

In accordance with 3 June 2010 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 2010

May 2011



Citation for this report is as follows:

DoN. 2011. Marine Species Monitoring For The U.S. Navy's Virginia Capes, Cherry Point, and Jacksonville Range Complexes - Annual Report 2010. Department of the Navy, United States Fleet Forces Command.

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List Of Acronyms

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 PhotoID
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

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 the three original 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 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?

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), 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.

There are no modifications requested for the Monitoring Plans and LOA monitoring requirements from the 2010 LOAs (NMFS 2010a, 2010b, 2010c). A summary of the Navy’s monitoring progress in all 3 range complexes for Year 1 and Year 2 can be found at the end of the report in **Table IV-1**.

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 2 January 2010 to 1 January 2011. Included in this assessment are reportable metrics of monitoring as requested by NMFS. Given the relatively new start of this ambitious program, this report will mainly 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 2011 Range Complex Monitoring Plans based on actual lessons learned from 2010. 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 (e.g., whales, dolphins, and porpoises), four pinniped species (e.g., true seals) and one sirenian species (e.g., 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 2010 monitoring objectives as initially agreed upon by the NMFS and Navy from the final VACAPES Monitoring Plan.

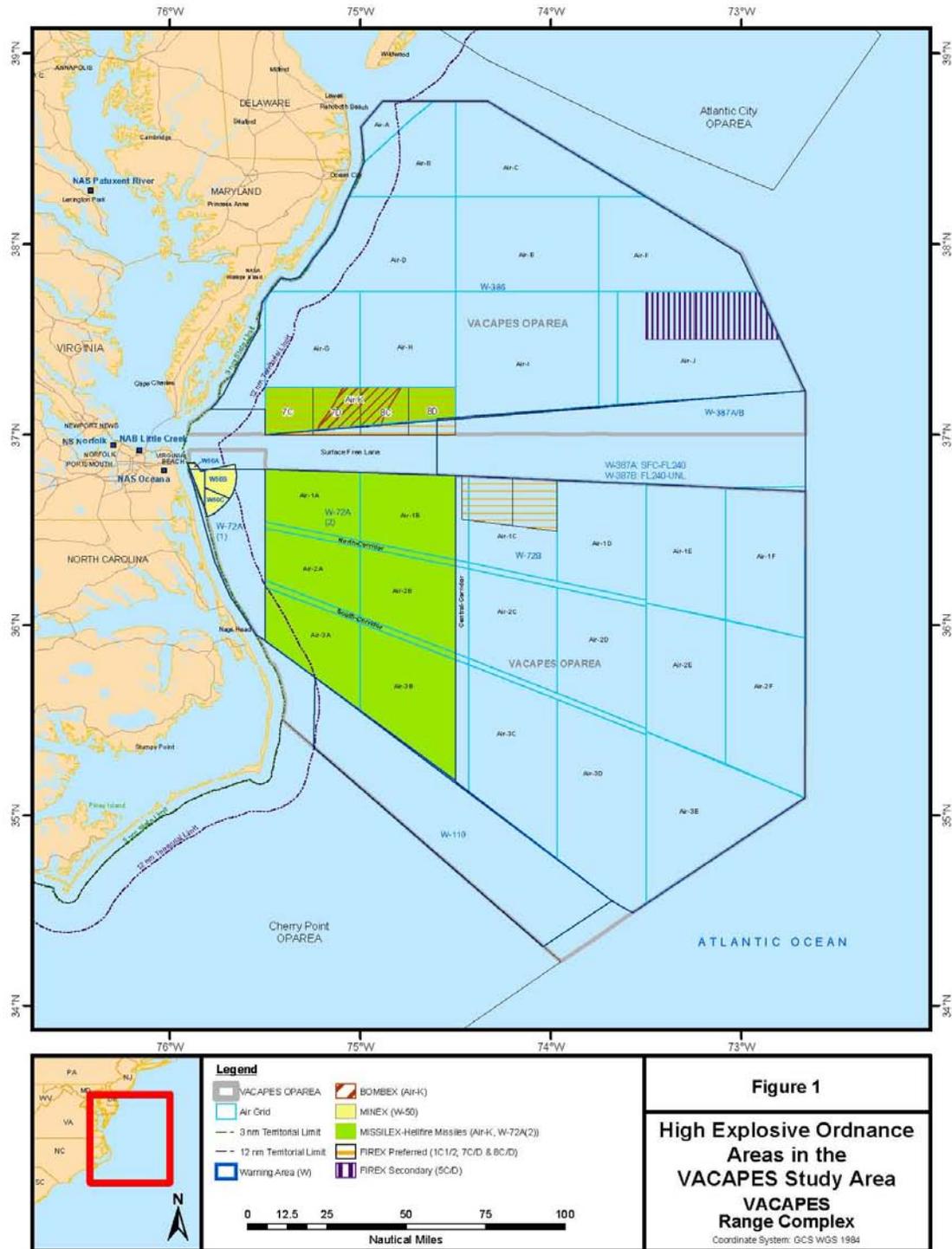


Figure I-1. VACAPES Study Area.

Table I-1. 2010 VACAPES monitoring obligations under VACAPES Final Rule, LOA and BiOP

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 2011 (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 2010

During 2010, USFF implemented vessel and aerial surveys, deployed marine mammal observers and deployed passive acoustic recording devices. The monitoring efforts for 2010 were conducted within the MINEX (W-50) box in conjunction with a mine neutralization exercise (MINEX) event, and the FIREX (7C/7D) box in conjunction with a firing exercise (FIREX) event.

Major accomplishments from the U.S. Fleet Forces' 2010 compliance monitoring in the VACAPES study area include:

- Vessel Visual Surveys
 - Completed vessel surveys within the MINEX (W-50) box before and after a MINEX event. During the event the boat stood off at 1,775 yds (1,623 m) and visually surveyed the buffer zone around the detonation site.
- Aerial Visual Surveys
 - Completed aerial surveys within the FIREX (7C/7D) box before and after a FIREX event.
- Passive Acoustic Monitoring
 - Passive acoustic buoys were deployed during a MINEX event to record any marine mammal vocalizations in the area.
- Marine mammal observers
 - 3 MMOs were deployed during a MINEX event. During the event the boat stood off at 1,775 yds (1,623 m) and the MMOs visually surveyed 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.

Table I-2. U.S. Navy funded monitoring accomplishments within the VACAPES study area from January 2010 to January 2011.

Study Type	Description of U.S. Navy EIS/LOA monitoring	Associated event type	MMPA/ESA requirement	Total accomplished
Vessel or aerial surveys –before and after event (study 1 and 2)	Vessel surveys during 1 MINEX event and aerial surveys during 1 FIREX event.	MINEX, MISSILEX, FIREX, or BOMBEX	2 events (1 multiple detonation event)	2 events (1 multiple detonation event)
Marine Mammal Observers (studies 1 and 2)	MMOs visually surveyed before, during and after 1 MINEX event.	MINEX, MISSILEX, or FIREX	1 event	1 event
Passive Acoustic Monitoring (study 2)	Deployed passive acoustic buoys during 1 MINEX event.	MINEX, MISSILEX, FIREX, or BOMBEX	Deploy hydrophone array during vessel surveys when feasible	1 event

VACAPES VESSEL VISUAL SURVEYS

Vessel surveys were conducted in association with a MINEX training event off the coast of Virginia Beach, Virginia. Surveys were conducted on 8-10 August before, during and after the training event. On 8 August, a pre-event survey was conducted resulting in one marine mammal sighting. On 9 August, the day of the event, pre-, during, and post-surveys were conducted. There was one marine mammal sighting and one sighting of a large school of amberjack. There were no marine mammal sightings on 10 August. A summary of all sightings is presented in **Table I-3**. The sighting that took place on 8 August is shown in **Figure 1-2** in relation to the planned detonation location. Sightings that took place on 9 August are shown in **Figures I-3** in relation to the detonation location. For additional details see **Appendix A** for the 2010 VACAPES MINEX Event Trip Report.

Table I-3. Summary of marine species sightings from the observer vessel off the coast of Virginia during August 2010.

Common Name	Scientific Name	# of Sightings	# of individuals
unidentified dolphins		2	1-2+
schooling amberjack		1	?

No injuries or mortalities of marine mammals or turtles were observed during the MINEX training event on 9 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. A visual sighting of a small group of unidentified dolphins was first obtained approximately 9 minutes prior to detonation on 9 August. The group was followed for approximately 2-3 minutes and was last seen heading north. The group was initially sighted approximately 885 yds (810 m) away from the detonation site and then resighted approximately 722 yds (660 m) away from the detonation site, which is outside the 700 yd buffer zone. The group was passing by the detonation site traveling north and last seen opening their distance away from the site. For a 20 lb charge, the estimated range for temporary threshold shift (TTS) is approximately 552 yds (505 m). If the group stayed in the area it is possible they could have been exposed to the explosion, but as stated they were headed away from the detonation site when last seen. The sighting was brief, but the individuals seemed to be traveling and no unusual behavior was observed.



Figure I-2. Ship position at time of sighting and planned detonation location during MINEX vessel surveys conducted on 8 August 2010.



Figure I-3. Location of sightings and detonation location during MINEX vessel surveys conducted on 9 August 2010.

VACAPES AERIAL VISUAL SURVEYS

Aerial surveys were conducted in association with a FIREX training event off the coast of Virginia. Line transect surveys were conducted on 10-11 August before and after the training event. On 10 August, two surveys were completed, one in the morning and one in the afternoon just prior to the event. There were no marine mammal sightings within the event area, but there were 3 sightings of marine mammals sighted farther offshore ranging from 15-26 nm east of the 7C/7D box. On 11 August, a post-event survey was flown in the morning. There was one marine mammal sighted within the event area and one marine mammal sighted farther offshore approximately 21 nm east of the 7C/7D box. A summary of the sightings are presented in **Table I-4 and Figures I-4 thru I-6**. For additional details see **Appendix B** for the 2010 VACAPES FIREX Event Trip Report. No injuries or mortalities of marine mammals or turtles were observed during the FIREX training event on 10 August. Since no marine mammals were seen within the event area on the day the FIREX event took place, there is no data to suggest that any marine mammals were exposed.

Table I-4. Summary of marine species sightings from the aerial survey during August 2010.

Common Name	Scientific Name	# of Sightings	# of individuals (best estimate)
unidentified cetacean		1	12
bottlenose dolphin	<i>Tursiops truncatus</i>	1	12
common dolphin	<i>Delphinus delphis</i>	1	65
Risso's dolphin	<i>Grampus griseus</i>	1	6
Atlantic spotted dolphin	<i>Stenella frontalis</i>	1	10

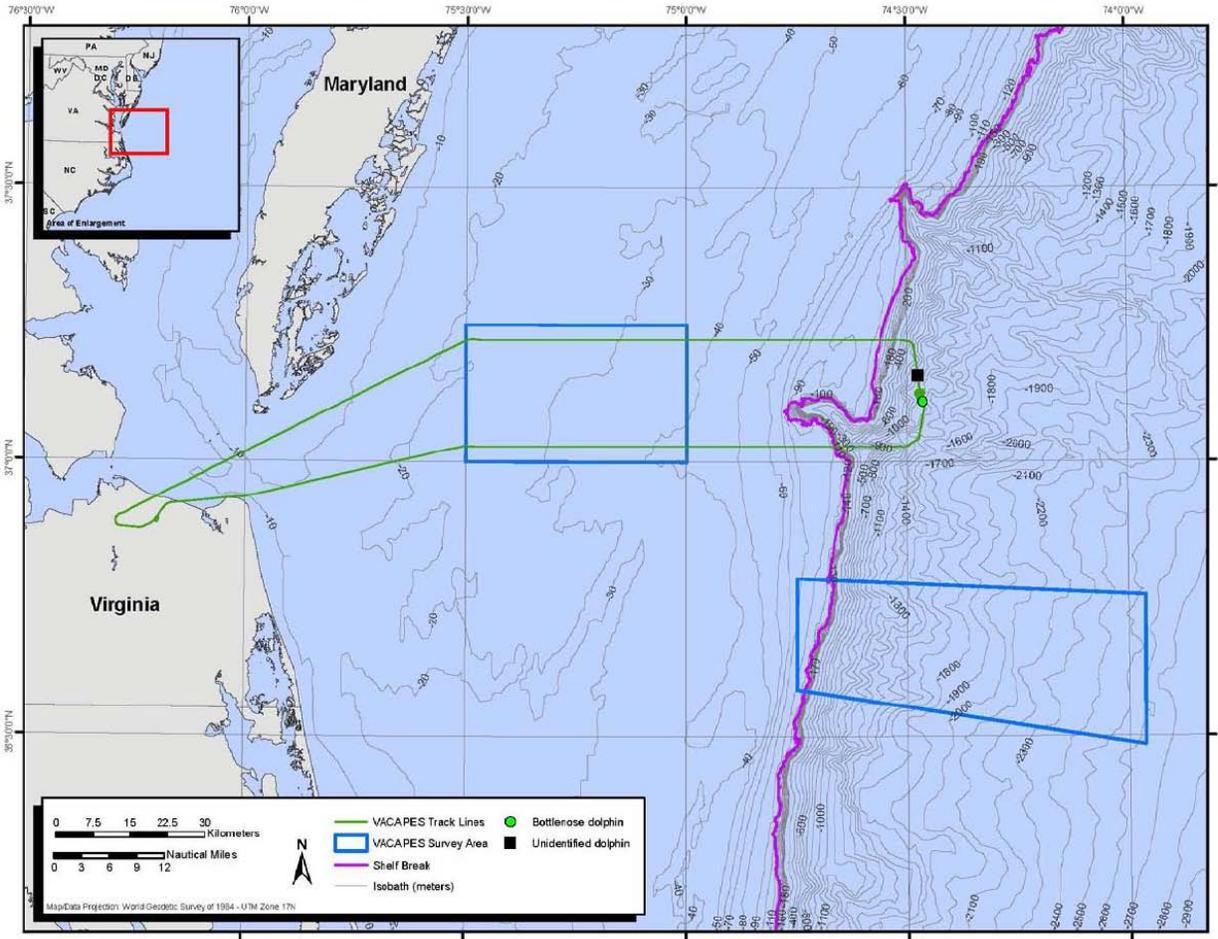


Figure I-4. Marine species sightings during FIREX aerial surveys conducted in the morning on 10 August 2010.

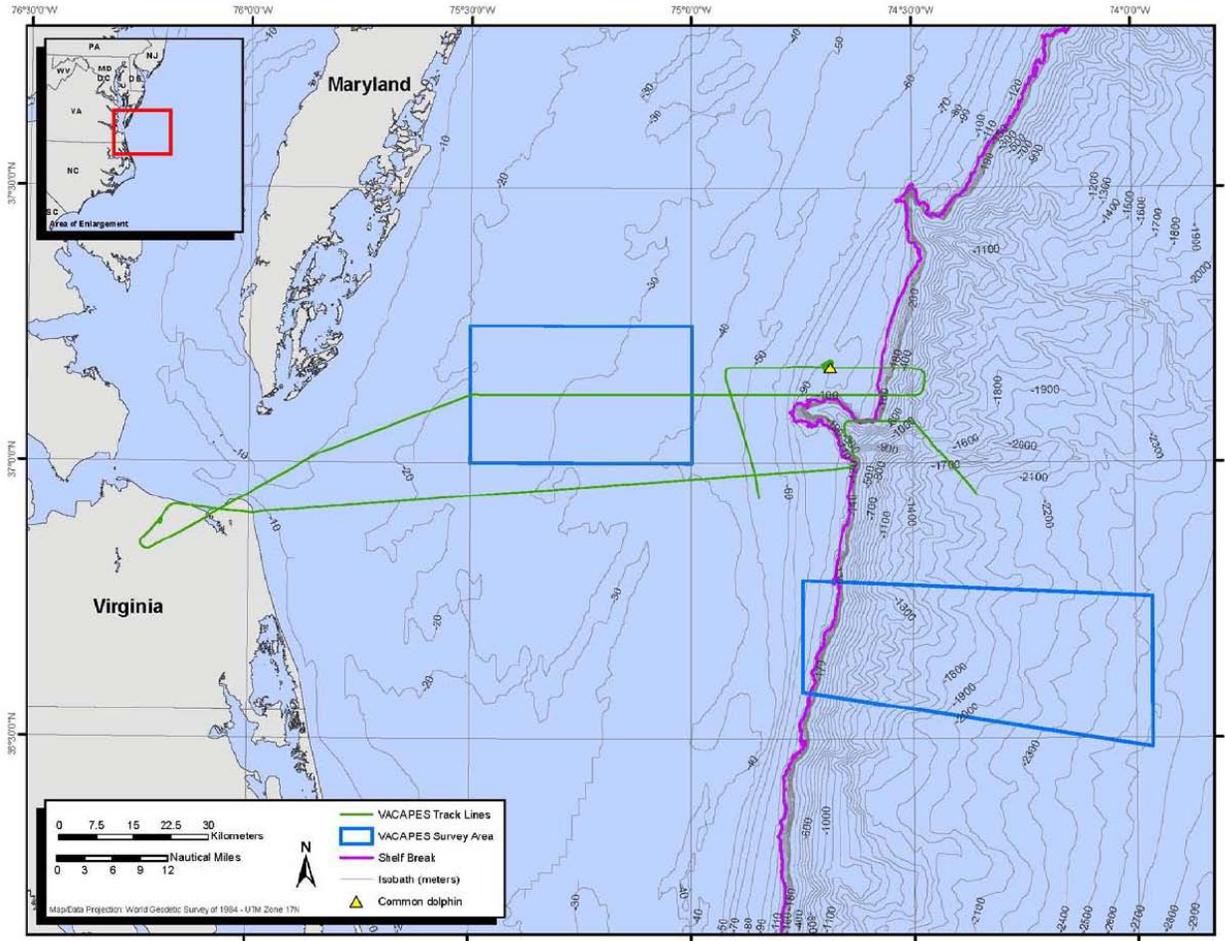


Figure I-5. Marine species sightings during FIREX aerial surveys conducted in the afternoon on 10 August 2010.

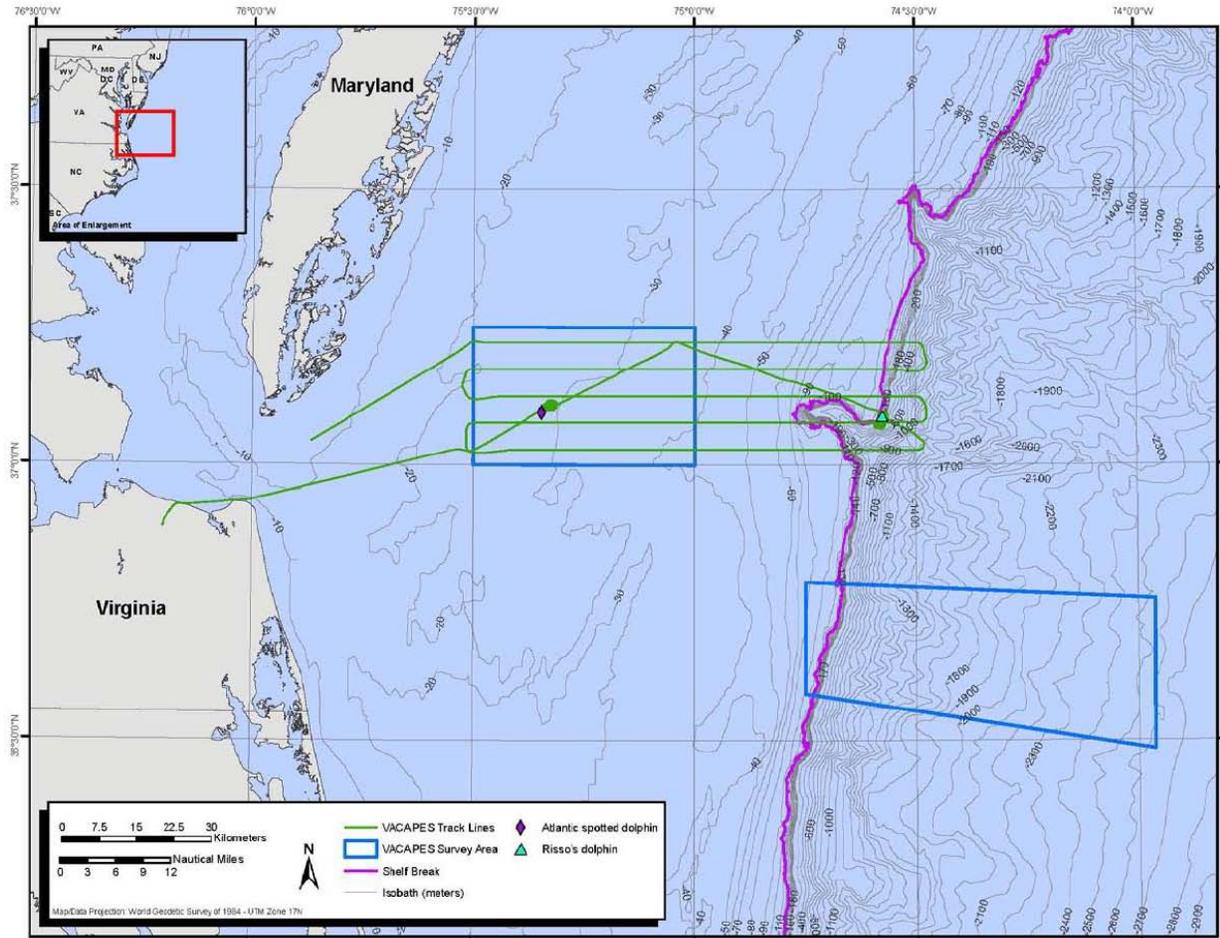


Figure I-6. Marine species sightings during FIREX aerial surveys conducted on 11 August 2010.

VACAPES MARINE MAMMAL OBSERVERS (MMOs)

Navy marine mammal biologists performed visual observation associated with the vessel surveys during a MINEX training event within the VACAPES Range Complex from 8-10 August 2010. Summary information regarding the visual observations obtained from the vessel surveys can be found in the previous section (VACAPES vessel visual surveys). For additional details see **Appendix A** for the 2010 VACAPES MINEX Event Trip Report.

VACAPES PASSIVE ACOUSTIC MONITORING (PAM)

Vessel surveys were conducted in association with a MINEX training event off the coast of Virginia Beach, Virginia (see VACAPES Vessel Visual Survey section). Passive acoustic buoys were deployed on 8-10 August before, during, and after the MINEX event to monitor marine mammal vocalization activity. Total successful recording time was approximately 14.5 hours, which includes 4 hours on 8 August, 7 hours on 9 August and 3.5 hours on 10 August.

A preliminary analysis was performed on the 9 August data using 1 minute spectrogram windows. Results showed marine mammal detections on all 3 of the buoys that successfully recorded. It does not appear that there were detections that occurred before the detonation, but there were detections found as early as 15 minutes following the detonation. As an example, **Figures I-7 and I-8** shows some whistles from buoy #1 that occurred 15 min 27 sec and 19 min 21 sec after the detonation, respectively. There were no visual sightings after the detonation to correspond with any of the acoustic data gathered.

At this time, no detailed analysis has been completed on the acoustic data set, other than a cursory visualization of the data; however, plans are in place to conduct a detailed analysis and any additional results that are found will be presented in the 2011 Monitoring Report.

In addition to passive acoustic monitoring, oceanographic sampling was also conducted by deploying Conductivity, Temperature and Depth (CTD) recorders on 9 and 10 August. This made it possible to calculate the sound velocity profiles for the monitoring area on both these days. For additional details, see **Appendix A** for the 2010 VACAPES MINEX Event Trip Report.

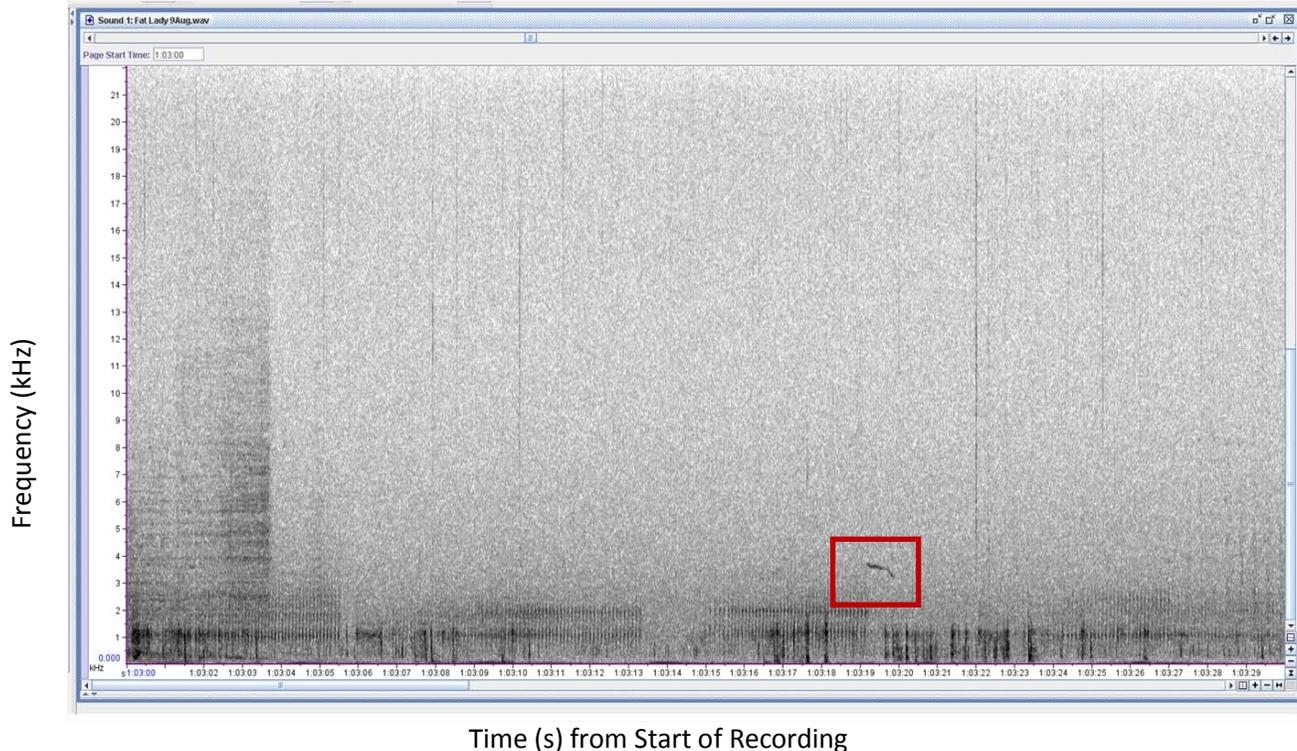


Figure I-7. Spectrogram of vocal detection from buoy #1 on 9 August 2010.

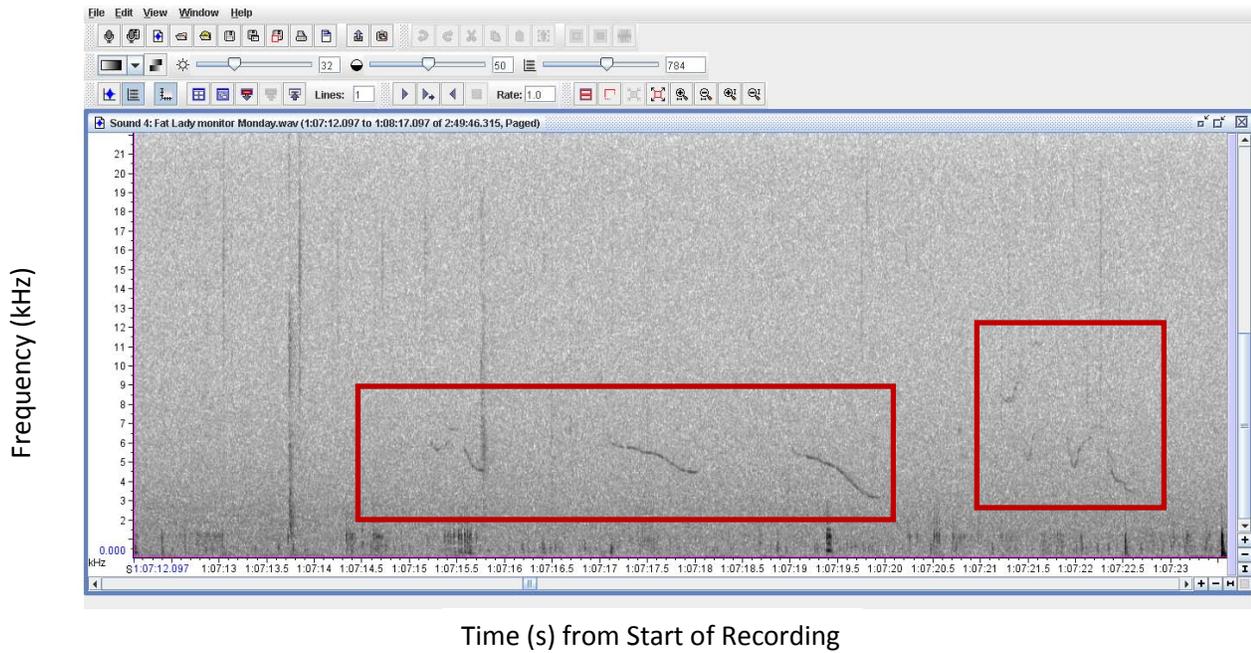


Figure I-8. Spectrogram of vocalizations prior to detonation on 9 August 2010.

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 (e.g., whales, dolphins, and porpoises), one pinniped species (e.g., true seal) and one sirenian species (e.g., 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 2010 monitoring objectives as initially agreed upon by the NMFS and Navy from the final CHPT Monitoring Plan.

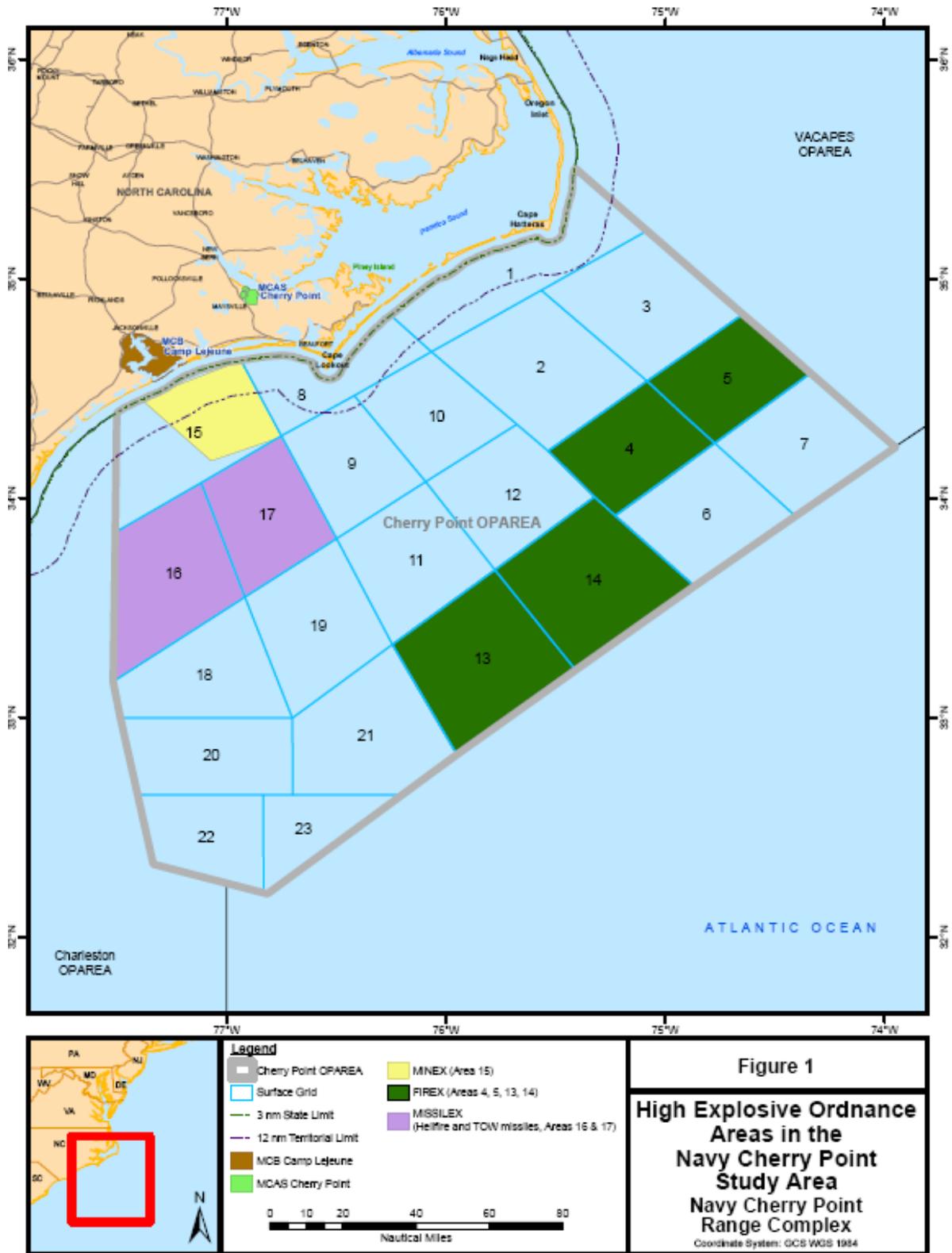


Figure II-1. CHPT Study Area.

Table II-1. 2010 CHPT monitoring obligations under CHPT Final Rule, LOA and BiOP

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 2011 (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 2010

From January 2010 – January 2011, there have been no monitoring opportunities available for explosive events in the CHPT OPAREA. Therefore, there is no monitoring to report at this time.

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 (e.g., whales, dolphins, and porpoises) and one sirenian species (e.g., 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 2010 monitoring objectives agreed upon by the NMFS and Navy from the final JAX Monitoring Plan.

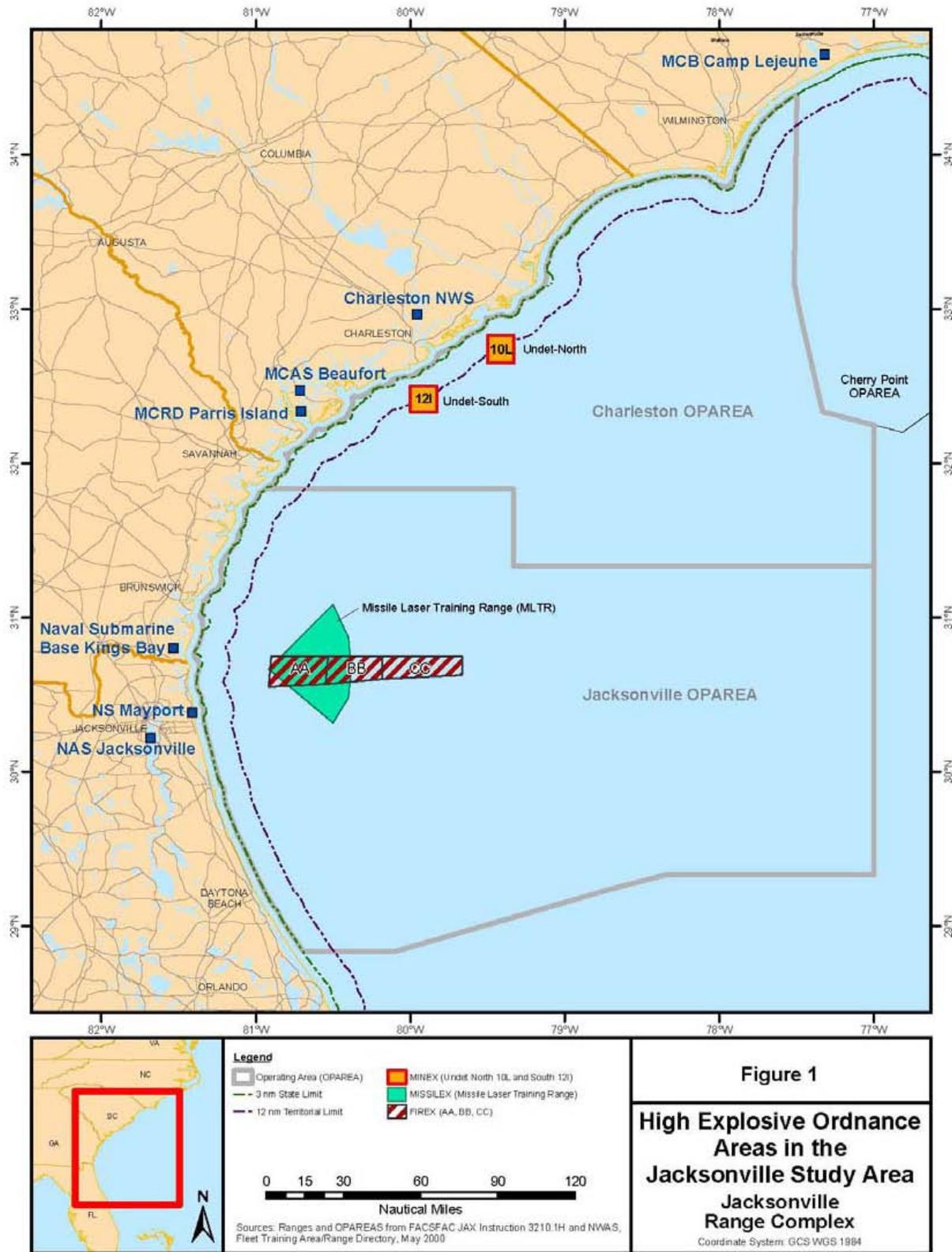


Figure III-1. JAX Study Area.

Table III-1. 2010 JAX monitoring obligations under JAX Final Rule, LOA and BiOP

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 2011 (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 2010

During 2010, USFF implemented aerial surveys within the MISSILEX (MLTR) box in conjunction with two Maverick missile exercise (MISSILEX) events, and the firing exercise (FIREX) (BB/CC) box in conjunction with two FIREX events.

Major accomplishments from the U.S. Fleet Forces’ 2010 compliance monitoring in the JAX study area include:

- Aerial Visual Surveys
 - Completed aerial surveys within the MISSILEX (MLTR) box before and after 2 Maverick MISSILEX events.
 - Completed aerial surveys within the FIREX (BB/CC) box before and after 2 FIREX events.
- Marine mammal observers
 - 3 MMOs were deployed during 1 of the FIREX events on a Navy ship.

Table III-2 presents a summary of the major accomplishments for Navy funded marine species monitoring within the JAX study area.

Table III-2. U.S. Navy funded monitoring accomplishments within the JAX study area from January 2010 to January 2011.

Study Type	Description of U.S. Navy EIS/LOA monitoring	Associated event type	MMPA/ESA requirement	Total accomplished
Vessel or aerial surveys –before and after event (study 1 and 2)	Aerial surveys during 2 MISSILEX events and aerial surveys during 2 FIREX events.	MINEX, MISSILEX, FIREX, or BOMBEX	2 events (1 multiple detonation event)	4 events (2 multiple detonation events)
Marine Mammal Observers (studies 1 and 2)	MMOs were visually surveying before, during and after 1 FIREX event.	MINEX, MISSILEX, or FIREX	1 event	1 event
Passive Acoustic Monitoring (study 2)	Not feasible for events monitored	MINEX, MISSILEX, FIREX, or BOMBEX	Deploy hydrophone array during vessel surveys when feasible	Not feasible for events monitored

JAX AERIAL VISUAL SURVEYS

Aerial surveys were conducted by HDR E²M in association with two Maverick MISSILEX events and two FIREX events off the coast of Florida. No injuries or mortalities of marine mammals or turtles were observed during the MISSILEX or FIREX training events.

Maverick MISSILEX Event

In conjunction with the Maverick MISSILEX events, line transect surveys were conducted on 8 and 9 August. One day prior to the event, on 8 August, a pre-event survey was completed; however, there were no sightings. On 9 August, two surveys were completed, one flown prior to and one flown after the events were completed. One sea turtle sighting occurred before the event, and 4 marine mammal sightings and 1 sea turtle sighting occurred after the event. A summary of the sightings on 9 August is presented in **Table III-3 and Figure III-2**. The scheduled 10 August survey was cancelled due to weather, so no additional post-event surveys could be conducted. For additional details see **Appendix C** for the 2010 JAX MAVEX Trip Report.

No injuries or mortalities of marine mammals or turtles were observed during the Maverick MISSILEX training event on 9 August. The first missile was fired at 1419 and the second missile was fired at 1501. **Table III-4** shows each of the marine species sightings that occurred on 9 August and estimates whether it was possible that the animals could have been in the detonation area when the missiles were fired. Using average swim speeds, 3 nm/hr for bottlenose dolphins and 0.75 nm/hr for loggerheads (Meylan, 1995), it was possible to estimate the time needed to travel the distance between where the animals were sighted and the detonation location. Based on the information in **Table III-4**, only the one sighting of bottlenose dolphins could have reasonably been able to travel to the detonation location within the time frame to potentially be exposed. However, there is no visual data to confirm whether this actually occurred.

Table III-3. Summary of marine species sightings from the aerial survey on 9 August.

Common Name	Scientific Name	# of Sightings	# of individuals
bottlenose dolphin	<i>Tursiops truncatus</i>	1	50
unidentified cetacean		3	13
loggerhead sea turtle	<i>Caretta caretta</i>	2	2

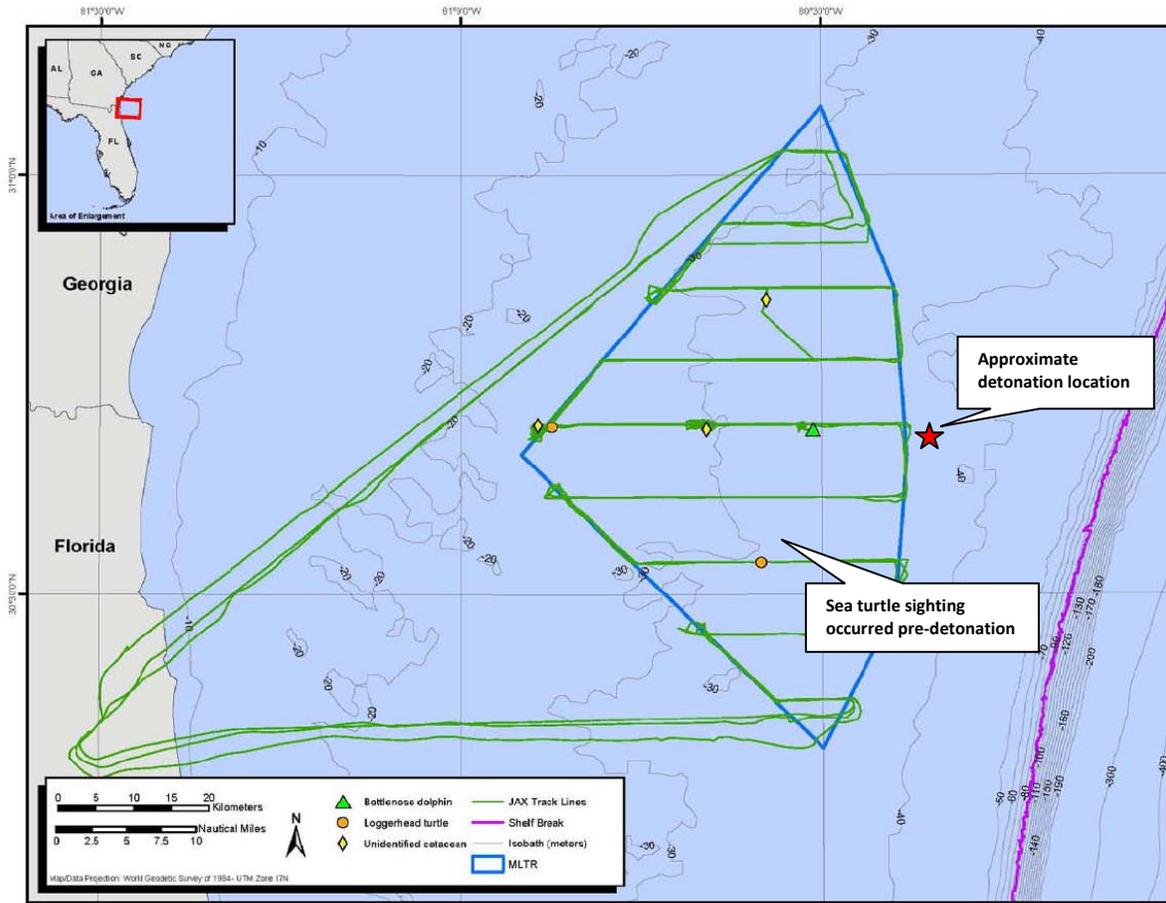


Figure III-2. Location of cetacean and sea turtle sightings seen during MISSILEX aerial surveys on 9 August.

Table III-4. Marine species sightings on 9 August in relation to the detonation site.

Species	Sighting Time	Distance from Detonation	Time Relative to Detonation	Time Needed to Travel Distance from Detonation
Loggerhead sea turtle	1002	~13 nm	4 hrs 17 min before 1 st missile and 4 hrs 59 min before 2 nd	17 hrs 20 min
Unidentified cetactean	1650	~17 nm	2 hrs 31 min after 1 st missile and 1 hr 49 min after 2 nd missile	5 hrs 40 min
Unidentified cetactean	1728	~27 nm	3 hrs 9 min after 1 st missile and 2 hr 27 min after 2 nd missile	9 hrs
Loggerhead sea turtle	1739	~26 nm	3 hrs 20 min after 1 st missile and 2 hr 38 min after 2 nd missile	34 hrs 40 min
Unidentified cetactean	1745	~16 nm	3 hrs 26 min after 1 st missile and 2 hr 44 min after 2 nd missile	5 hrs 20 min
Bottlenose dolphin	1803	~8 nm	3 hrs 44 min after 1 st missile and 3 hr 2 min after 2 nd missile	2 hrs 40 min

FIREX Events

For the FIREX events, aerial line transect surveys were conducted from 3-7 October. A summary of the sightings from 3-7 October is presented in **Table III-4**. Prior to the first event, pre-event surveys were completed on 3 and 4 October, with a total of 4 marine mammal sightings and 16 sea turtle sightings (see **Figure III-3**). For the first event, on 5 October, surveys were completed just prior to and post the event. No marine mammals were sighted on 5 October, but there were a total of 5 sea turtle sightings. However, it is important to note that Beaufort sea states were between 4 and 5 on 5 October, which made sighting animals difficult. For the second event, on 6 October, surveys were completed just prior to (which also acted as an additional post-survey for 5 October) and post the event. No marine mammals were sighted on 6 October, but there was 1 sea turtle sighting. Again, the Beaufort sea state was a 5 on 6 October, so sighting animals was extremely difficult. Sightings for 5 and 6 October are shown in **Figure III-4**. Following the events, an additional post-event survey was completed on 7 October, with a total of 2 marine mammal sightings and 12 sea turtle sightings (see **Figure III-5**). For additional details see Appendix D for the 2010 JAX IMPASS Gunnery Trip Report.

The 5 October FIREX event commenced at 0915, and a total of 48 inert rounds were fired. Since it was possible to collect all the necessary scoring data using inert rounds, no explosive rounds were ever fired. Therefore, no animals were exposed on 5 October.

For the 6 October FIREX event, the approximate detonation location is shown in **Figure III-4**, and the event occurred intermittently from 0915 to 1425. The loggerhead turtle sighting that occurred on 6 October was observed at 0908, only 7 minutes before the first round of firing commenced. This sighting was over 4 nm away from the detonation site, so the loggerhead turtle was not exposed to the first round of firing. The last round of firing ended by 1425; based on an average swim speed of 0.75 nm/hr (Meylan, 1995), the loggerhead could have traveled ~3.9 nm from the time the animal was sighted to the time when the event ended. Therefore, even if the loggerhead sea turtle was traveling directly towards the detonation location, which is extremely unlikely, it would not have made it within 600 yds of the detonation location by the time firing ceased. Therefore, it is highly unlikely that the loggerhead sighted would have been exposed.

Table III-5. Summary of marine species sightings from the aerial surveys from 3-7 October.

Common Name	Scientific Name	# of Sightings	# of individuals
Atlantic spotted dolphin	<i>Stenella frontalis</i>	3	100
Unidentified cetacean		3	8
loggerhead sea turtle	<i>Caretta caretta</i>	33	33
unidentified sea turtle		1	1

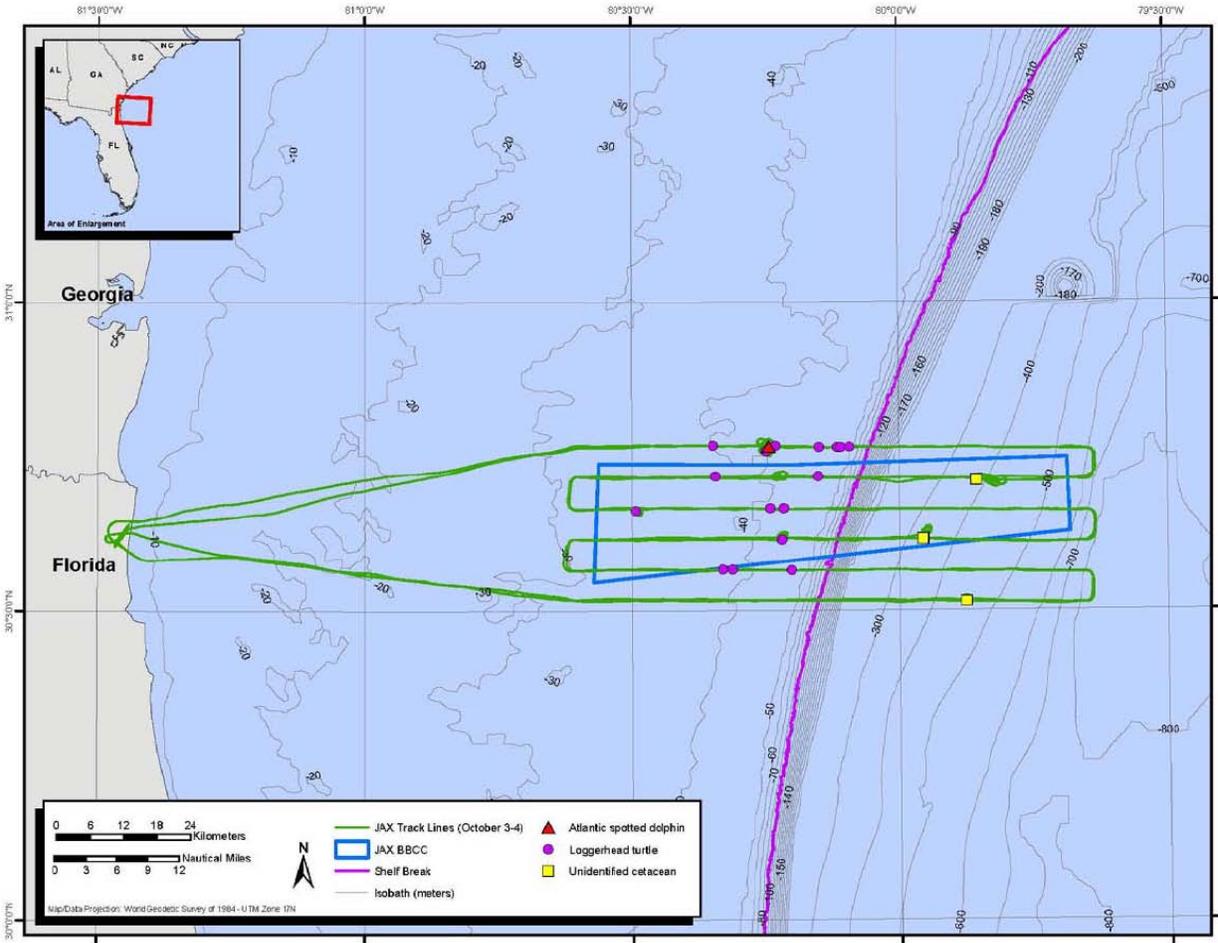


Figure III-3. Location of cetacean and sea turtle sightings seen during FIREX aerial surveys on 3-4 October.

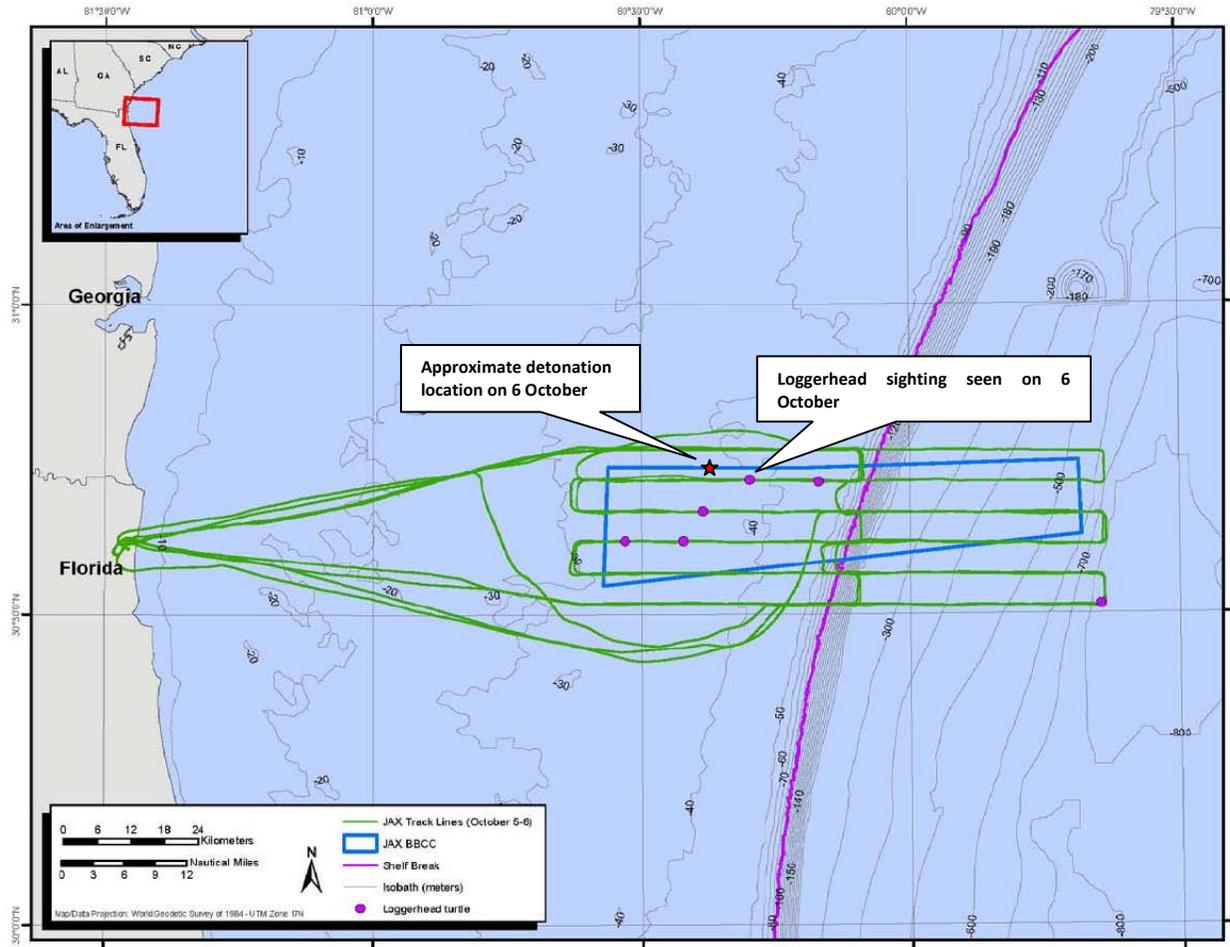


Figure III-4. Location of sea turtle sightings seen during FIREX aerial surveys on 5-6 October.

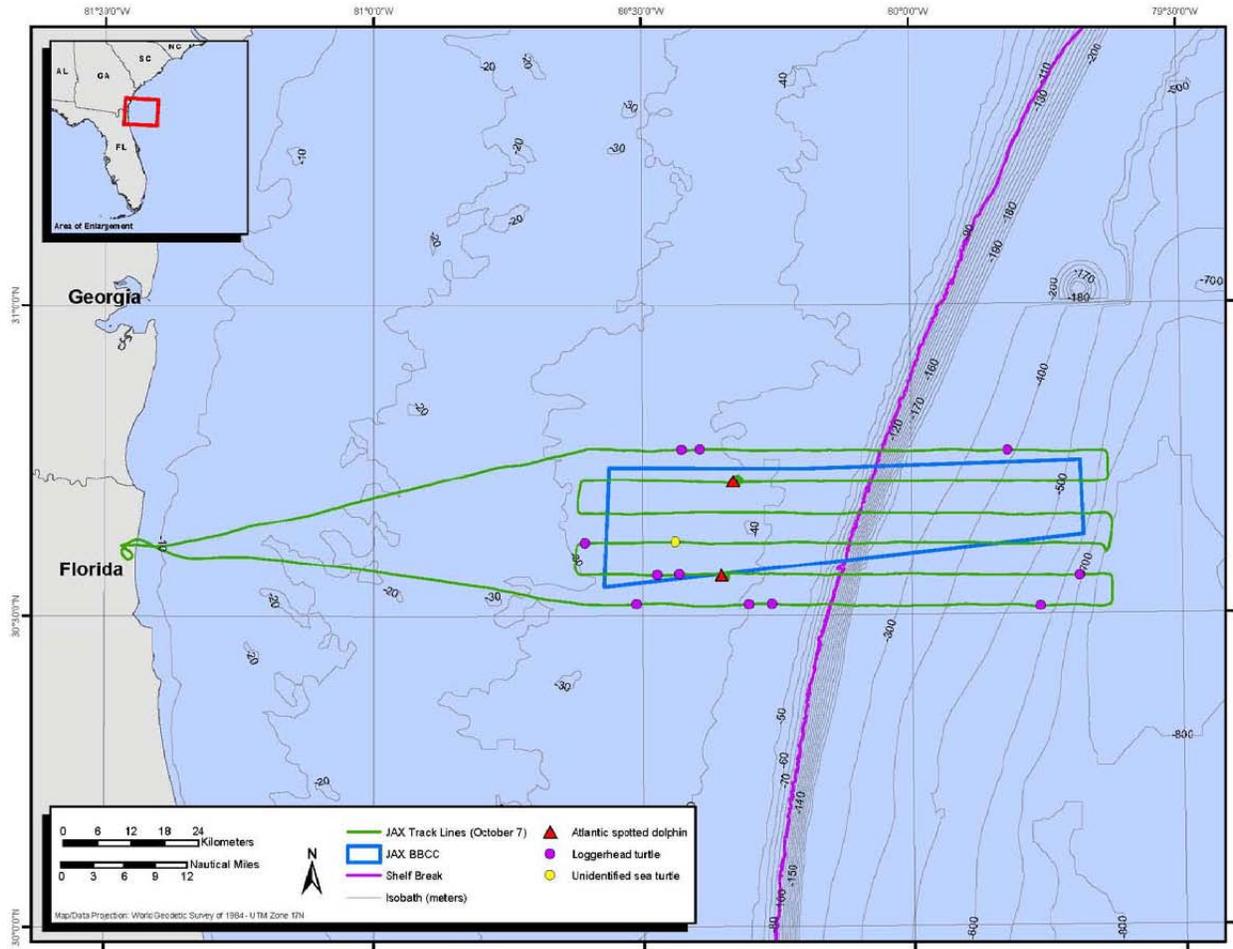


Figure III-5. Location of cetacean and sea turtle sightings seen during FIREX aerial surveys on 7 October.

JAX MARINE MAMMAL OBSERVERS (MMOs)

Navy marine mammal biologists performed visual observation aboard the Navy ship that conducted the 6 October FIREX event. The Navy MMOs were aboard the ship from 5-6 October. A summary of the sightings by the MMOs is presented in **Table III-6 and Figure III-6**. For additional details see **Appendix E** for the 2010 JAX FIREX Event MMO Trip Report.

The one bottlenose dolphin sighting occurred on 6 October during a break between the 1st and 2nd round of firing, and it was estimated to be approximately 68 yds from the vessel. The sighting was very brief, and no unusual behavior was observed. The area was monitored for 30 minutes, but the animal was not seen again and was assumed to have moved out of the area. Since the animal was not seen for 30 minutes within the 70 yd mitigation zone, the 2nd round of firing commenced. No additional marine mammal or sea turtle sightings were obtained within the mitigation zones (within 600 yds of the detonation site or within 70 yds of the vessel) during the FIREX. Due to the fact that no marine mammals or sea turtles were observed within the mitigation zones 30 minutes prior to or while gunfire occurred, there is no data to suggest that any animals were exposed to the event.

Table III-6. Summary of marine species sightings seen by Navy MMOs from on 6 October.

Common Name	Scientific Name	# of Sightings	# of individuals
bottlenose dolphin	<i>Tursiops truncatus</i>	1	1

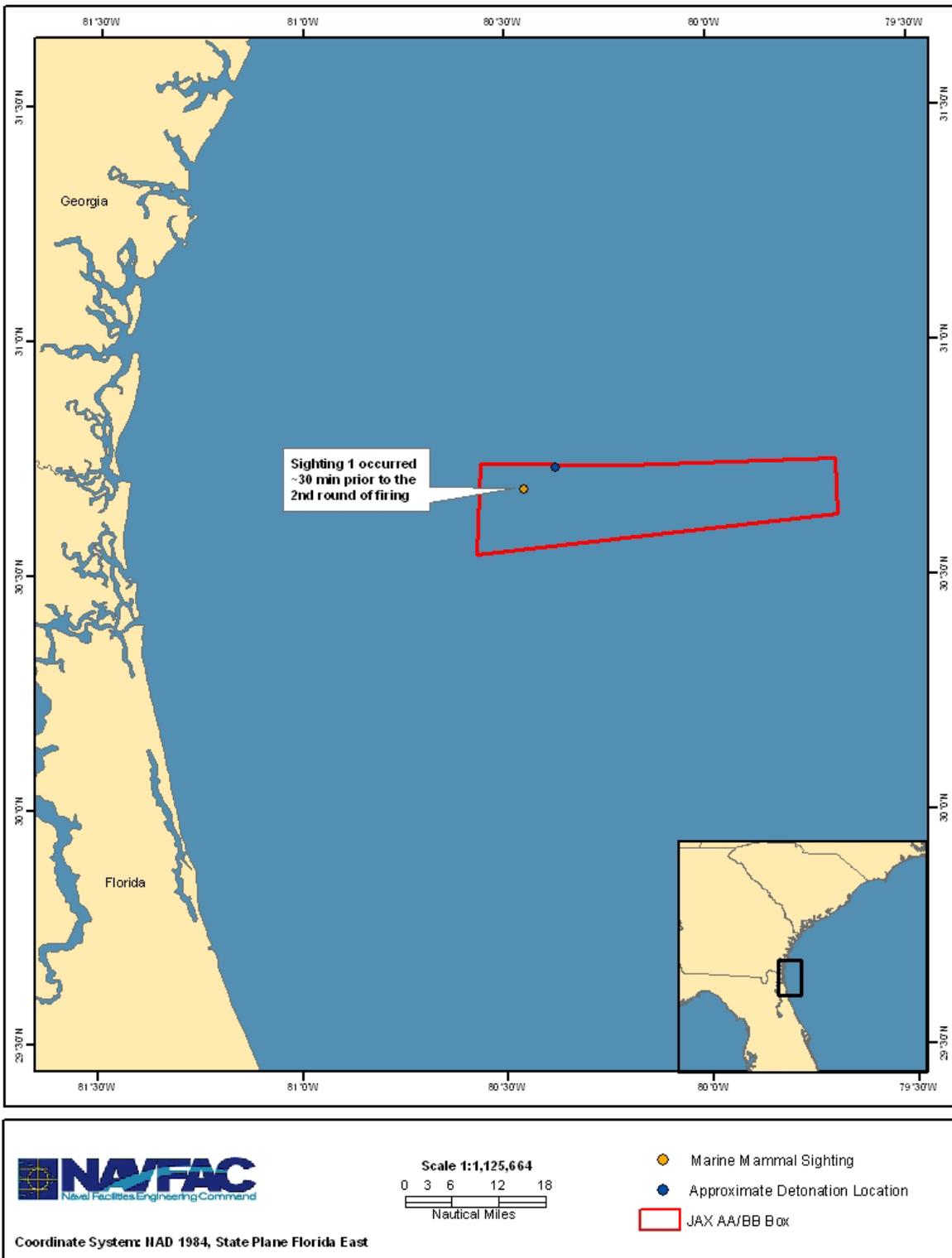


Figure III-6. Location of cetacean sighting seen by MMOs during FIREX on 6 October.

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, with the understanding that uncertainties exist. It provides managers the latitude to change direction as needed to improve the understanding of ecological systems while still achieving management objectives and taking proper 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 vessels 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

There are no additional modifications requested for the VACAPES Monitoring Plan as amended by the June 2010 LOA monitoring requirements.

CHPT Range Complex

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

JAX Range Complex

There are no additional modifications requested for the JAX Monitoring Plan as amended by the June 2010 LOA monitoring requirements.

Summary of current monitoring progress for VACAPES, CHPT, and JAX for Year 1 and Year 2 is shown below in **Table IV-1**.

Table IV-1 Summary of monitoring progress for Years 1 and 2.

Range Complex	Monitoring Event	Annual Requirement	Year 1 5 June 2009 - 4 June 2010	Year 2 5 June 2010 - 4 June 2011	Total	
					Required	Completed
VACAPES	Aerial or vessel survey	2 (1 MDE)	2 MINEX (with PAM)	1 MINEX (with PAM) 1 IMPASS (1MDE)	4 (2 MDE)	4 (1 MDE)
	MMO on Navy Platform	1	2 MINEX	1 MINEX	2	3
CHPT	Aerial or vessel survey	1	0	0	2	0*
	MMO on Navy Platform	1	0	0	2	0*
JAX	Aerial or vessel survey	2 (1 MDE)	0	2 MISSILEX 2 IMPASS (2 MDEs)	4 (2 MDE)	4 (2 MDE)
	MMO on Navy Platform	1	0	1 IMPASS	2	1

PAM = Passive Acoustic Monitoring

MDE = Multiple Detonation Event

MMO = Marine Mammal Observer

*no monitoring due to no training events being conducted

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DoN. 2009c. Jacksonville (JAX) Range Complex Monitoring Plan-Final 15 June 2009. Department of the Navy, Commander. U.S. Fleet Forces Command.

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NMFS. 2010c. Letter of Authorization, Taking Marine Mammals Incidental to U.S. Navy Training in the Cherry Point Range Complex, issued June 3, 2010.

Acknowledgements

Research Conducted By and Data Courtesy of:

Shipboard Surveys

CDR Carl Hager, LCDR John Woods
United States Naval Academy, Annapolis

Aerial Surveys

Dan Engelhaupt, Greg Fulling, and Mari Smultea
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Fleet Exercise Coordination

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SECTION 7: REFERENCES

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