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**Trip Report, July 2013 Integrated Anti-submarine
Warfare Course Marine Mammal Monitoring
Cherry Point Range Complex**

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List of Acronyms and Abbreviations

°	degree(s)
AFAST	Atlantic Fleet Active Sonar Training
BSS	Beaufort Sea State
CHPT	Cherry Point
dB	decibel(s)
DDG	guided missile destroyer
EDT	Eastern Daylight Time
ESA	Endangered Species Act
ft	feet
GPS	global positioning system
IAC	Integrated Anti-Submarine Warfare Course
km	kilometer(s)
kts	knot(s) (nautical miles per hour)
MFAS	mid-frequency active sonar
min	minute(s)
MMO	marine mammal observer
MMPA	Marine Mammal Protection Act
nm	nautical mile(s)
NMFS	National Marine Fisheries Service
OPAREA	Operating Area
PTS	permanent threshold shift
RHIB	rigid hull inflatable boat
TTS	temporary threshold shift
U.S.	United States
yd	yards

SECTION 1: INTRODUCTION

In order to train with mid-frequency active sonar (MFAS), the United States (U.S.) Navy must obtain a permit from the National Marine Fisheries Service (NMFS) under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). The Atlantic Fleet Active Sonar Training (AFAST) Monitoring Plan (U.S. Department of the Navy 2009), finalized in January 2009, was developed with NMFS to comply with the requirements under the permits obtained for MFAS training (National Marine Fisheries Service 2012).

The AFAST Monitoring Plan is one component of the overall effort the U.S. Navy is undertaking to understand its potential effects and the biological consequences of those effects to protected marine species. For the Integrated Anti-Submarine Warfare Course (IAC) using MFAS, the AFAST Monitoring Plan has been designed as a collection of focused “studies” to gather data that will allow the U.S. Navy to address the following questions:

1. Are marine mammals and sea turtles exposed to MFAS, especially at levels associated with adverse effects (i.e., based on NMFS’ criteria for behavioral harassment, temporary threshold shift [TTS], or permanent threshold shift [PTS])? If so, at what levels are they exposed?
2. If marine mammals and sea turtles are exposed to MFAS in the western North Atlantic or Gulf of Mexico (or “AFAST Study Area”), do they redistribute geographically as a result of continued exposure? If so, how long does the redistribution last?
3. If marine mammals and sea turtles are exposed to MFAS, what are their behavioral responses to various levels?
4. Is the U.S. Navy’s suite of mitigation measures for MFAS (e.g., Protective Measures Assessment Protocol, major exercise measures agreed to by the U.S. Navy through permitting) effective at avoiding TTS, injury, and mortality of marine mammals and sea turtles?

In addition to the AFAST Monitoring Plan, the U.S. Navy has developed an Integrated Comprehensive Monitoring Program that provides the overarching framework for coordination of the U.S. Navy’s Monitoring Program. During an Adaptive Management Review in 2010, the “study questions” above were determined to be too general for practical application. Top-level goals were further refined as follows:

- An increase in our understanding of the likely occurrence of marine mammals and/or ESA-listed marine species in the vicinity of the action (i.e., presence, abundance, distribution, and/or density of species);
- An increase in our understanding of the nature, scope, or context of the likely exposure of marine mammals and/or ESA-listed species to any of the potential stressor(s) associated with the action (e.g., tonal and impulsive sound), through better understanding of one or more of the following: 1) the action and the environment in which it occurs (e.g., sound source characterization, propagation, and ambient noise levels); 2) the affected species (e.g., life history or dive patterns); 3) the likely co-occurrence of marine mammals and/or ESA-listed marine species with the action (in whole or part) associated with specific adverse effects, and/or; 4) the likely biological or behavioral context of exposure to the stressor for the marine mammal and/or ESA-listed marine species (e.g., age class of exposed animals or known pupping, calving or feeding areas);

- An increase in our understanding of how individual marine mammals or ESA-listed marine species respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible, e.g., at what distance or received level);
- An increase in our understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: 1) the long-term fitness and survival of an individual; or 2) the population, species, or stock (e.g., through effects on annual rates of recruitment or survival);
- An increase in our understanding of the effectiveness of mitigation and monitoring measures;
- A better understanding and record of the manner in which the authorized entity complies with the Incidental Take Authorization and Incidental Take Statement;
- An increase in the probability of detecting marine mammals (through improved technology or methods), both specifically within the safety zone (thus allowing for more effective implementation of the mitigation) and in general, to better achieve the above goals; and
- A reduction in the adverse impact of activities to the least practicable level, as defined in the MMPA.

In order to support these top-level goals, data are to be collected through various means, including contracted vessel and aerial surveys, passive acoustics, and placing marine mammal observers (MMOs) aboard U.S. Navy assets.

As part of this data collection effort, three U.S. Navy MMOs (Ms. Sarah Rider, Ms. Jackie Bort, and Mr. Joel Bell) participated in an IAC on 23 – 25 July 2013. These MMOs were stationed aboard a guided missile destroyer (DDG), the *USS CARNEY* (DDG 64). The primary goal of the IAC monitoring effort was to collect data on marine mammals and sea turtles observed during MFAS use and to answer the following questions:

1. Which species are present in the vicinity of the IAC?
2. Are marine mammals and sea turtles exposed to MFAS?
3. If marine mammals and sea turtles are exposed to MFAS, what are their behavioral responses to various levels?

A secondary goal for the monitoring was to familiarize the MMOs with at-sea U.S. 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: INTEGRATED ANTI-SUBMARINE WARFARE COURSE DESCRIPTION

The IAC is a tailored course of instruction designed to improve Sea Combat Commander and strike group integrated anti-submarine warfare warfighting skill sets. IAC is a coordinated training scenario that typically involves five surface ships, two to three embarked helicopters, a submarine and one maritime patrol aircraft searching for, locating, and attacking one submarine.

The scenario consists of two 12-hour events that occur five times per year. The submarine may practice simulated attacks against the ships while being tracked. Hull-mounted, towed array and dipping sonar is employed by ships and helicopters. Any participating submarine also periodically operates its sonar. IAC is an intermediate level training event and can occur in conjunction with other major exercises.

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 U.S. Navy Lookouts; would not dictate operational requirements or maneuvers; and would remove themselves from the bridge wing if necessary for the *USS CARNEY* to accomplish its mission objectives. The only exception would be if a marine mammal was sighted by the MMO within the mitigation zones during MFAS (power down sonar by 6 decibels [dB] within 1,000 yards [yd], power down an additional 4 dB within 500 yd, and shut down within 200 yd of the ship) 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 the *USS CARNEY*, with one MMO on each wing and a third person responsible for recording data. MMOs rotate through the three positions approximately every hour. 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.

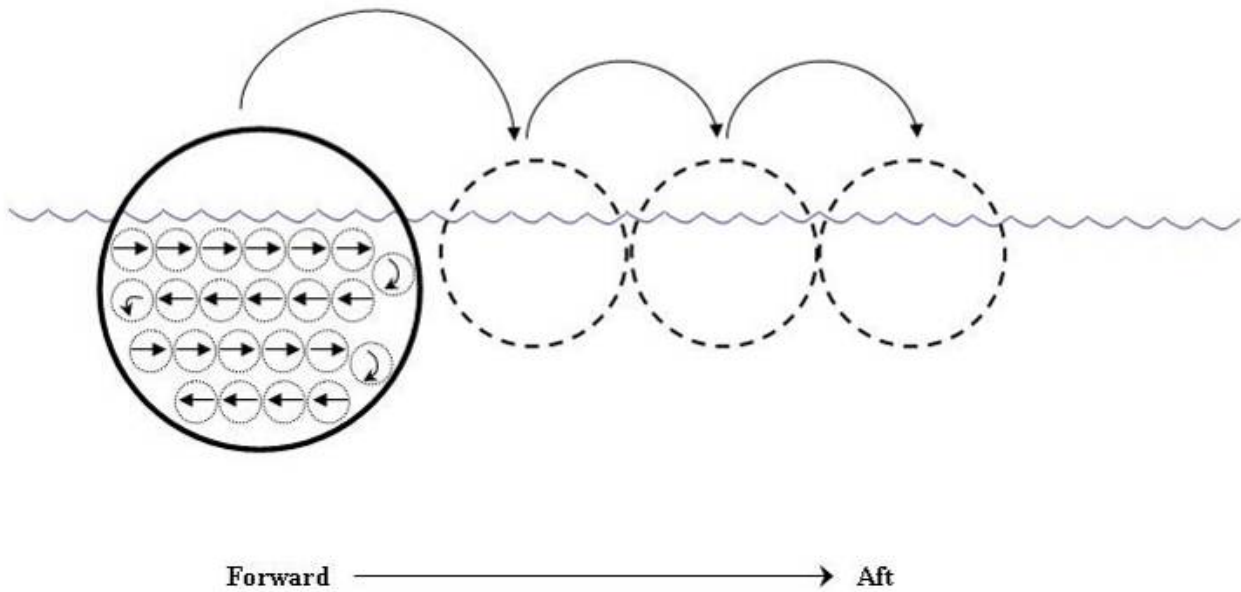


Figure 1. MMO Surface Searching Procedure

When an animal was visually detected the MMO would collect information on 23 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
Sightings Information	
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 Daylight Time (EDT)
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 (yd)	Estimated by the MMO using reticled binoculars. MMOs considered every tick mark as one reticle in the field.
Length of contact	Estimated by the MMO.
Environmental Information	
Wave height (feet [ft])	Estimated by the MMO.
Visibility	Estimated by the MMO.
Beaufort Sea State (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.
Operational Information	
Active sonar in use?	Specifically refers to mid-frequency active sonar (MFAS).
Direction of ship travel	Provided by monitors on the bridge and verified with global positioning system (GPS) ship track data.
Animal motion	Estimated by the MMO.
Behavior	<u>Individual behaviors:</u> breach, porpoise, spin, bow ride, 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 MFAS in use, the measures implemented, if any, by the vessel.
Comments	Other comments as necessary.

3.2. SEQUENCE OF EVENTS

MMOs were transported from Morehead City, North Carolina to the *USS CARNEY* by rigid hull inflatable boat (RHIB) on 22 July at approximately 1830 Eastern Daylight Time (EDT). The IAC exercise was conducted continuously from 23 – 25 July 2013 in the Cherry Point (CHPT) Operating Area (OPAREA). A detailed sequence of events is provided in **Table 2**.

Table 2. Sequence of Events

23 July		24 July	
Time	Notes	Time	Notes
0820	MMOs on effort	1119	MMOs on effort (morning storms)
0854	MMOs off effort (rain storm)	1202	MMOs off effort (lunch)
0902	MMOs on effort	1328	MMOs on effort
1141	MMOs off effort (lunch)	1708	MMOs off effort
1342	MMOs on effort		
1503	MMOs off effort (rain storm)		
1547	MMOs on effort		
1649	MMOs off effort (dinner)		
1743	MMOs on effort		
1905	MMOs off effort		

25 July	
Time	Notes
1321	MMOs on effort (morning storms)
1454	MMOs off effort
1506	MMOs on effort
1703	MMOs off effort (dinner)
1729	MMO on effort
1905	MMOs off effort

SECTION 4: RESULTS

MMOs recorded environmental information when beginning effort, at each observer rotation, and when conditions notably changed. A majority (46%) of observation time was spent in a BSS four, although sea states ranging from three to six were recorded.

Three marine species sightings (two marine mammal sightings and one sea turtle sighting) were recorded by the MMOs (**Table 3**) throughout the three days of observation. **Figure 2** provides the estimated locations of the animals at the time of the sighting based on distance and bearing from the ship's global positioning system (GPS) coordinates.

Table 3. Marine Species Sightings Data

Data Category	Sighting 1	Sighting 2	Sighting 3
Sightings Information			
Effort (on/off)	On	On	On
Date	7/23/2013	7/24/2013	7/25/2013
Time	11:08:09	13:53:18	18:59:12
Location	33.61444 -74.85806	33.56250 -75.12667	33.32667 -76.90528
Detection Sensor	Visual - Joel	Visual - Jackie	Visual - Sarah
Species/Group	Pilot whale	Unidentified hardshell turtle	Unidentified dolphin
Group Size (best/max/min)	1/1/1	1/1/1	1/1/1
# Calves	0	N/A	0
Bearing (true)	75°	170°	115°
Distance (yd)	875 yd	586 yd	1,458 yd
Length of contact	6 min	< 1 min	< 1 min
Environmental Information			
Wave height	Moderate (4-6 ft)	Moderate (4-6 ft)	Light (0-3 ft)
Visibility	Good (10-15 km)	Good (10-15 km)	Good (10-15 km)
BSS	4	5	3
Swell direction (true)	50°	65°	140°
Wind direction (true)	180°	211°	284°
% glare	0%	0%	20%
% cloud cover	50%	75%	10%
Operational Information			
Active sonar in use?	No	No	Yes
Direction of ship travel	41°	90°	165°
Animal motion	Closing/Parallel	Parallel	Parallel
Behavior	Traveling	None	Traveling
Mitigation implemented	N/A	N/A	No
Comments	Observed 4-5 breaths. Closing initially and then traveling parallel to the ship when last sighted (486 yd).	Turtle sighted with binoculars; saw head and carapace for a few seconds.	Sonar on, but sighting was outside of the mitigation zone.

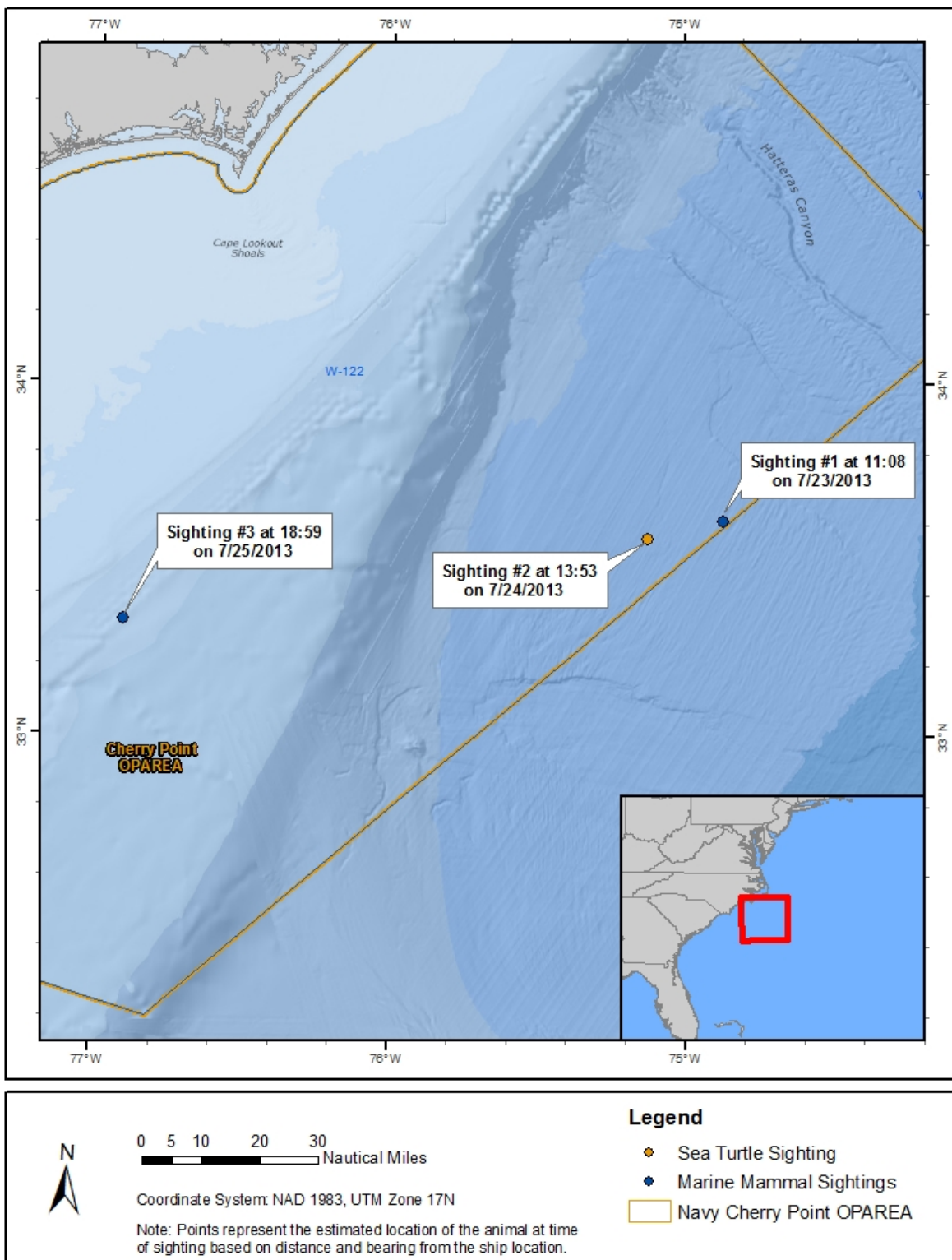


Figure 2. Sighting Locations

SECTION 5: CONCLUSION

5.1. MARINE SPECIES MONITORING

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

1. What species are present in the vicinity of the IAC?

Species observed during the IAC included a pilot whale (not visually identifiable to species, but most likely a short-finned pilot whale, *Globicephala macrorhynchus*, based on location and season), an unidentified dolphin, and an unidentified hardshell turtle.

2. Are marine mammals and sea turtles exposed to MFAS?

The sightings of the pilot whale and unidentified hardshell turtle occurred when MFAS was not in use. The unidentified dolphin was observed when MFAS was in use. Although the dolphin was not sighted within the mitigation zones, it is possible that the dolphin may have been exposed at levels that could result in behavioral disturbance.

3. If marine mammals and sea turtles are exposed to MFAS, what are their behavioral responses to various levels?

The sighting of the unidentified dolphin was very brief. The animal was sighted 50 degrees relative to the bow on the port side of the vessel, approximately 1,500 yd away, and seemed to be traveling parallel to the vessel. No atypical behavior or change in behavior was observed.

5.2. LESSONS LEARNED

A few lessons learned were noted for the IAC, as outlined below:

- Personnel transfer during embark was conducted in deteriorating sea conditions. Conditions were evaluated as safe to operate the RHIB to shore; however, conditions changed after picking up shore personnel, and RHIBs were operating at the upper limit of their capabilities while traveling back to the ship. Future MMOs should be cognizant of changing weather conditions and should not be intimidated to refuse transfer in conditions where they feel there is a safety concern. Due to safety of personnel, completing MMO passenger transfers from RHIB to ship in BSS five or higher is not recommended.
- Periods of inclement weather provided valuable “off effort” opportunities for MMOs to discuss U.S. Navy mitigation requirements, environmental compliance responsibilities, and answer questions from Lookouts related to marine species monitoring.
- Periods of inclement weather also provided valuable opportunities for MMOs to learn more about the IAC scenario with the training instructors and officers on the bridge.
- Requesting a copy of the Plan of the Day is useful in understanding the various evolutions occurring more or less continuously throughout the exercise.

SECTION 6: ACKNOWLEDGEMENTS

We thank the officers and crew of the *USS CARNEY* (DDG 64) for their outstanding support and hospitality during this cruise and Mr. Dennis Emhoff (RCST) for pre-planning coordination.

SECTION 7: REFERENCES

- National Marine Fisheries Service. 2012. Letter of Authorization, Taking Marine Mammals Incidental to U.S. Navy Training Activities Conducted as Part of the Atlantic Fleet Active Sonar Training (AFAST) in the Atlantic Ocean and Gulf of Mexico, valid January 22, 2012 to January 22, 2014. National Marine Fisheries Service, Silver Spring, MD.
- U.S. Department of the Navy. 2009. Atlantic Fleet Active Sonar Training (AFAST) Monitoring Plan—Final. January 2009. Department of the Navy, Commander, U.S. Fleet Forces Command, Norfolk, VA.