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In accordance with 5 June 2009 Letters of Authorization for the Virginia Capes, Jacksonville, and Cherry Point Range Complexes and 50 CFR Part 218, Subparts A, B, and C

Marine Species Monitoring

For The U.S. Navy's

Virginia Capes, Cherry Point, and Jacksonville Range Complexes

Annual Report for 2009

FINAL
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List of Acronyms & Abbreviations

AMR	Adaptive Management Review
ARP	acoustic recording package
AS	aerial survey
BiOP	ESA Biological Opinion
COMPTUEX	Composite Training Unit Exercises
CNO	Chief of Naval Operations
CREEM	Centre for Research into Ecological and Environmental Modeling
dB	decibel
EIS	Environmental Impact Statement
DoN	Department of the Navy
ESA	Endangered Species Act
ft	feet
FY	fiscal year
GUNEX	Gunnery Exercise, Surface-to-Surface
HARP	high-frequency acoustic recording package
HQ	headquarters
JTFEX	Joint Task Forces Exercises
ITA	Incidental Take Authorization
LOA	Letter of Authorization
M3R	Marine Mammal Monitoring on Navy Ranges
MINEX	mine neutralization exercise
MMO	marine mammal observer
MMPA	Marine Mammal Protection Act
MMPI	marine mammal photo identification
MTE	Major Training Exercise
nm	nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
OEIS	Overseas Environmental Impact Statement
ONR	Office of Naval Research
PAM	passive acoustic monitoring
PMAP	Protective Measures Assessment Protocol
R&D	research and development
VS	vessel survey
yd(s)	yards
m	meters

INTRODUCTION

Background

The U.S. Navy developed Range Complex specific Monitoring Plans 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) of 1973. 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 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 Endangered Species Act (ESA) does not have specific monitoring requirements, recent Biological Opinions issued by National Marine Fisheries Service (NMFS) also have included terms and conditions requiring the Navy to develop a monitoring program. Therefore, as part of the issuance of three LOAs in 2009 (NMFS 2009a, 2009b, 2009c), the Navy published three Monitoring Plans with specific monitoring objectives for the Virginia Capes (VACAPES) Range Complex, the Cherry Point (CHPT) Range Complex, and the Jacksonville (JAX) Range Complex (DoN 2009a, 2009b, 2009c).

Based on discussions with NMFS, Range Complex Monitoring Plans were designed as a collection of focused "studies" to gather data that will attempt to address the following questions:

1. What are the behavioral responses of marine mammals and sea turtles exposed to explosives at specific levels?

2. Is the Navy's suite of mitigation measures for explosives (e.g., PMAP, major exercise measures agreed to by the Navy through permitting) effective at avoiding TTS, injury, and mortality of marine mammals and sea turtles?

Monitoring methods proposed for the Range Complex Monitoring Plans include a combination of research elements designed to support both Range Complex specific monitoring, and contribute information to a larger Navy-wide science-based program. These research elements include visual surveys from vessels or airplanes, passive acoustic monitoring (PAM) when operationally feasible, and marine mammal observers (MMO). Each monitoring technique has advantages and disadvantages that vary temporally and spatially, as well as support one particular study objective better than another (DoN 2009a, 2009b, 2009c). The Navy intends to use 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. This also includes incorporation of new techniques (e.g. photo-ID) if warranted.

In addition to Fleet funded Monitoring Plans described above, the Chief of Naval Operations (CNO) Environmental Readiness Division (N45) and the Office of Naval Research (ONR) have developed a coordinated Science & Technology and Research & Development program focused on marine mammals and sound. Total investment in this program for fiscal year (FY) 2009 was approximately $22 million, and continued funding at levels greater than $14 million is foreseen in subsequent years. Several significant projects relative to Navy operational impact or lack of impact to marine mammals are currently funded and ongoing within some Navy Range Complexes.

Report Objective

Design of the Range Complex specific Monitoring Plans represented part of a new 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 layout the background for monitoring, as well as define initial procedures to be used in meeting certain study objectives derived from NMFS-Navy agreements.

Overall, and in support of the above statement, this report has two main objectives:

1) Under the VACAPES, CHPT, and JAX LOAs, present data and results from the Navy-funded marine mammal and sea turtle monitoring conducted in the VACAPES, CHPT, and JAX Range Complexes during the period from 5 June 2009 to 1 January 2010. Because one full year of monitoring has not occurred from the June 2009 promulgation of the LOAs, this report is meant to be a status report on Navy's accomplishments over the past seven months of effort. Included in this assessment are reportable metrics of monitoring as requested by NMFS. Given the relatively new start of this ambitious program, this first report will focus on summarizing collected data, and providing a brief description of the major accomplishments from techniques used this year.

2) Set the foundation for an adaptive management review with NMFS for incorporating proposed revisions to the Navy's 2010 Range Complex Monitoring Plans based on actual lessons learned from 2009. This can include data quality in answering the original study questions, assessment of logistic feasibility, availability of training events to monitor, availability of monitoring resources, use of new techniques not originally incorporated in this year's Monitoring Plan, and any other pertinent information.

SECTION I –VIRGINIA CAPES RANGE COMPLEX

The VACAPES study area consists of the range complex Operating Area (OPAREA), including the area from the mean high tide line, up to and extending seaward of the 3 nm western boundary of the OPAREA (**Figure I-1**).

There are 40 marine mammal species or separate stocks with possible or confirmed occurrence in the marine waters off Maryland, Virginia, and North Carolina within the VACAPES Range Complex. There are 35 cetacean species (whales, dolphins, and porpoises), three pinniped species (sea lions, fur seals and true seals) and one sirenian species (manatee). In addition there are five species of threatened and endangered sea turtles (Reviewed in DoN, 2008a).

VACAPES STUDY QUESTIONS OVERVIEW

The goal of the VACAPES Monitoring Plan is to implement field methods chosen to address the long term monitoring objectives outlined in the Introduction. In the VACAPES Monitoring Plan (DoN 2009a), the Navy proposed to implement a diversity of field methods to gather monitoring data for marine mammals and sea turtles in Navy training areas. Specifically, the Navy proposed to use visual surveys (aerial or vessel), deploy passive acoustic monitoring devices when possible, and put marine mammal observers aboard Navy vessels to meet its goals during the current time period. Studies were specifically designed to meet the questions outlined in the Introduction section of this document. **Table I-1** shows the 2009 monitoring objectives agreed upon by the NMFS and Navy from the final VACAPES Monitoring Plan.

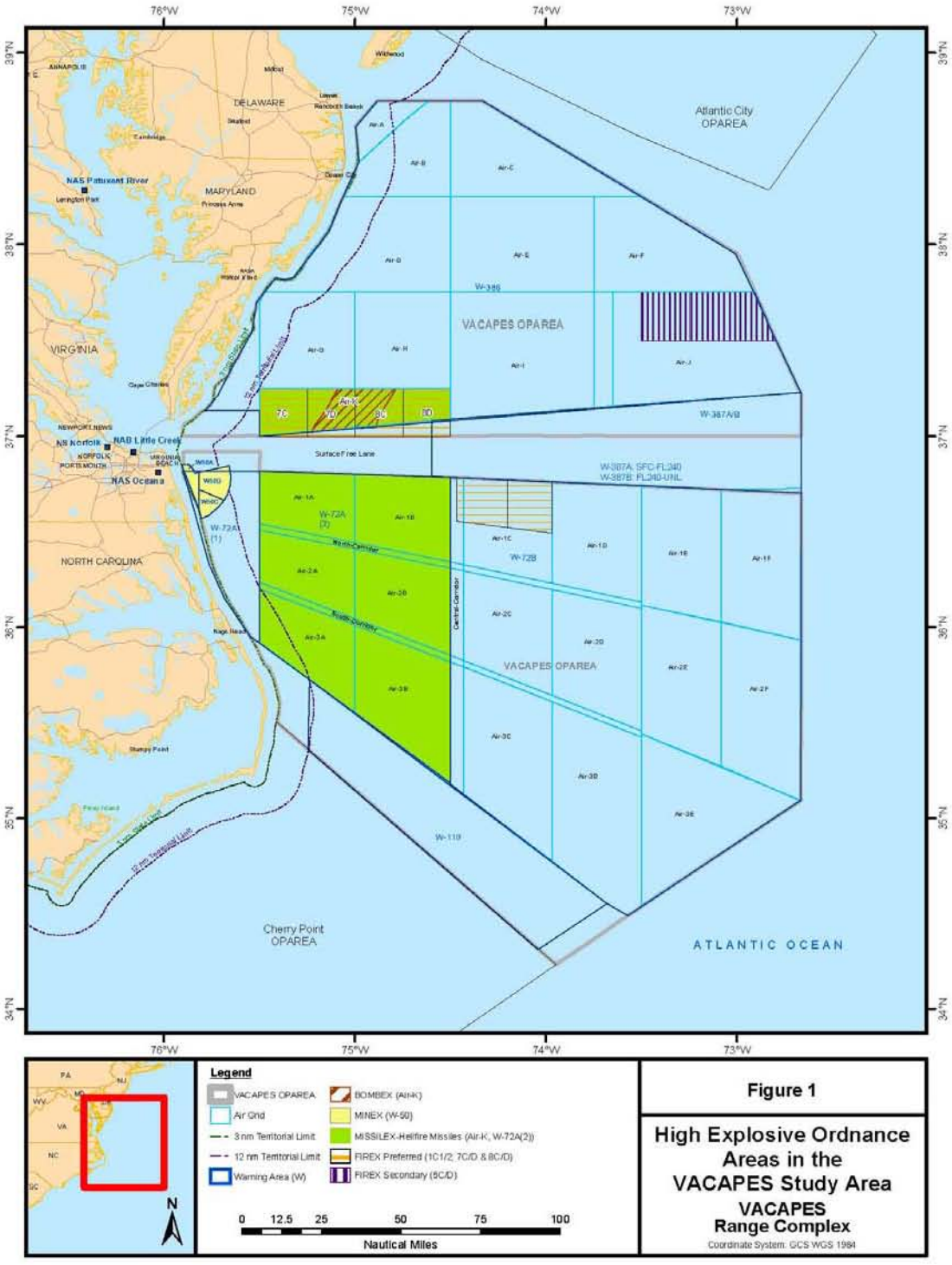

Figure I-1. VACAPES Study Area.

Table I-1. 2009 monitoring objectives agreed upon by the NMFS and Navy from the final VACAPES Monitoring Plan.

STUDY 1 (behavioral responses)		
Aerial or Vessel Surveys	- 2 explosive events per year (one involving multiple detonations). When feasible, deploy hydrophone array during vessel surveys for passive acoustic monitoring.	Adaptive Management Review for 2010 (AMR)
Marine Mammal Observers (MMO)	- 1 explosive event per year.	
STUDY 2 (mitigation effectiveness)		
MMO/ Lookout Comparison	- 1 explosive event per year.	AMR
Vessel or Aerial Surveys Before And After Training Events	- 2 explosive events per year (one involving multiple detonations). When feasible, deploy hydrophone array during vessel surveys for passive acoustic monitoring.	

VACAPES MONITORING ACCOMPLISHMENTS FOR 2009

During 2009, USFF implemented vessel surveys, deployed passive acoustic recording devices, and deployed marine mammal observers. The monitoring effort for 2009 was conducted within the MINEX (W-50) box off the coast of Virginia, in conjunction with two mine neutralization exercise (MINEX) events.

Major accomplishments from the U.S. Fleet Forces' 2009 compliance monitoring in the VACAPES study area include:

- Vessel Visual Survey
    - Completed vessel surveys within the MINEX (R6606/W-50A) box before and after two MINEX events. During the events the boat was standing off at a distance and visually surveying the buffer zone around the detonation site.
- Passive Acoustic Monitoring
    - A hydrophone was deployed during two MINEX events to record any marine mammal vocalizations in the area.
- Marine mammal observers
    - MMOs were deployed during two MINEX events. During the events the boat was standing off at a distance and the MMOs were visually surveying the area around the detonation site.

Table I-2 presents a summary of the major accomplishments for Navy funded marine species monitoring within the VACAPES study area. As briefly mentioned in the Introduction, because one full year of monitoring has not occurred from the June 2009 promulgation of the VACAPES LOA, this report is meant to be a status report on Navy's accomplishments over the past seven months of effort.

Table I-2. U.S. Navy funded monitoring accomplishments within the VACAPES study area from June 2009 to January 2010.

Study Type	Description of U.S. Navy EIS/LOA monitoring	Associated event type	Description of U.S. Navy R&D funded monitoring	MMPA/ESA requirement	Total accomplished
Vessel or aerial surveys –before and after event (study 1 and 2)	Vessel surveys during 2 MINEX events.	MINEX, MISSILEX, FIREX, or BOMBEX	n/a	2 events (1 multiple explosives event)	2 events
Marine Mammal Observers (studies 1 and 2)	MMOs were visually surveying the detonation site and surrounding area during 2 MINEX events.	MINEX, MISSILEX, or FIREX	n/a	1 event	2 events
Passive Acoustic Monitoring (study 2)	Deployed hydrophone during 2 MINEX events.	MINEX, MISSILEX, FIREX, or BOMBEX	n/a	Deploy hydrophone array during vessel surveys when feasible	2 events

VACAPES VESSEL VISUAL SURVEYS

Vessel surveys were conducted in association with two MINEX training events off the coast of Virginia Beach, Virginia. Line transect surveys were conducted on 5-7 August before and after the training events. A summary of the sightings is presented in **Table I-3 and Figures I-2 and I-3**. All sightings on 5 August are shown in Figure I-2; however no event took place on this day. A MINEX event took place on 6 August, however no sightings were reported. All sightings on 7 August are shown in Figure I-3, along with the approximate detonation location. For additional details see **Appendix A** for the VACAPES MINEX events Cruise Report.

Table I-3. Summary of marine species sightings from the observer vessel off the coast of Virginia during August 2009.

Common Name	Scientific Name	# of Sightings	# of individuals
Bottlenose Dolphin	*Tursiops truncatus*	18	51-64
Loggerhead Sea Turtle	*Caretta caretta*	1	1
Unidentified Sea Turtle		1	1

No injuries or mortalities of marine mammals or turtles were observed during the two MINEX training events on 6 and 7 August. For sightings that were obtained between 30 minutes pre-detonation and 30 minutes post-detonation, calculations were made to determine whether it was probable the animals could have been exposed to the detonation. Only one sighting fell within this time frame, which was a visual sighting of bottlenose dolphins obtained approximately 5 minutes post-detonation on 7 August. The sighting was estimated to be approximately 4,940 yds (4,517 m) away from the detonation. If an average swim speed of 1.7 yds/sec (3 knots) is assumed, then over a 5 minute period, the dolphins could have swum approximately 510 yds (466 m). If this estimated distance is subtracted from the distance at which the sighting occurred, then the closest estimated distance the bottlenose dolphins would have been to the detonation would be approximately 4,430 yds (4,051 m). For a 10 lb charge, the estimated range for temporary threshold shift (TTS) is approximately 437 yds (400 m), so it is extremely unlikely that these individuals would have been exposed to the explosion. The sighting was very brief, but no unusual behavior was observed.

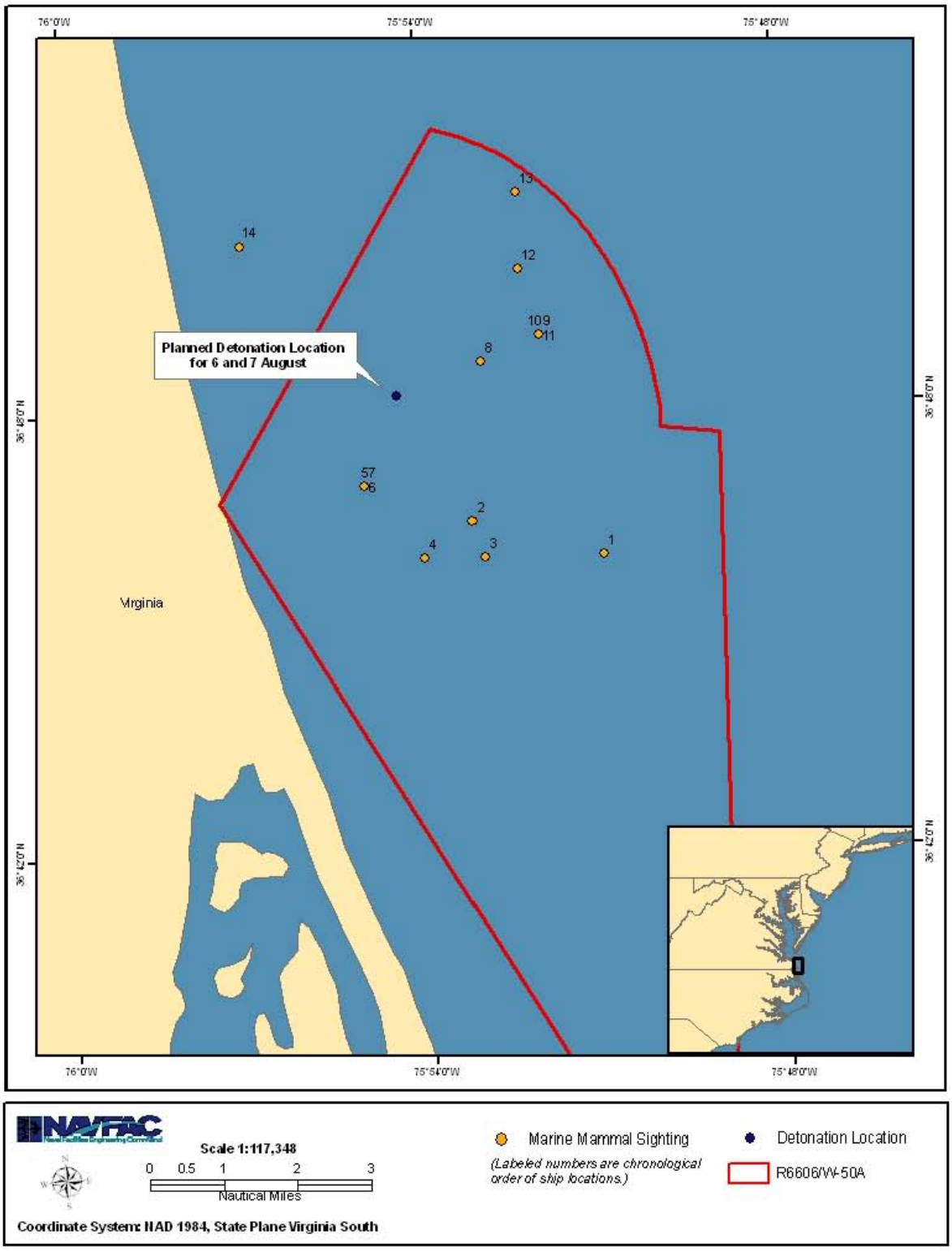

Figure I-2. Ship positions at time of sightings during vessel surveys conducted on 5 August 2009.

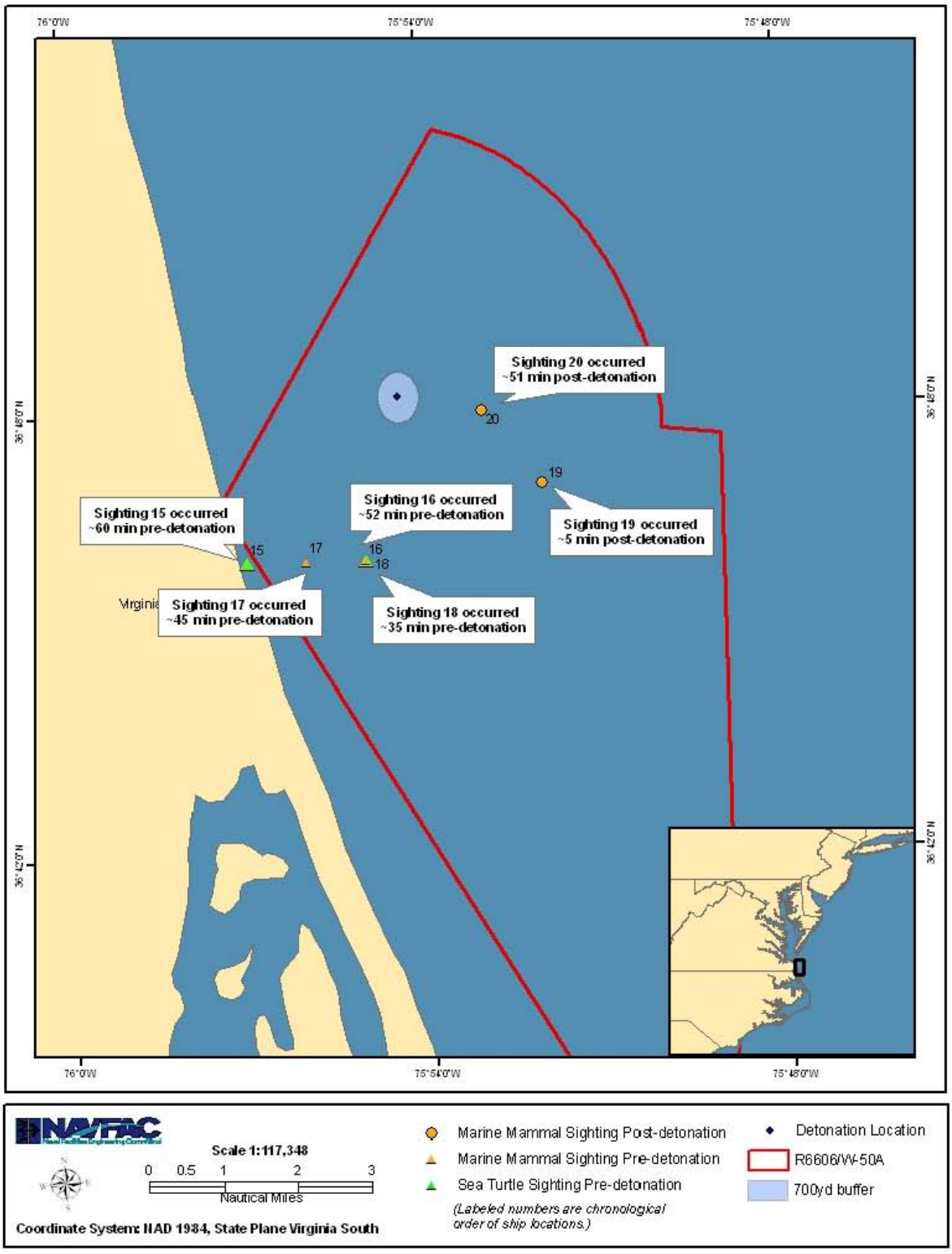

Figure I-3. Approximate detonation location and ship positions at time of sightings during vessel surveys conducted on 7 August 2009.

VACAPES MARINE MAMMAL OBSERVERS (MMOs)

Navy marine mammal biologists performed visual observation during two MINEX training events within the VACAPES Range Complex from 6-7 August 2009. Summary information regarding the visual observations obtained from the vessel surveys can be found in the previous section. For additional details see **Appendix A** for the VACAPES MINEX Events Cruise Report.

VACAPES PASSIVE ACOUSTIC MONITORING (PAM)

Vessel surveys were conducted in association with two MINEX training events off the coast of Virginia Beach, Virginia. During the training events, the ship was at a distance of approximately 2200-2300 m from the detonation site. A hydrophone was deployed on the 6th and 7th of August before, during, and after the MINEX events to monitor marine mammal vocalization activity. Total recording time included approximately 20 minutes each day, and both of the explosive events were captured on the hydrophone.

At this time it does not appear that any marine mammal vocalizations were detected on 6 August, which is consistent with the visual survey results. On 7 August, it does not appear that any marine mammal vocalizations were detected before the event; however, within seconds of the detonation on 7 August, delphinid vocalizations (presumed to be bottlenose dolphins) were heard (Figure I-4). At this time, no analysis has been completed on the acoustic data set, except a quick visualization of the data; however, attempts will be made to extract the received level of the delphinid vocalizations. By making an assumption on the estimated source level of the vocalizations, it should be possible to estimate a maximum and minimum distance of the vocalizing animal from the hydrophone. Once this is done, it will be possible to estimate the closest estimated distance the animals would have been to the detonation, and therefore whether they were potentially exposed. Plans are in place for further analysis to be completed, and results will be included in the 2010 Annual Monitoring Report.

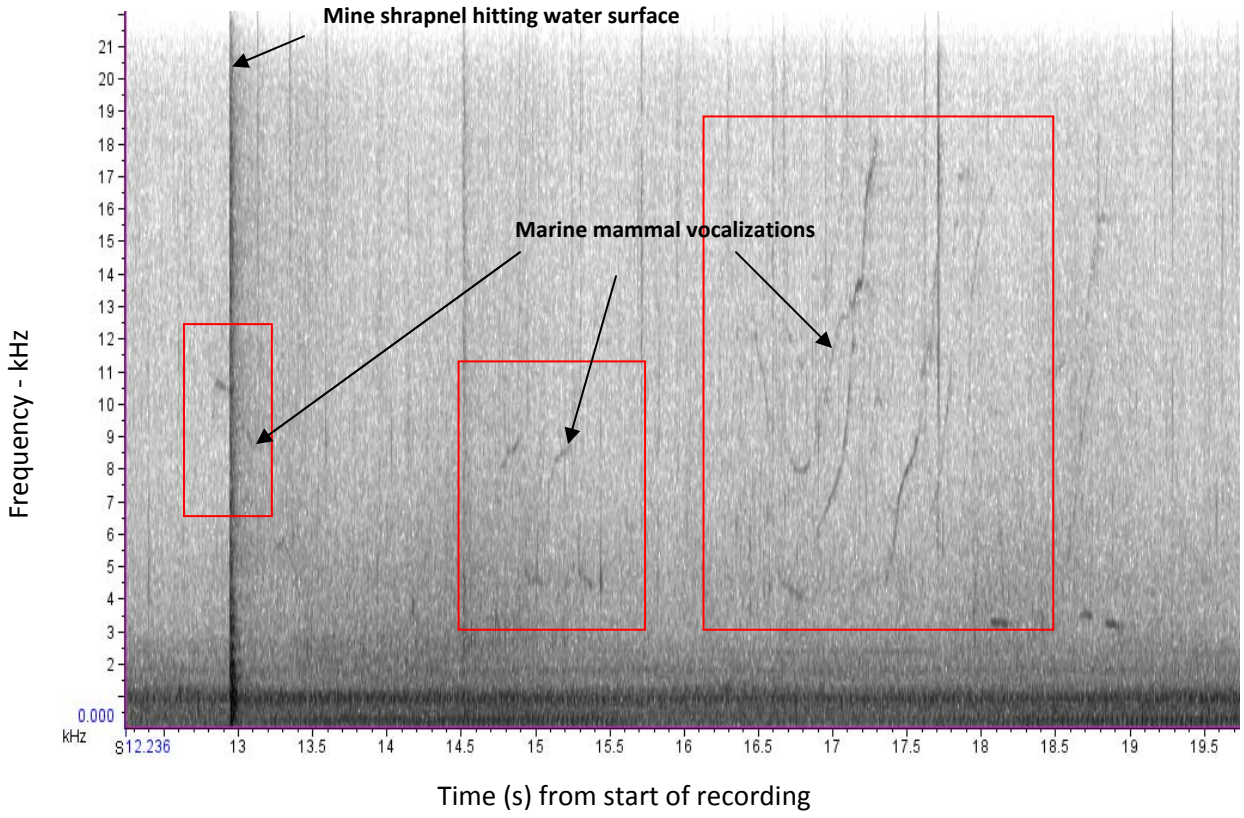

Figure I-4. Spectrogram of Mine Shrapnel and Post-detonation Whistles on 7 August 2009

SECTION II – CHERRY POINT RANGE COMPLEX

The CHPT study area consists of the range complex OPAREA, including the area from the mean high tide line, up to and extending seaward of the 3 nm western boundary of the OPAREA (**Figure II-1**).

There are 34 marine mammal species expected to occur regularly in the marine waters off North Carolina within the CHPT Range Complex. There are 32 cetacean species (whales, dolphins, and porpoises), one pinniped species (true seal) and one sirenian species (manatee). In addition there are five species of threatened and endangered sea turtles (Reviewed in DoN, 2008b).

CHPT STUDY QUESTIONS OVERVIEW

The goal of the CHPT Monitoring Plan is to implement field methods chosen to address the long term monitoring objectives outlined in the Introduction. In the CHPT Monitoring Plan (DoN 2009b), the Navy proposed to implement a diversity of field methods to gather monitoring data for marine mammals and sea turtles in Navy training areas. Specifically, the Navy proposed to use visual surveys (aerial or vessel), deploy passive acoustic monitoring devices when possible, and put marine mammal observers aboard Navy vessels to meet its goals during the current time period. Studies were specifically designed to meet the questions outlined in the Introduction section of this document. **Table II-1** shows the 2009 monitoring objectives agreed upon by the NMFS and Navy from the final CHPT Monitoring Plan.

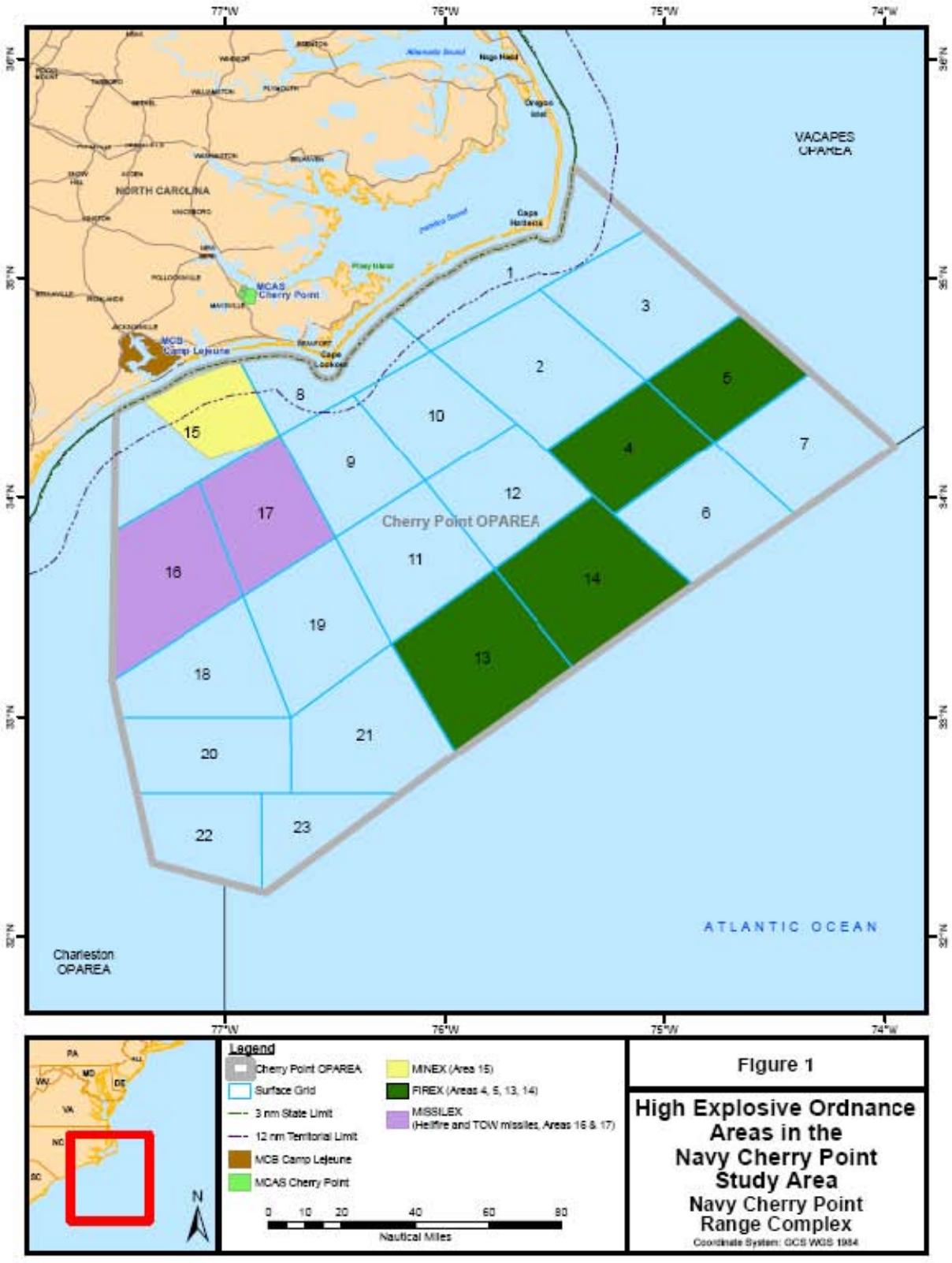

Figure II-1. CHPT Study Area.

Table II-1. 2009 monitoring objectives agreed upon by the NMFS and Navy from the final CHPT Monitoring Plan.

STUDY 1 (behavioral responses)		
Aerial or Vessel Surveys	- 1 explosive event per year. When feasible, deploy hydrophone array during vessel surveys for passive acoustic monitoring.	Adaptive Management Review for 2010 (AMR)
Marine Mammal Observers (MMO)	- 1 explosive event per year.	
STUDY 2 (mitigation effectiveness)		
MMO/ Lookout Comparison	- 1 explosive event per year.	AMR
Vessel or Aerial Surveys Before And After Training Events	- 1 explosive event per year. When feasible, deploy hydrophone array during vessel surveys for passive acoustic monitoring.	

CHPT MONITORING ACCOMPLISHMENTS FOR 2009

From June 2009 – January 2010, there have been no monitoring opportunities available for explosive events in the CHPT OPAREA. As briefly mentioned in the Introduction, because one full year of monitoring has not occurred from the June 2009 promulgation of the CHPT LOA, this report is meant to be a status report on Navy's accomplishments over the past seven months of effort. In this case, there is no monitoring to report at this time and no monitoring requirements have been satisfied to date.

SECTION III – JACKSONVILLE RANGE COMPLEX

The JAX study area consists of both the Charleston and Jacksonville OPAREAs, including the area from the mean high tide line, up to and extending seaward of the 3 nm western boundary of the OPAREAs (**Figure III-1**).

There are 30 marine mammal species or separate stocks with possible or confirmed occurrence in the marine waters off North Carolina, South Carolina, Georgia, and Florida within the Jacksonville Range Complex. There are 29 cetacean species (whales, dolphins, and porpoises) and one sirenian species (manatee). In addition there are five species of threatened and endangered sea turtles (Reviewed in DoN, 2008c).

JAX STUDY QUESTIONS OVERVIEW

The goal of the JAX Monitoring Plan is to implement field methods chosen to address the long term monitoring objectives outlined in the Introduction. In the JAX Monitoring Plan (DoN 2009c), the Navy proposed to implement a diversity of field methods to gather monitoring data for marine mammals and sea turtles in Navy training areas. Specifically, the Navy proposed to use visual surveys (aerial or vessel), deploy passive acoustic monitoring devices when possible, and put marine mammal observers aboard Navy vessels to meet its goals during the current time period. Studies were specifically designed to meet the questions outlined in the Introduction section of this document. **Table III-1** shows the 2009 monitoring objectives agreed upon by the NMFS and Navy from the final JAX Monitoring Plan.

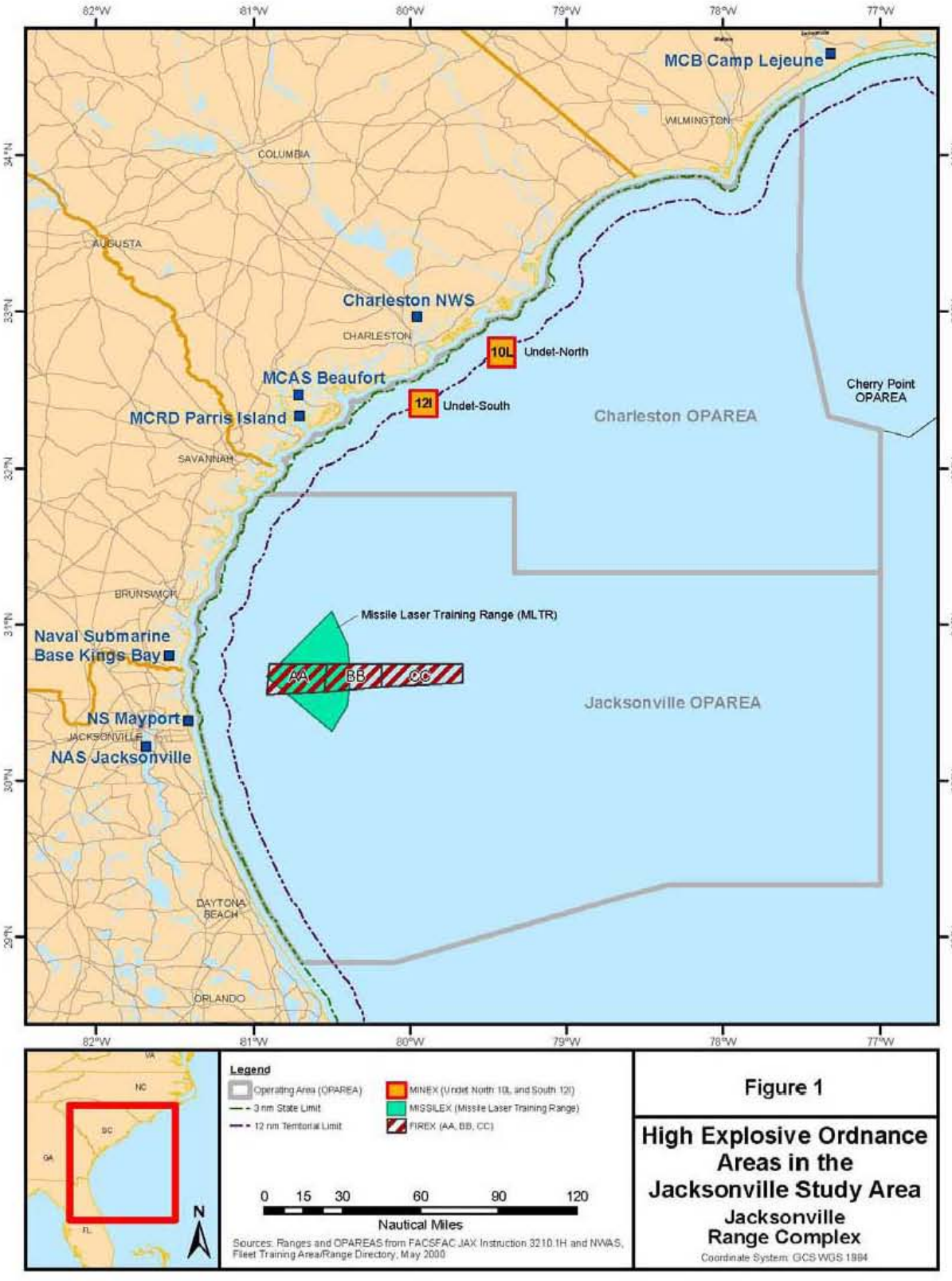

Figure III-1. JAX Study Area.

Table III-1. 2009 monitoring objectives agreed upon by the NMFS and Navy from the final JAX Monitoring Plan.

STUDY 1 (behavioral responses)		
Aerial or Vessel Surveys	- 2 explosive events per year, one of which is a multiple detonation event. When feasible, deploy hydrophone array during vessel surveys for passive acoustic monitoring.	Adaptive Management Review for 2010 (AMR)
Marine Mammal Observers (MMO)	- 1 explosive event per year.	
STUDY 2 (mitigation effectiveness)		
MMO/ Lookout Comparison	- 1 explosive event per year.	AMR
Vessel or Aerial Surveys Before And After Training Events	- 2 explosive events per year. When feasible, deploy hydrophone array during vessel surveys for passive acoustic monitoring.	

JAX MONITORING ACCOMPLISHMENTS FOR 2009

From June 2009 – January 2010, there have been few monitoring opportunities available for explosive events in the JAX study area and therefore, it is has been difficult to coordinate monitoring efforts. The 4 events conducted as of 1 January 2010 have been Unit Level Training (ULT), which makes planning and coordination of aerial or vessel surveys by third part contractors logistically difficult due to truncated planning timeframes (as compared to a major exercise). As a lesson learned, the Navy will coordinate more closely with specific Navy units conducting ULT exercises to ensure JAX monitoring requirements are satisfied by June 2010. As briefly mentioned in the Introduction, because one full year of monitoring has not occurred from the June 2009 promulgation of the JAX LOA, this report is meant to be a status report on Navy's accomplishments over the past seven months of effort. In this case, there is no monitoring to report at this time and no monitoring requirements have been satisfied to date.

SECTION 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 of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable ecosystems. Adaptive management helps science managers maintain flexibility in their decisions, knowing that uncertainties exist and provides managers the latitude to change direction will improve understanding of ecological systems to achieve management objectives; and is about taking action to improve progress towards desired outcomes.

In March, 2009, the Navy convened government and academic researchers to review the Navy's range complex monitoring plans. This diverse group of experts reviewed the methods that currently exist for monitoring, methods expected to be available in five years and the Navy's current plans. The team reinforced that the current methods being used by the Navy for monitoring were robust and strongly recommended that Navy continue to use a diversity of methods simultaneously. The Navy was successful in using a diversity of field methods to gather visual and acoustic data towards answering the questions posed by Navy and NMFS.

The Navy's adaptive management of the VACAPES, CHPT, and JAX Range Complex Monitoring Plans will involve close coordination with NMFS to align marine mammal monitoring with each Plan's overall objectives as stated within each of the Plans and in the Introduction of this report.

Scheduling monitoring that involves civilian aircraft or a ship operating within areas of explosive ordnance training requires extensive pre-survey coordination between multiple Navy commands. The USFF operational community provided critical interface and coordination that was instrumental in allowing for researchers to conduct monitoring in close-proximity to Navy assets.

Cancellations or major date shifts in Navy training events based on logistics, fiscal, or operational needs were challenging to overcome. These kind of changes are difficult to predict and more importantly, more difficult to reschedule from a monitoring prospective when contracts have been awarded, survey equipment has been purchased, rented or relocated; personnel availability and transport arranged; and fixed date contracts put into place.

Specific challenges faced were: 1) low densities of animals precluded large sample sizes; 2) weather delays and/or cancellations; 3) Navy operational delays and/or event cancellations; 4) identifying monitoring opportunities due to low number of events being carried out; and 5) safety logistics due to the training events involving explosive ordnance.

VACAPES Range Complex

In view of lessons learned during implementation of the 2009 VACAPES Monitoring Plan, Navy requests modification to the VACAPES Monitoring Plan and LOA monitoring requirements. The following 2 modifications to the monitoring plan allow for flexibility when an insufficient number of training events occur over the course of a year or if logistical constraints make monitoring not practicable. Specifically, Navy proposes:

1) Adding an exception to the 2 event per year visual survey monitoring requirement that reduces this requirement to 1 surveyed event if the number of training events conducted is equal to or less than 50% of the annual average number of events specified at 50 C.F.R. § 218.1(c)(1)(ii). In addition, if the required monitoring surveys are not completed within a given year, those surveys will roll into following years. A need for the flexibility proposed for the VACAPES Range Complex was not envisioned during development of the VACAPES Monitoring Plan. Navy's implementation of the first monitoring plan in 2009 proved difficult due to the low number of actual training events compared to the original proposed action. Incorporating this flexibility will ensure the monitoring requirements are commensurate with the level of training conducted on an annual basis.
2) Adding "if possible" to the requirement for a visual survey of a multiple detonation event. Due to the low number of events that have been carried out to date, it has been difficult to schedule any monitoring events, regardless of what type. Having the requirement that one event will involve multiple detonations adds an additional layer of complications. The only two types of events in VACAPES that involve multiple detonations are FIREX and BOMBEX events. There has been no BOMBEX training thus far, and therefore FIREX events are the only option to meet this requirement. Although every effort will be made to monitor as many different types of training events as possible (including the ones involving multiple detonations), Navy requests that this measure be removed as a strict requirement.

Proposed modifications to the VACAPES Monitoring Plan are shown in **Table IV-1** (additions are underlined).

Table IV-1. Navy's adaptive management review for VACAPES showing edits to the VACAPES Monitoring Plan.

STUDY 1 (behavioral responses)[1, 3]						
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**
Aerial or Vessel surveys	Award monitoring contract, develop SOP, obtain permits	2 explosive events per year	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)
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)[1, 3]						
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**
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 explosive events per year	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)

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

Note 2: If the number of training events conducted is equal to or less than 50% of the annual average number of events specified at 50 C.F.R. § 218.1(c)(1)(ii), then 1 explosive event per year will be surveyed. If the required number of monitoring events is not completed for a specific year, the remaining monitoring requirements will roll into the following year.

Note 3: If possible, one of the events visually surveyed per year will be a multiple detonation event.

Navy requests section 7(b)(i)(A) of the 2009 LOA be revised as follows (additions = underlined, deletions = strikeout):

(i) Vessel or aerial surveys.

(A) The Holder of this Authorization shall visually survey a minimum of 2 explosive events per year~~,~~. If the number of training events conducted is equal to or less than 50% of the annual average number of events specified at 50 C.F.R. § 218.1(c)(1)(ii), then 1 explosive event per year will be surveyed. If possible, one of the events surveyed ~~which~~ shall be a multiple detonation event. One of the vessel or aerial surveys should involve professionally trained marine mammal observers (MMOs). If it is impossible to conduct the required surveys due to lack of training exercises, the missed annual survey requirement shall roll

into the subsequent year to ensure that the appropriate number of surveys occurs over the 5-year period of effectiveness of 50 C.F.R. Part 218, Subpart A.

CHPT Range Complex

There are no modifications requested for the CHPT Monitoring Plan and LOA monitoring requirements.

JAX Range Complex

In view of lessons learned during implementation of the 2009 JAX Monitoring Plan, Navy requests modification to the JAX Monitoring Plan and LOA monitoring requirements. The following 2 modifications to the monitoring plan allow for flexibility when an insufficient number of training events occur over the course of a year or if logistical constraints make monitoring not practicable. Specifically, Navy proposes:

3) Adding an exception to the 2 event per year visual survey monitoring requirement that reduces this requirement to 1 surveyed event if the number of training events conducted is equal to or less than 50% of the annual average number of events specified at 50 C.F.R. § 218.10(c)(1)(ii). In addition, if the required monitoring surveys are not completed within a given year, those surveys will roll into following years. A need for the flexibility proposed for the JAX Range Complex was not envisioned during development of the JAX Monitoring Plan. Navy's implementation of the first monitoring plan in 2009 proved difficult due to the low number of actual training events compared to the original proposed action. Incorporating this flexibility will ensure the monitoring requirements are commensurate with the level of training conducted on an annual basis.
4) Adding "if possible" to the requirement for a visual survey of a multiple detonation event. Due to the low number of events that have been carried out to date, it has been difficult to schedule any monitoring events, regardless of what type. Having the requirement that one event will involve multiple detonations adds an additional layer of complications. The only two types of events in JAX that involve multiple detonations are FIREX and small arms training with anti-swimmer grenades. There has been no anti-swimmer grenade training, and therefore FIREX events are the only option to meet this requirement. FIREX using explosives are only conducted in the JAX Range Complex from 16 April – 14 November to avoid the right whale calving season. Although every effort will be made to monitor as many different types of training events as possible (including the ones involving multiple detonations), Navy requests that this measure be removed as a strict requirement.

Proposed modifications to the JAX Monitoring Plan are shown in **Table IV-2** (additions are underlined).

Table IV-2. Navy's adaptive management review for JAX showing edits to the JAX Monitoring Plan.

STUDY 1 (behavioral responses)[1, 3]						
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**
Aerial or Vessel surveys	Award monitoring contract, develop SOP, obtain permits	2 explosive events per year	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)
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) [1, 3]						
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**
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 explosive events per year	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)	2 explosive events per year (or 1 event per Note 2)

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

Note 2: If the number of training events conducted is equal to or less than 50% of the annual average number of events specified at 50 C.F.R. § 218.10(c)(1)(ii), then 1 explosive event per year will be surveyed. If the required number of monitoring events is not completed for a specific year, the remaining monitoring requirements will roll into the following year.

Note 3: If possible, one of the events visually surveyed per year will be a multiple detonation event.

Navy requests section 7(b)(i)(A) of the 2009 LOA be revised as follows (additions = underlined, deletions = strikeout):

(i) Vessel or aerial surveys.

(A) The Holder of this Authorization shall visually survey a minimum of 2 explosive events per year~~.~~. If the number of training events conducted is equal to or less than 50% of the annual average number of events specified at 50 C.F.R. § 218.10(c)(1)(ii), then 1 explosive event per year will be surveyed. If possible, one of the events surveyed ~~which~~ shall be a multiple detonation event. One of the vessel or aerial

surveys should involve professionally trained marine mammal observers (MMOs). If it is impossible to conduct the required surveys due to lack of training exercises, the missed annual survey requirement shall roll into the subsequent year to ensure that the appropriate number of surveys occurs over the 5-year period of effectiveness of 50 C.F.R. Part 218, Subpart B.

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NMFS. 2009a. Letter of Authorization, Taking Marine Mammals Incidental to U.S. Navy Training in the Virginia Capes Range Complex, issued June 5, 2009.

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NMFS. 2009c. Letter of Authorization, Taking Marine Mammals Incidental to U.S. Navy Training in the Cherry Point Range Complex, issued June 5, 2009.

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Shipboard Surveys

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United States Naval Academy, Annapolis

APPENDICES

Appendix A VACAPES MINEX Events Cruise Report

February 2010

Cruise Report, Marine Mammal Monitoring
Mine Neutralization Exercise Events, August 2009
VACAPES Range Complex

Prepared for:
Commander, United States Fleet Forces Command

Prepared by:
Naval Facilities Engineering Command,
Atlantic

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List of Acronyms and Abbreviations

ft	feet
EST	Eastern Standard Time
kts	knots (nautical miles per hour)
m	meters
MINEX	Mine Neutralization Exercise
MMO	Marine Mammal Observer
nm	nautical miles
NMFS	National Marine Fisheries Service
PMAP	Protective Measures Assessment Protocol
XO	Executive Officer
yd(s)	yards
YP	Yard Patrol Craft

SECTION 1: INTRODUCTION

In order to train with explosives, the Navy must obtain a permit from the National Marine Fisheries Service (NMFS) under the Marine Mammal Protection Act and Endangered Species Act. The Virginia Capes (VACAPES) Range Complex Monitoring Plan (DoN 2009), finalized in June 2009, was developed with NMFS to comply with the requirements under the permits obtained for explosives training (NMFS 2009). The VACAPES Range Complex Monitoring Plan is one component of the overall effort the Navy is undertaking to understand its potential affects and the biological consequences of those effects to protected marine species. The VACAPES Range Complex Monitoring Plan has been designed as a collection of focused "studies" to gather data that will allow us to address the following questions:

1. What are the behavioral responses of marine mammals and sea turtles that are exposed to explosives at specific levels?

2. Is the Navy's suite of mitigation measures for explosives (e.g., PMAP, major exercise measures agreed to by the Navy through permitting) effective at avoiding TTS, injury, and mortality of marine mammals and sea turtles?

In order to answer these questions, data is to be collected through various means, including contracted vessel and aerial surveys, passive acoustics, and placing marine mammal observers (MMOs) aboard Navy assets.

As part of this data collection effort, vessel surveys were conducted in conjunction with two Mine Neutralization Exercise (MINEX) events during August 5-7. Two to three U.S. Navy MMOs were stationed aboard the Navy Yard Patrol Craft (YP) ships YP 686 and YP 688 during the events. The primary goal of the monitoring effort was to collect data on marine mammals observed during operations and to answer the follow questions:

1. Are marine mammals and sea turtles exposed to explosives?
2. If so, at what levels?
3. Did exposed marine mammals/sea turtles show a behavioral response?

A secondary goal for the monitoring was to familiarize the MMOs with at-sea Navy operations and to gather information to facilitate future MMO opportunities. This secondary goal is captured as "lessons learned" in Section 5.2.

SECTION 2: MINE NEUTRALIZATION EXERCISE (MINEX) EVENT DESCRIPTION

During a mine neutralization exercise (MINEX) event, explosive ordnance disposal (EOD) personnel detect, identify, evaluate, and neutralize mines. In this specific case, a helicopter located the mine and deployed two EOD divers. In order to neutralize the mine, the EOD divers placed a 10 pound (lb) explosive charge on the mine. A timer on the charge was activated (~10 minutes) and then the EOD divers swam over and were picked up by a nearby Combat Rubber Raiding Craft (CRRC) and taken a specified distance away from the charge for safety reasons.

This event was performed on August 6th and 7th and participants were members of the EODTEU-2 group located out of Dam Neck, VA.

SECTION 3: METHODS

3.1. SHIPBOARD MARINE MAMMAL MONITORING

The vessel surveys were conducted on the bridge wings of YP 686 and YP 688 (16 feet [ft] above water's surface), with a minimum of one observer on each wing. On-effort monitoring conducted before and after the events involved line-transect surveys. Observers would use the naked eye and 7X50 powered binoculars to scan the area from dead ahead to just abaft of the beam.

On-effort monitoring conducted during the events involved the ship being approximately 2,405 – 2,515 yards (yds) [2200 - 2300 meters (m)] away from the detonation site, where the MMOs would use the naked eye and 7X50 powered binoculars to scan the detonation site and surrounding buffer zone. MMO surveys were conducted on a not-to-interfere basis, which means that the MMOs would not replace required Navy lookouts and would not dictate operational requirements/maneuvers. The only exception would be if a marine mammal or sea turtle was sighted by the MMO within the buffer zone for the specified event (within 700 yds of the detonation site for a MINEX event), and was not sighted by the lookout, the MMO would report the sighting to the lookout for appropriate reporting and action.

When an animal was visually detected, the MMO would collect information on sighting, environmental, and operational parameters (Table 1). When practical, still photography was obtained by the MMOs. In addition to visual monitoring, a hydrophone was put in the water to monitor marine mammal vocal activity before, during, and after the events.

Table 1. MMO Data Category Descriptions

Data Category	Description
Sightings Information	
Effort (on/off)	On effort means actively searching for marine mammals.
Date	Format in mm/dd/yy.
Time	Time provided in Eastern Standard Time (EST).
Location	This is the location of YP 686 or YP 688 at the time of the sighting, provided by MMOs.
Detection Sensor	Either visual or aural (if detected passively by the sonar technician).
Species/Group	Determined by the MMO.
Group Size	Estimated by the MMO.
# Calves	Estimated by the MMO.
Behavior	Individual behaviors: breach, porpoise, spin, bowride, feeding, head slap, social, tail slap, pectoral fin slap, other Whale behaviors: blow, no blow rise, fluke up, peduncle arch, unidentified large splash Group behaviors: rest, mill, travel, surface active travel, surface active mill
Animal bearing (true)	Estimated by the MMO.
Animal motion relative to ship	Estimated by the MMO (closing, parallel, opening).
Distance from ship (yds)	Estimated by the MMO using reticled binoculars.
Length of contact	Estimated by the MMO.
Environmental Information	
Wave height (ft)	Estimated by the MMO.
Visibility	Estimated by the MMO.
BSS	Estimated by the MMO.
Operational Information	
Active sonar in use?	Specifically refers to MFAS.
Explosives in use?	Determined by the MMO.
Bearing of ship	Provided by monitors on the bridge.
Mitigation implemented	If explosive exercise underway, the measures implemented, if any, by the Navy Operators.
Comments	Other comments as necessary.

3.2. SCHEDULE OF EVENTS

YP 686 departed out of Little Creek Amphibious Base in Virginia Beach, VA on 5 August and conducted pre-event monitoring from 0900 to 1300 Eastern Standard Time (EST). On 6 August, YP 688 conducted pre-event monitoring from 0900 to 1230 EST. The MINEX training event was conducted from approximately 1100 to 1330 EST, with the detonation occurring at 1305 EST. From 1230 to 1330 EST, YP 688 conducted monitoring during the event from approximately a 2,515 yds (2,300 m) distance from the detonation site. Following the event, the weather deteriorated and monitoring was halted at 1330 EST. On 7 August, YP 688 conducted pre-event monitoring from 0900 to 1130 EST. The MINEX training event was conducted from approximately 1000 to 1200 EST, with the detonation occurring at 1145 EST. From 1100 to 1200 EST, YP 688 conducted monitoring during the event from approximately a 2,405 yds (2,200m) distance from the detonation site. Following the event, post-event monitoring was conducted from 1200 to 1300 EST. A detailed schedule of events is provided below in Table 2.

Table 2. Schedule of Events

5 August	
Time	**Notes**
0630	YP 686 underway
0900	MMOs on effort
1300	MMOs off effort
1700	YP 686 return to port

6 August	
Time	**Notes**
0645	YP 688 underway
0900	MMOs on effort
1100	MINEX event begins
1330	MINEX event ends
1330	MMO off effort
1730	YP 688 return to port

7 August April	
Time	**Notes**
0645	YP 688 underway
0900	MMOs on effort
1000	MINEX event begins
1200	MINEX event ends
1300	MMO off effort
1715	YP 688 return to port

SECTION 4: RESULTS

Visual

Eighteen marine mammal and two sea turtle sightings were recorded by the MMOs (Table 3 through Table 5). All of the marine mammal sightings were of bottlenose dolphins. One of the sea turtle sightings was of an unidentified hardshell sea turtle, and the other was of a loggerhead sea turtle.

All sightings on 5 August are shown in Figure 1; however no event took place on this day. A MINEX event took place on 6 August, however no sightings were reported. All sightings on 7 August are shown in Figure 2, along with the approximate detonation location.

For sightings that were obtained between 30 minutes pre-detonation and 30 minutes post-detonation, calculations were made to determine whether it was probable the animals could have been exposed to the detonation. Only one sighting fell within this time frame, which was a visual sighting of bottlenose dolphins obtained approximately 5 minutes after the detonation on 7 August. The sighting was estimated to be approximately 4,940 yds (4,517 m) away from the detonation. If we assume an average swim speed of 1.7 yds/sec (3 knots), then over a 5 minute period, the dolphins could have swum approximately 510 yds (466 m). If this estimated distance is subtracted from the distance at which the sighting occurred, then the closest estimated distance the bottlenose dolphins would have been to the detonation would be approximately 4,430 yds (4,051 m). For a 10 lb charge, the estimated range for temporary threshold shift (TTS) is approximately 437 yds (400 m), so it is extremely unlikely that these individuals would have been exposed to the explosion. The sighting was very brief, but no unusual behavior was observed.

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Table 3. Marine Species Sightings Data

Data Category	Sighting 1	Sighting 2	Sighting 3	Sighting 4	Sighting 5	Sighting 6	Sighting 7
Map ID*	1	2	3	4	5	6	7
Sightings Information							
Effort (on/off)	on	on	on	on	on	on	on
Date	08/05/09	08/05/09	08/05/09	08/05/09	08/05/09	08/05/09	08/05/09
Time	1010	1036	1040	1050	1115	1122	1125
Location	36°46'N 75°51'W	36°46'29"N 75°53'11"W	36°46'N 75°53'W	36°46'N 75°54'W	36°47'N 75°55'W	36°47'N 75°55'W	36°47'N 75°55'W
Detection Sensor	visual	visual	visual	visual	visual	visual	visual
Species/Group	bottlenose dolphin	bottlenose dolphins	bottlenose dolphins	bottlenose dolphins	bottlenose dolphin	bottlenose dolphin	bottlenose dolphin
Group Size	1	12-15	2-3	2	1	5	2
# Calves	0	0	0	0	0	0	0
Behavior	jumping	?	?	traveling	traveling	?	traveling
Animal bearing (true)	180°	180°	270°	280°	60°	60°	60°
Animal motion relative to ship	?	?	?	closing	closing	?	parallel
Distance from ship (yds)	?	1 km	700-800	500-1,000	?	< 200	1,000-2,000
Distance of animal to detonation location (yds)	NA	NA	NA	NA	NA	NA	NA
Length of contact	?	?	?	?	?	8 min	5 min
Environmental Information							
Wave height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	> 20 km	> 20 km	> 20 km	> 20 km	> 20 km	> 20 km	> 20 km
BSS	1	1	1	1	1	1	1
Operational Information							
Active sonar in use?	no	no	no	no	no	no	no
Explosives in use?	no	no	no	no	no	no	no
Bearing of ship	270°	270°	270°	280°	60°	60°	60°
Mitigation implemented	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comments						Hydrophone deployed	Hydrophone deployed

* Map ID related to the labeled numbers in Figure 1.

Table 4. Marine Species Sightings Data (Cont.)

Data Category	Sighting 8	Sighting 9	Sighting 10	Sighting 11	Sighting 12	Sighting 13	Sighting 14
Map ID*	8	9	10	11	12	13	14
Sightings Information							
Effort (on/off)	on	on	on	on	on	on	on
Date	08/05/09	08/05/09	08/05/09	08/05/09	08/05/09	08/05/09	08/05/09
Time	1150	1215	1220	1225	1222	1244	1305
Location	36°48’39”N 75°53’00”W	36°49’N 75°52’W	36°49’N 75°52’W	36°49’N 75°52’W	36°49’53”N 75°52’19”W	36°50’55”N 75°52’20”W	36°50’17”N 75°57’W
Detection Sensor	visual	visual	visual	visual	visual	visual	visual
Species/Group	bottlenose dolphin	bottlenose dolphin	bottlenose dolphin	bottlenose dolphin	bottlenose dolphin	bottlenose dolphin	bottlenose dolphin
Group Size	8-15	1	1	2	3	3-5	1
# Calves	yes	0	0	0	0	0	0
Behavior	traveling	?	?	traveling	?	?	?
Animal bearing (true)	60°	245°	60°	?	150°	10°	30°
Animal motion relative to ship	parallel	?	Closing	closing	?	?	?
Distance from ship (yds)	?	?	< 200	< 200	200-500	>2000	< 200
Distance of animal to detonation location (yds)	NA	NA	NA	NA	NA	NA	NA
Length of contact	?	?	?	?	?	?	?
Environmental Information							
Wave height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	> 20 km	> 20 km	> 20 km	> 20 km	> 20 km	> 20 km	> 20 km
BSS	1	1	1	1	1	1	1
Operational Information							
Active sonar in use?	no	no	no	no	no	no	no
Explosives in use?	no	no	no	no	no	no	no
Bearing of ship	60°	245°	285°	285°	265°	265°	270°
Mitigation implemented	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comments							Hydrophone deployed

* Map ID related to the labeled numbers in Figure 1.

Table 5. Marine Species Sightings Data (Cont.)

Data Category	Sighting 15	Sighting 16	Sighting 17	Sighting 18	Sighting 19	Sighting 20
Map ID*	15	16	17	18	19	20
Sightings Information						
Effort (on/off)	on	on	on	on	on	on
Date	08/07/09	08/07/09	08/07/09	08/07/09	08/07/09	08/07/09
Time	1045	1053	1100	1110	1150	1236
Location	36°46'N 75°57'W	36°46'N 75°55'W	36°46'N 75°56'W	36°46'N 75°55'W	36°47'N 75°52'W	36°48'N 75°53'W
Detection Sensor	visual	visual	visual	visual	visual	visual
Species/Group	Loggerhead turtle	Hardshell turtle	bottlenose dolphin	bottlenose dolphin	bottlenose dolphin	bottlenose dolphin
Group Size	1	1	1	4	?	?
# Calves	0	0	0	0	0	0
Behavior	traveling	?	?	traveling	traveling	traveling
Animal bearing (true)	?	180°	180°	150°	60°	180°
Animal motion relative to ship	parallel	?	?	parallel	?	parallel
Distance from ship (yds)	< 200	< 20	220	220	~ 500	1,000
Distance of animal to detonation location (yds)	~5,950	~4,575	~5,190	~4,950	~4,940	~2,650
Length of contact	< 5 sec	< 5 sec	?	?	< 5 sec	?
Environmental Information						
Wave height (ft)	4-6	0-3	0-3	4-6	0-3	4-6
Visibility	10-20 km	10-20 km	10-20 km	10-20 km	10-20 km	10-20 km
BSS	2	2	2	2	2	2
Operational Information						
Active sonar in use?	no	no	no	no	no	no
Explosives in use?	60 minutes prior to detonation	52 minutes prior to detonation	45 minutes prior to detonation	35 minutes prior to detonation	5 minutes post-detonation	51 minutes post-detonation
Bearing of ship	270°	270°	270°	74°	57°	277°
Mitigation implemented	N/A	N/A	N/A	N/A	N/A	N/A
Comments			5 reticle distance (25 mil) reading	5 reticle distance (25 mil) reading		

* Map ID related to the labeled numbers in Figure 2.

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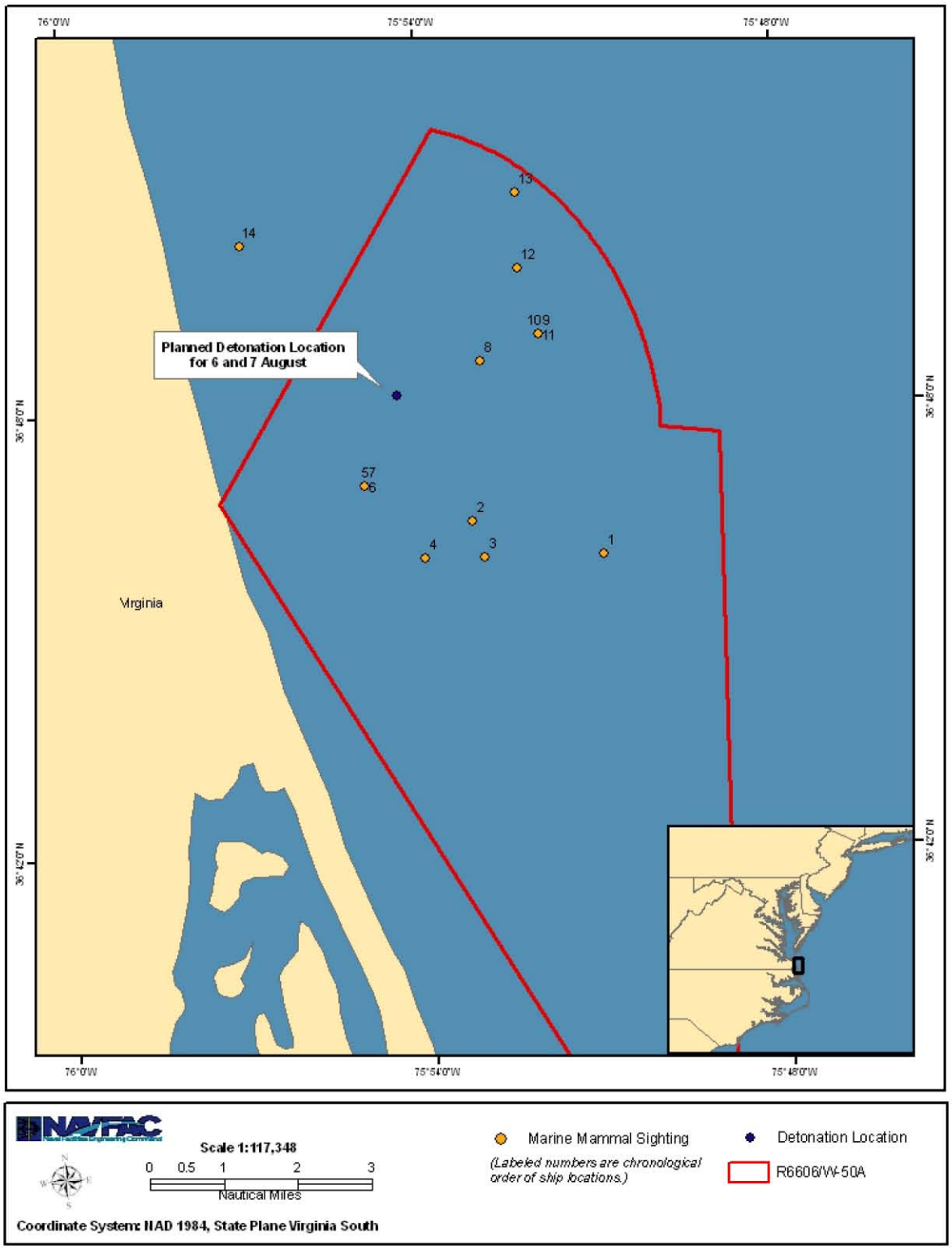

Figure 1. Ship position at time of sightings on 5 August 2009.

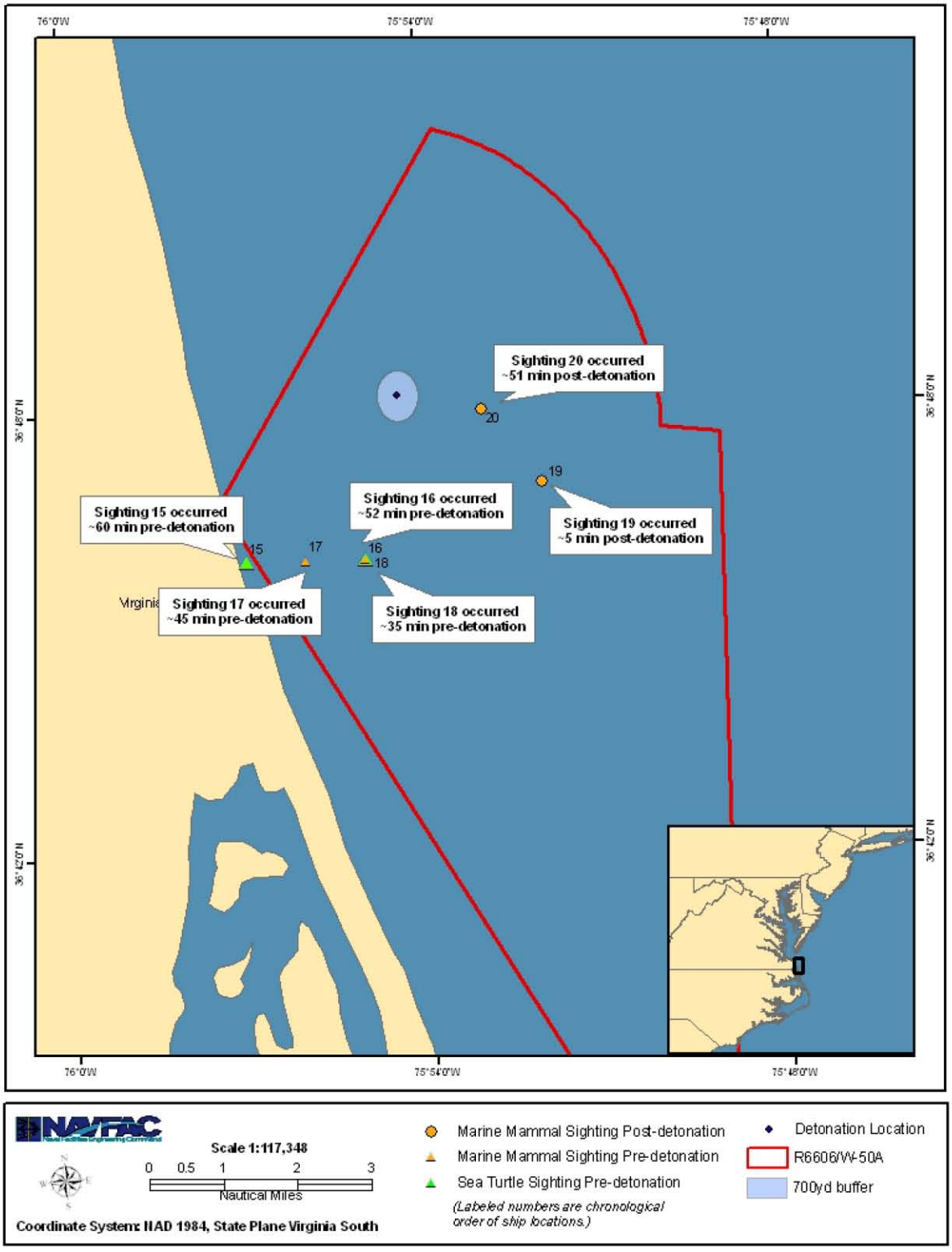

Figure 2. Ship position at time of sightings and approximate detonation location on 7 August 2009.

Acoustic

A hydrophone was deployed on the 6th and 7th of August to monitor marine mammal vocalization activity before, during, and after the MINEX events. Total recording time included approximately 20 minutes each day and both of the explosive events were captured on the hydrophone. At this time it does not appear that any marine mammal vocalizations were detected on 6 August, which is consistent with the visual survey results. On 7 August, it does not appear that any marine mammal vocalizations were detected before the event; however, within seconds of the detonation on 7 August, delphinid vocalizations (presumed to be bottlenose dolphins) were heard (Figure 3). At this time, no analysis has been completed on the acoustic data set, except a quick visualization of the data; however, attempts will be made to extract the received level of the delphinid vocalizations. By making an assumption on the estimated source level of the vocalizations, it should be possible to estimate a maximum and minimum distance of the vocalizing animal from the hydrophone. Once this is done, it will be possible to estimate the closest estimated distance the animals would have been to the detonation, and therefore whether they were potentially exposed.

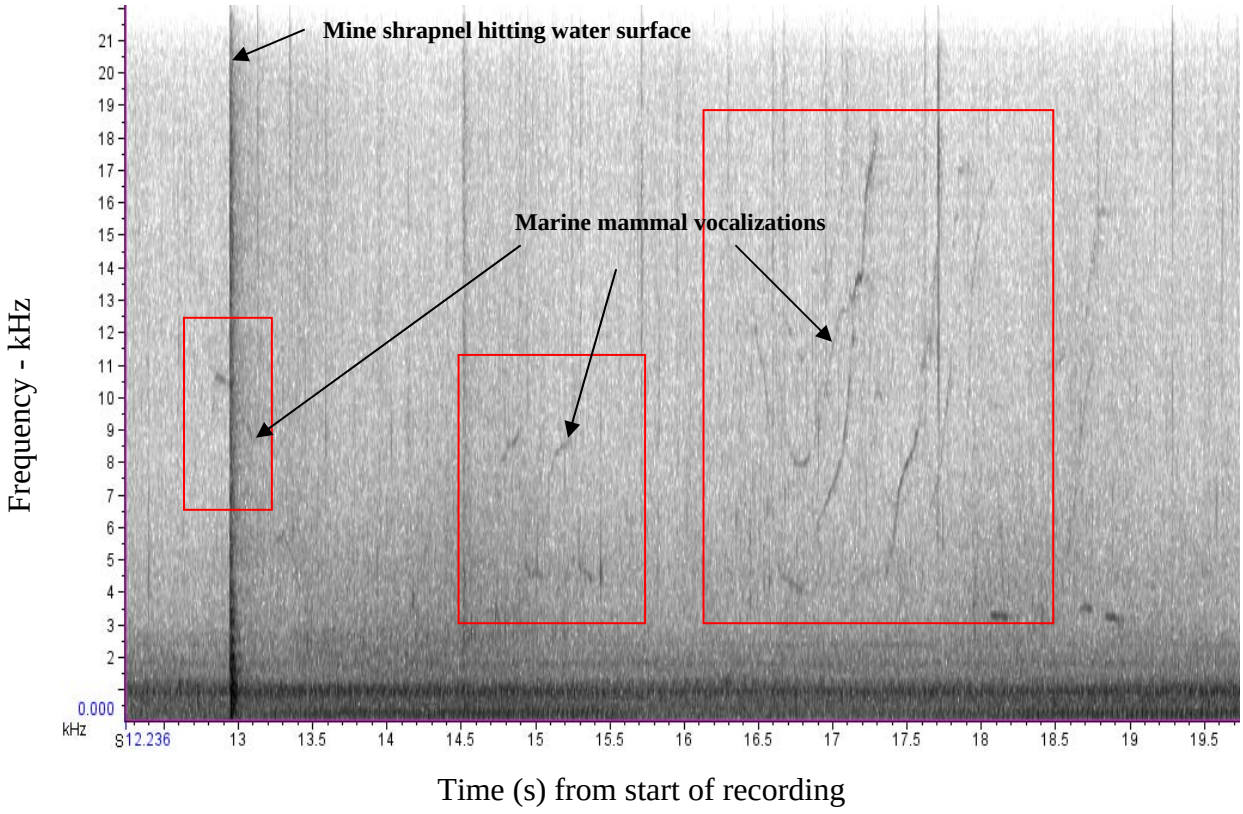

Figure 3. Spectrogram of Mine Shrapnel and Post-detonation Whistles on 7 August 2009.

SECTION 5: CONCLUSION

5.1. MARINE MAMMAL MONITORING

The goal of the VACAPES MINEX monitoring effort is provided below, with a conclusion regarding each of the specific questions that were asked:

1. Are marine mammals and sea turtles exposed to explosives?

   No marine mammal or sea turtle sightings were obtained by YP 688 MMOs during the explosive event on 6 August. However, on 7 August, a sighting of bottlenose dolphins was made approximately 5 minutes post-detonation. Based on the sighting location and average swim speed (see Results Section), the closest estimated distance from the detonation location at the time of detonation would have been approximately 4,430 yds.

   At this time it does not appear that any marine mammal vocalizations were detected on 6 August, which is consistent with the visual survey results. However, on 7 August, within seconds of the detonation, delphinid vocalizations (presumed to be bottlenose dolphins) were captured on the hydrophone. At this time it is unclear whether the delphinids were close enough to the detonation to be exposed. Plans are in place for further analysis to be completed, and results will be included in the 2010 Annual Monitoring Report for Marine Species Monitoring in the Virginia Capes, Cherry Point, and Jacksonville Range Complexes.

2. If so, at what levels?

   For a 10 lb charge, the estimated range for temporary threshold shift (TTS) is approximately 437 yds (400 m). Therefore, it is extremely unlikely that the bottlenose dolphins sighted on 7 August (estimated to be a minimum of 4,430 yds away from the detonation) would have been exposed to the explosion.

   For the delphinid vocalizations that were obtained on 7 August, at this time it is unclear how far away the individuals were from the detonation site. Once this information is obtained, estimations can be made regarding whether the individuals were exposed and at what levels. Plans are in place for further analysis to be completed, and results will be included in the 2010 Annual Monitoring Report for Marine Species Monitoring in the Virginia Capes, Cherry Point, and Jacksonville Range Complexes.

3. Did exposed marine mammals/sea turtles show a behavioral response?

Based on visual sighting data, no marine mammal or sea turtles were exposed during the explosive events.

Based on the acoustic data, it is unclear at this point whether the vocalizing delphinids were exposed during the explosive event. No behavioral data can be drawn from the acoustic data at this time, but any results that can be drawn in the future will be included in the 2010 Annual Monitoring Report for Marine Species Monitoring in the Virginia Capes, Cherry Point, and Jacksonville Range Complexes.

5.2. LESSONS LEARNED

A few lessons learned were noted for the VACAPES MINEX event monitoring effort, and are separated into those for shipboard monitoring and operational information below.

5.2.1. Shipboard Marine Mammal Monitoring

- Ensure that a detailed log (leave port, begin on-effort, begin event, end event, off-effort, and return to port) is kept for each day of monitoring. We only have approximate times because this information was not strictly logged.

- Recommend that improvements are made to ensure consistency among MMOs regarding filling out the sighting forms. For example, use same format for coordinates, distance, etc.

- Methods are needed to continue to improve the close aboard distance estimation by MMOs. Reticled binoculars were used for longer distance sightings, however this method was not useful for close aboard sightings. Suggest that MMOs practice close aboard distance estimation if possible.

- Recommend improving passive acoustic monitoring capabilities so that more detailed information can be obtained.

5.2.2. Operational Information

- Future monitoring efforts should continue to make every attempt possible to organize a pre-event brief. This allows the environmental staff to present the goals of the monitoring and explain what information is needed for their planning efforts, as well as the opportunity to learn more about the event(s) that will be taking place.

- A field communication plan is extremely vital for successful monitoring on Navy ranges. It is imperative to have multiple forms of potential communication in case the preferred method does not work. Communication needs to take place in the event range schedulers need to confirm that MMOs have permission to be on the range, as well as to get updates regarding schedule of event(s).

- Need to continue to improve pre-planning coordination between operators and MMOs to ensure that monitoring opportunities and data gathering is maximized.

SECTION 6: ACKNOWLEDGEMENTS

We thank the officers and crew of the *EODTEU-2* unit for their outstanding support and cooperation with our monitoring efforts. We thank the US Naval Academy Annapolis for supplying the monitoring boats and crews to support the MMO work. We also thank NAVFAC Atlantic's range sustainment staff and USFF's environmental staff for pre-planning coordination.

SECTION 7: REFERENCES

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