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**Trip Report, July 2011 FIREX Marine Mammal  
Monitoring  
VACAPES Range Complex**

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### **List of Acronyms and Abbreviations**

CO	Commanding Officer
ft	feet
EST	Eastern Standard Time
FIREX	Firing Exercise
IMPASS	Integrated Maritime Portable Acoustic Scoring and Simulation System
km	kilometers
kts	knots (nautical miles per hour)
MMO	Marine Mammal Observer
nm	nautical miles
NMFS	National Marine Fisheries Service
PMAP	Protective Measures Assessment Protocol
VACAPES	Virginia Capes Range Complex
XO	Executive Officer
yd(s)	yards

## **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 Plans (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 effects 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 the Navy 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, four U.S. Navy MMOs (Ms. Sarah Bellau, Mr. Anu Kumar, Ms. Erin Swiader and Mr. Scott Haga) participated in a firing exercise (FIREX) with Integrated Maritime Portable Acoustic Scoring System (IMPASS) exercise on July 13-14. These MMOs were stationed aboard *USS THE SULLIVANS* (DDG 68). The primary goal of the FIREX 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: FIREX WITH IMPASS DESCRIPTION**

A FIREX involves bombardment of a target within an impact area by one or more ships. The scenario is as follows: the IMPASS is deployed by the firing ship and consists of five sonobuoys set in a pentagon-shaped arrangement at 1.3 km intervals. Within the ship’s combat system, the training system creates a virtual land mass that overlays the array and simulates land targets. The

ship then positions itself about 4 to 5 nm from the target area. The ship fires its ordnance into the target area; the sonobuoys detect the bearing to the acoustic noise resulting from the impact of a round landing in the water, and then transmit their GPS position and their bearing information to the ship. From the impact location data collected, the training system computer triangulates the exact point of impact of the round and, from those data, the exercise may be conducted as if the ship were firing at an actual land target. When the training is complete, the IMPASS buoy system is recovered by the ship. Inert ordnance was used in this FIREX with IMPASS event.

### SECTION 3: METHODS

#### 3.1. SHIPBOARD MARINE MAMMAL MONITORING

MMO surveys were conducted on a not-to-interfere basis, which means that the MMOs would not replace required Navy lookouts, would not dictate operational requirements/maneuvers, and would remove themselves from the bridge wing if necessary for *USS THE SULLIVANS* to accomplish its mission objectives. The only exception would be if a marine mammal was sighted by the MMO within the shut-down zone during the event (within 700 yds of the target for FIREX with IMPASS event) and was not sighted by the lookout, the MMO would report the sighting to the lookout for appropriate reporting and action.

The MMO survey was conducted on the bridge wing of *USS THE SULLIVANS*, with one MMO on each wing. During on-effort surveys, the MMOs would use the naked eye and 7X50 binoculars to scan the area from dead ahead to just abaft of the beam. In searching this area, the MMOs would start at the forward part of the sector and search aft. Binoculars were held so that the horizon was in the top third of the field of view. The field of view was scanned from the horizon towards the ship. Once the field of view was scanned, the binoculars were repositioned and the field of view was scanned again (Figure 1). Once the scan with the binoculars was completed, the eyes were rested for a few seconds and the entire sector was scanned with the naked eye.

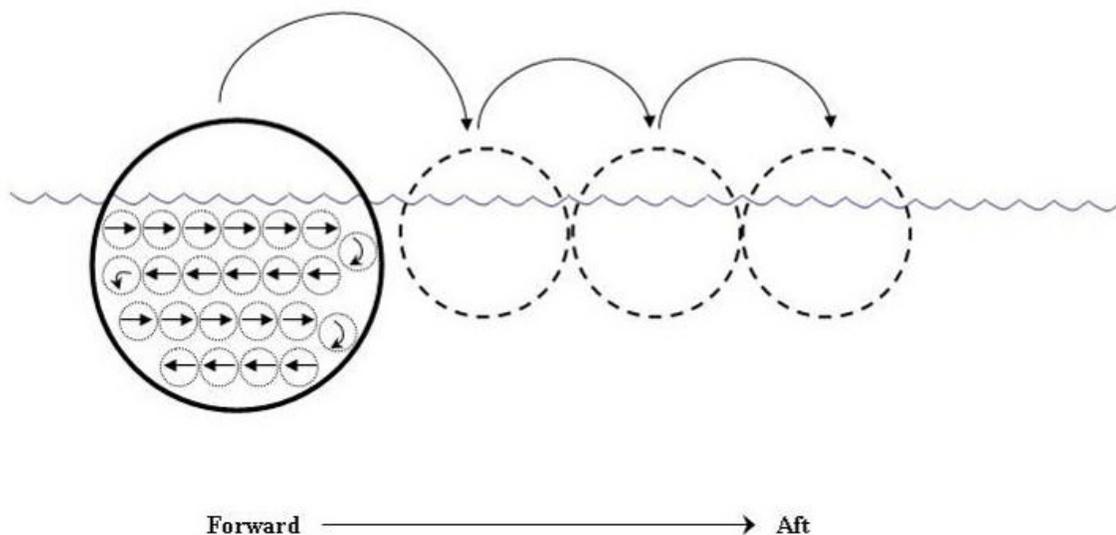


Figure 1. MMO Surface Searching Procedure

When an animal was visually detected the MMO would collect information on twenty-three sighting, environmental, and sonar parameters (Table 1). When practicable, still photographs were obtained by the MMO.

**Table 1. Shipboard MMO Data Category Descriptions**

Data Category	Description
<b>Sightings Information</b>	
Effort (on/off)	On effort means actively searching for marine mammals; time spent off effort could result from vacating the bridge wing for operational reasons.
Date	Format in mm/dd/yy.
Time	Time provided in Eastern Standard Time (EST).
Location	This is the location of the vessel at the time of the sighting, provided by monitors on the bridge.
Detection Sensor	Either visual or aural (if detected passively by the sonar technician) and which MMO observed the animal.
Species/Group	Determined by the MMO.
Group Size	Estimated by the MMO.
# Calves	Estimated by the MMO.
Bearing (true)	Estimated by the MMO.
Distance (yds)	Estimated by the MMO using reticled binoculars.
Length of contact	Estimated by the MMO.
<b>Environmental Information</b>	
Wave height (ft)	Estimated by the MMO.
Visibility	Estimated by the MMO.
BSS	Estimated by the MMO.
Swell direction (true)	Estimated by the MMO.
Wind direction (true)	Estimated by the MMO.
% glare	Estimated by the MMO.
% cloud cover	Estimated by the MMO.
<b>Operational Information</b>	
Active sonar in use?	Specifically refers to MFAS.
Explosives in use?	This refers to whether an explosive event occurred within the monitoring rotation, not necessarily whether an explosion occurred at the specific time of the sighting.
Direction of ship travel	Provided by monitors on the bridge.
Animal motion	Estimated by the MMO.
Behavior	<u>Individual behaviors:</u> breach, porpoise, spin, bowride, feeding, head slap, social, tail slap, pectoral fin slap, other <u>Whale behaviors:</u> blow, no blow rise, fluke up, peduncle arch, unidentified large splash <u>Group behaviors:</u> rest, mill, travel, surface active travel, surface active mill
Mitigation implemented	If explosives in use, the measures implemented, if any, by the vessel.
Comments	Other comments as necessary.

### 3.2. SCHEDULE OF EVENTS

*USS THE SULLIVANS* departed Yorktown, Virginia, on 13 July at approximately 1500 Eastern Standard Time (EST). A FIREX with IMPASS using the 5 inch guns (bow) was conducted on 14 July, followed by the ship returning the IMPASS team and MMOs to Rudee Inlet, Virginia. A detailed schedule of events is provided below in Table 2.

**Table 2. Schedule of Events**

13 July	
Time	Notes
1500	<i>USS THE SULLIVANS</i> underway
1600	MMOs testing equipment/tour of vessel
1800	MMOs participate in IMPASS brief

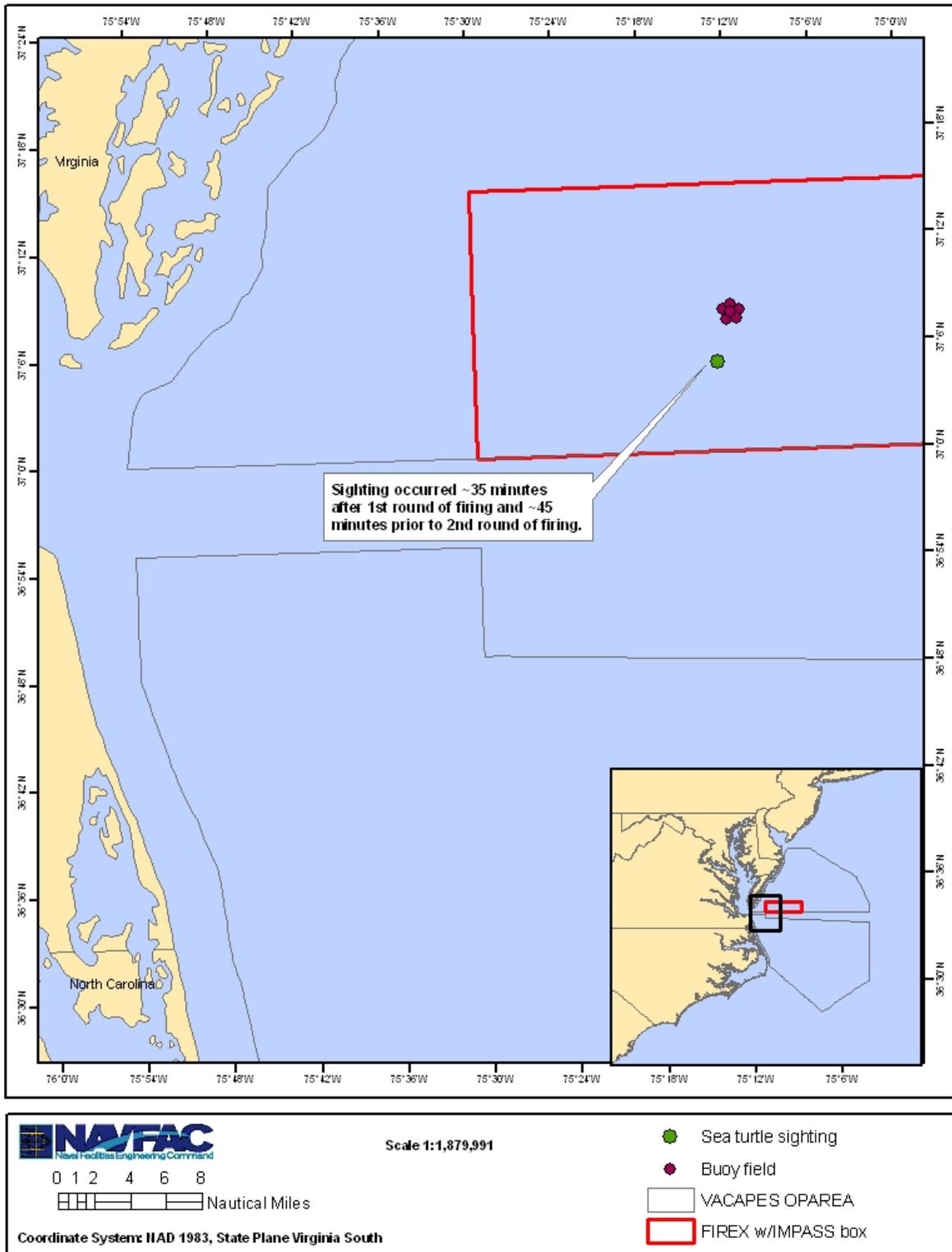
14 July	
Time	Notes
0705	MMOs on effort / Buoy deployment begins
0749	FIREX begins
1144	MMOs off effort
1158	MMOs on effort
1302	FIREX ends / Buoy recovery begins
1312	MMOs off effort
1700	IMPASS team / MMOs return to Rudee Inlet

## SECTION 4: RESULTS

One marine species sighting, of a hardshell turtle, was recorded by the MMOs (Table 3). The sighting as well as the buoy field location is shown on Figure 2.

**Table 3. Marine Species Sightings Data**

Data Category	Sighting 1
<b>Sightings Information</b>	
Effort (on/off)	on
Date	07/14/2011
Time	08:44
Location	37°05.112'N 075°13.583'W
Detection Sensor	Visual - Naked Eye
Species/Group	Hardshell Turtle
Group Size	1
# Calves	0
Bearing (true)	340°
Distance (yds)	60
Length of contact	?
<b>Environmental Information</b>	
Wave height (ft)	4-6
Visibility	unrestricted
BSS	4
Swell direction (true)	From NE
Wind direction (true)	NE
% glare	50%
% cloud cover	20%
<b>Operational Information</b>	
Active sonar in use?	no
Explosives in use?	no
Direction of ship travel	160°
Animal motion	parallel
Behavior	traveling
Mitigation implemented	N/A
Comments	Animal was sighted by an MMO on the bridge while firing was not occurring during RHIB recovery of a malfunctioning IMPASS buoy. Sighting occurred approximately 35 minutes after the completion of the 1 <sup>st</sup> round of firing, and 45 minutes prior to the start of the 2 <sup>nd</sup> round of firing. The area was clear when the 2 <sup>nd</sup> round of firing commenced.



**Figure 2. Sea Turtle Sighting and Buoy Field Location**

## SECTION 5: CONCLUSION

### 5.1. MARINE MAMMAL MONITORING

The goal of the FIREX 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?

Because inert ordnance was used in this IMPASS event, there was no potential for exposure of marine mammals and sea turtles to explosives. One sea turtle sighting was obtained by *USS THE SULLIVANS* MMOs during the FIREX. The sighting occurred during RHIB recovery of a malfunctioning IMPASS buoy and was estimated to be approximately 60 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 2<sup>nd</sup> round of firing was able to commence. The 2<sup>nd</sup> round of firing commenced approximately 45 minutes after the animal was sighted (15 minutes after the mitigation zone requirements were met). 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 inert ordnance during the event.

2. If so, at what levels?

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 are no data to suggest that any animals were exposed to inert ordnance during the event.

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

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 are no data to suggest that any animals were exposed to inert ordnance during the event.

## 5.2. LESSONS LEARNED

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

### 5.2.1. Shipboard Marine Mammal Monitoring

- Methods are needed to continue to improve the close-aboard distance estimation by MMOs. Reticled binoculars are used for longer distance sightings; this method is not useful for close aboard sightings. Suggest that MMOs practice close-aboard distance estimation if possible.
- Previous MMO trips have only consisted of two or three Navy MMOs. For this trip, there were four Navy MMOs so that one could be a data recorder, two could observe, and one would be on break. Having a fourth MMO allowed everyone to have a break every fourth hour. It is recommended that a minimum of four MMOs go on all trips, if feasible.

### 5.2.2. Operational Information

- MMOs attended the pre-exercise brief with the IMPASS team, which eliminated confusion regarding timing and sequence of events. MMOs presented the purpose of their monitoring during the brief and cleared up confusion about their intentions. MMOs explained the VACAPES MMPA and ESA permit requirements and importance of environmental compliance as rationale for the MMO embark. This information was received well by the CO and XO. It is recommended that this continue to be done in the future.
- Coordination for this event went fairly smoothly and we were able to work out getting on the ship for the necessary time to complete the monitoring associated with the event. Need to continue to improve pre-planning coordination between operators and MMOs to ensure that monitoring opportunities and data gathering are maximized.

## SECTION 6: ACKNOWLEDGEMENTS

We thank the officers and crew of *USS THE SULLIVANS* (DDG 68) for their outstanding support and hospitality during this cruise and Mr. Dennis Emhoff (RCST) for pre-planning coordination.

## SECTION 7: REFERENCES

- DoN. 2009. Virginia Capes (VACAPES) Range Complex Monitoring Plan-Final 15 June 2009. Department of the Navy, Commander. U.S. Fleet Forces Command.
- NMFS. 2010. Letter of Authorization, Taking Marine Mammals Incidental to U.S. Navy Training in the Virginia Capes Range Complex, issued June 3, 2010.