive test events per year.

Species composition of marine animals will be reported. If any distressed, injured or stranded animals are observed, an assessment of the animal's disposition (alive, injured, dead, or degree of decomposition) will be reported immediately to the NSW PCD Environmental Office POC for appropriate action (notification to the NMFS Regional Stranding Coordinator).

Implementation

IMPLEMENTATION – ANALYSIS – REPORTING

For all field monitoring conducted in support of this plan, it will be the responsibility of any contracted researchers to obtain and maintain the appropriate permits.

Table 1 provides detail on how the NSWC PCD Monitoring Plan will be fully implemented from fiscal year 2010 to fiscal year 2014 (FY10 to FY14). The implementation of this monitoring plan will not officially commence until August 2009, after the issuance of the LOA. The NSWC PCD Monitoring Plan will be implemented gradually in the last few months of FY09, with full ramp up in 2010 as contracts are issued, SOPs are developed, and statisticians are consulted for input on sample size and analysis. Many of the study hours may overlap when implemented, allowing for data to be collected for more than one study simultaneously. Therefore, the hours in Table 1 represent those spent on each study, but are not necessarily an additive number of hours per method, per year. Collecting data concurrently for more than one study will only be initiated if the data integrity is not compromised.

The Navy will be investing significant funding and resources towards monitoring programs and intends to conduct the research in a scientifically valid and robust manner. The Navy is committed to conducting research until these questions have been addressed to the satisfaction of both the NMFS and the Navy. Therefore, it is in the best interest of the Navy to choose studies wisely in the NSWC PCD Study Area and Navy range complexes that are the most likely to collect large data sets, and will enable the Navy and the NMFS to answer the required questions. Some field methods may be applied throughout the NSWC PCD Study Area and Navy range complexes, while other methodologies may be specially selected for one or two areas within the NSWC PCD Study Area or Navy range complex that are most likely to produce the best quality data. For example, in Hawaii, there are some baseline data on odontocetes from previous tagging (Baird et al., 2006), which can be used to provide a context for any tagging data collected during test events.

Using the Acoustic Thermometry of Ocean Climate (ATOC) and Surveillance Towed Array Sensor System (SURTASS) Monitoring Programs as a guideline for success it is clear that the key to the success of the monitoring plan's execution and analysis is using scientific professionals that are the top of their field. It is the Navy's intention that monitoring be implemented by a team of qualified, professional marine mammal and sea turtle biologists who are experts in their field. This team of experts will include statistical analysts to analyze data and make recommendations as to when they are beginning to see a pattern in the data and/or when the study designs need to be altered for more robust data collection. This adaptive management process will provide a critical feedback loop to allow for adapting to new methods and evolving methodology. The process will be transparent to the public through annual reports to the NMFS under the MMPA permit as well as encouraging the scientific team to publish results as they become available.

New technology and techniques will be incorporated as part of the Navy's adaptive management strategy. Adaptive measures and feedback from the experts will allow flexibility within a given year and/or within years so as to best achieve monitoring plan goals and take into consideration shifting demands, inclement weather and other unforeseen events. For example, flexibility is incorporated to monitor an alternate but equal NSWC PCD RDT&E activity within the year and/or in a following year if test event schedule changes, is delayed or cancelled. This flexibility ensures monitoring will occur under optimal circumstances and conditions.

Implementation

Integrated Comprehensive Monitoring Program (ICMP):

The ICMP is currently in development by the Navy, with Chief of Naval Operations Environmental Readiness Division (CNO-N45) having the lead. The program does not duplicate the monitoring plans for individual areas (e.g. Atlantic Fleet Active Sonar Training [AFAST], HRC, SOCAL, Virginia Capes [VACAPES]); instead it is intended to provide the overarching coordination that will support compilation of data from NSWC PCD and range-specific monitoring plans as well as Navy funded research and development (R&D) studies. The ICMP will coordinate the monitoring programs' progress towards meeting its goals and develop a data management plan. A program review board is also being considered to provide additional guidance. The ICMP will be evaluated annually to provide a matrix for progress and goals for the following year, and will make recommendations on adaptive management for refinement and analysis of the monitoring methods.

Due to the complexity of the ICMP and large number of U.S. Navy range complexes and associated activities, the Navy is considering the dedication of a Program Manager to oversee the ICMP. Specific qualifications, roles and responsibilities are yet to be determined but may include the oversight and coordination of all Navy monitoring plans.

Reporting:

The Navy will provide monitoring reports to the NMFS Headquarters in fulfillment of the MMPA LOA requirements. The reports will provide information on the amount and spatial/temporal distribution of monitoring effort as well as summaries of data collected and any preliminary results that may be available from analysis. All subsequent analysis shall be completed in time for Navy's five year report to the NMFS.

Data collected from the NSWC PCD Monitoring Plan will be added to a Navy-wide analysis of monitoring from permitted Navy range complexes via the ICMP. All available data will be included in Navy's annual report and individual test event reports as detailed in the requirements specified in the NMFS MMPA LOA. All subsequent analysis shall be completed in time for Navy's five year report to the NMFS. The Navy's reports will provide information on the amount and spatial/temporal distribution of monitoring effort as well as summaries of data collected and any preliminary results that may be available from the analysis. All data will be considered pre-decisional during the course of the research studies to prevent premature conclusions from being drawn. While data will be prepared and analyzed over the course of the five years of the LOA, under no circumstances will conclusions be represented before the studies are completed. Final conclusions cannot be published nor information released outside of their organization without the written consent of the Secretary of the Navy or their designee.

Implementation

Table 1. Summary of studies planned each year within the NSW PCD Study Area.

STUDY 1 (behavioral responses)						
	FY10	FY11	FY12	FY13	FY14	FY15
Aerial or Vessel surveys	Award monitoring contract, develop SOP, obtain permits	2 sonar activities and 2 explosive events per year	2 sonar activities and 2 explosive events per year	2 sonar activities and 2 explosive events per year	2 sonar activities and 2 explosive events per year	2 sonar activities and 2 explosive events per year
Marine Mammal Observers	Opportunistic as staff and SOP developed	1 explosive event per year	1 explosive event per year	1 explosive event per year	1 explosive event per year	1 explosive event per year
STUDY 2 (mitigation effectiveness)						
	FY10	FY11	FY12	FY13	FY14	FY15
Marine mammal observers/lookout comparison	Opportunistic as staff and SOP developed	1 explosive event per year	1 explosive event per year	1 explosive event per year	1 explosive event per year	1 explosive event per year
Vessel or Aerial surveys before and after training events	Award monitoring contract, develop SOP, obtain permits	2 sonar activities and 2 explosive events per year	2 sonar activities and 2 explosive events per year	2 sonar activities and 2 explosive events per year	2 sonar activities and 2 explosive events per year	2 sonar activities and 2 explosive events per year

Note: Study 1 and 2 will be conducted simultaneously when possible

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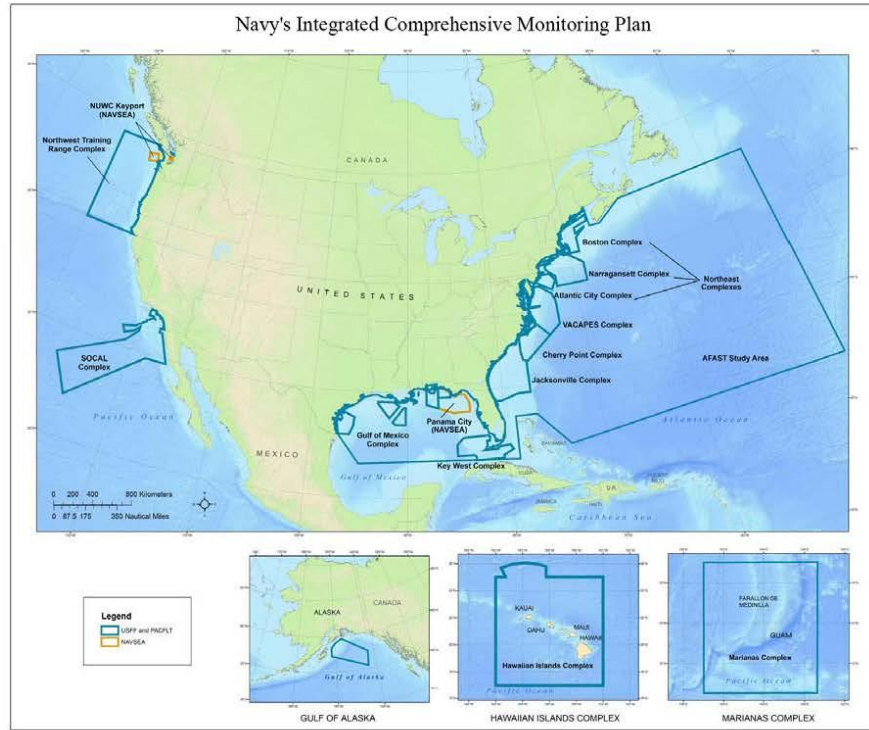


Figure 1. Range Complexes Included in the Integrated Comprehensive Monitoring Program