

**Cruise Report, Marine Mammal Monitoring
ASWEX
Jacksonville Range Complex**

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Prepared for:
Commander, United States Fleet Forces Command



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List of Acronyms and Abbreviations

AFAST	Atlantic Fleet Active Sonar Training
ASWEX	antisubmarine warfare exercise
ft	feet
MFAS	mid-frequency active sonar
MMO	Marine Mammal Observer
NMFS	National Marine Fisheries Service
yd(s)	yards

SECTION 1: INTRODUCTION

In order to train with mid-frequency active sonar (MFAS) and 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 Atlantic Fleet Active Sonar Training (AFAST) and Jacksonville Range Complex Monitoring Plans, finalized in January 2009 and June 2009, respectively, were developed with NMFS to comply with the requirements under the permits obtained for MFAS and explosives training. For the Antisubmarine Warfare Exercise (ASWEX) using MFAS, the AFAST Monitoring Plan has been designed as a collection of focused “studies” to gather data that will allow us to address the following questions:

1. Are marine mammals and sea turtles exposed to mid-frequency active sonar (MFAS), especially at levels associated with adverse effects (i.e., based on NMFS’ criteria for behavioral harassment, TTS, or PTS)? If so, at what levels are they exposed?
2. If marine mammals and sea turtles are exposed to MFAS in the Northwestern 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 Navy’s suite of mitigation measures for MFAS (e.g., Protective Measures Assessment Protocol, major exercise measures agreed to by the Navy through permitting) effective at avoiding TTS, injury, and mortality of marine mammals and sea turtles?

In addition to the AFAST Monitoring Plan, the Navy has developed an Integrated Comprehensive Monitoring Program that provides the overarching framework for coordination of the 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 is 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, three United States (U.S.) Navy MMOs (Ms. Amy Farak, Ms. Tara Moll, and Mr. Scott Haga) participated in an Antisubmarine Warfare Exercise (ASWEX) on 29 May – 01 June 2012. These MMOs were stationed aboard the *USS Halyburton* (FFG 40). The primary goal of the ASWEX monitoring effort was to collect data on marine mammals and sea turtles observed during MFAS use and to answer the following questions:

1. What species are present in the vicinity of the ASWEX?
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 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: ASWEX DESCRIPTION

ASWEX is designed to provide an environment for a submarine, surface ship, and aircraft to conduct training in a realistic scenario. This training provides a venue to develop standardized tactics, techniques and procedures, as well as to promote interoperability and develop coalition building and multi-lateral security cooperation.

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 the *USS Halyburton* 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 MFAS (within 200 yards [yds] 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 Halyburton*, with one MMO on each wing. During on-effort surveys, the MMOs would use the naked eye and 7X50 powered 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.

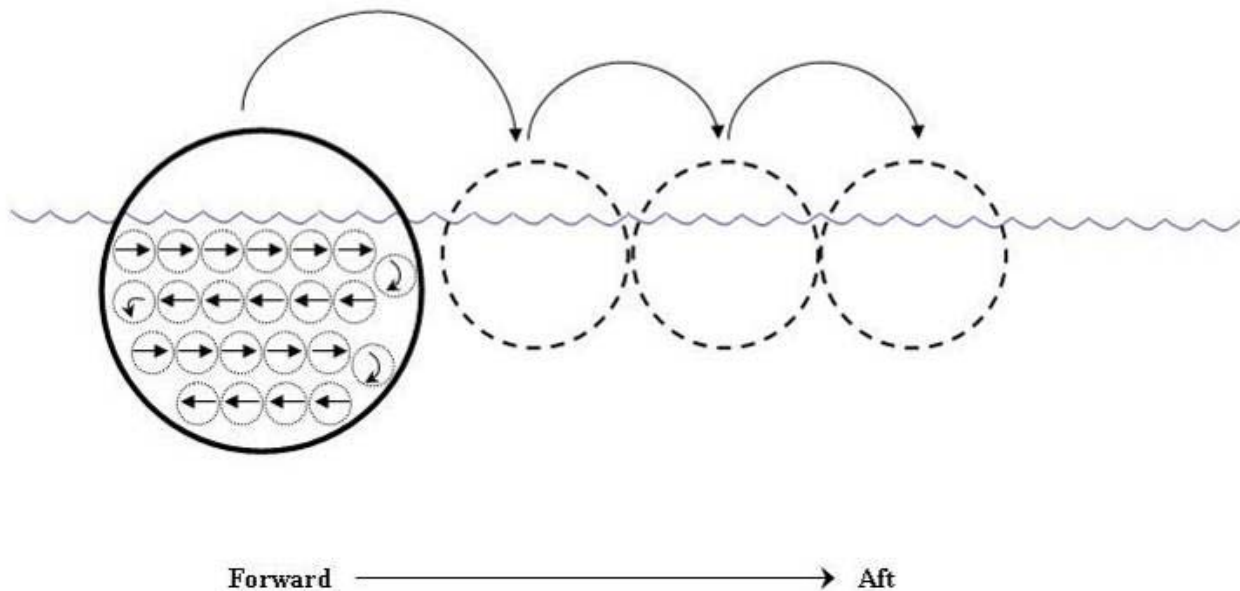


Figure 1. MMO Surface Searching Procedure

When an animal was visually detected the MMO would collect information on twenty-three sighting, environmental, and sonar parameters (Table 1). When practicable, still photography was 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 Standard Time
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. MMOs considered half-reticle marks, but converted to each line = 1 reticle for conversion to yards.
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.
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 MFAS.
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 MFAS in use, the measures implemented, if any, but the vessel.
Comments	Other comments as necessary.

3.2. SCHEDULE OF EVENTS

USS Halyburton departed Mayport, Florida, on 29 May at 0915 Eastern Standard Time. The ASWEX was conducted from 30 May – 1 June. During this time, a Brazilian submarine, U.S. helicopters, and U.S. fixed-wing aircraft joined in the ASWEX. A detailed schedule of events is provided below in Table 2.

Table 2. Schedule of Events

29 May		30 May	
Time	Notes	Time	Notes
0700	MMOs embark <i>USS Halyburton</i>	0705	MMOs on effort
0915	<i>USS Halyburton</i> underway	1200	MMOs off effort
1223	MMOs on effort	1300	MMOs on effort
1624	MMOs off effort	1700	MMOs off effort
1800	Brief to Commanding Officer	1800	MMO on effort
		2000	MMOs off effort

31 May		01 June	
Time	Notes	Time	Notes
0705	MMOs on effort	0730	MMOs on effort
1157	MMOs off effort	1128	MMOs off effort
1302	MMOs on effort	1300	MMOs on effort
1700	MMOs off effort	1500	MMOs off effort
1800	MMO on effort	1715	<i>USS Halyburton</i> returned to port
1946	MMOs off effort		

SECTION 4: RESULTS

MMOs recorded ship positions and environmental information when beginning effort and at each observer rotation. A majority (35.57%) of time observing was spent in a Beaufort Sea State 2, though sea states up to 4 were recorded (Figure 2). Gathering ship positional data allows for a rough ship track to be identified (Figure 3).

Thirteen marine mammal and eight sea turtle sightings were recorded by the MMOs (Table 3 through Table 7). Additionally, one marine mammal sighting was provided by the lookout. Figure 3 provides the ship locations at each animal sighting. A majority of the marine mammal sightings were Atlantic spotted dolphins. Most of the sea turtle sightings were of unidentified hardshell sea turtles, although there were confirmed sightings of loggerhead sea turtles.

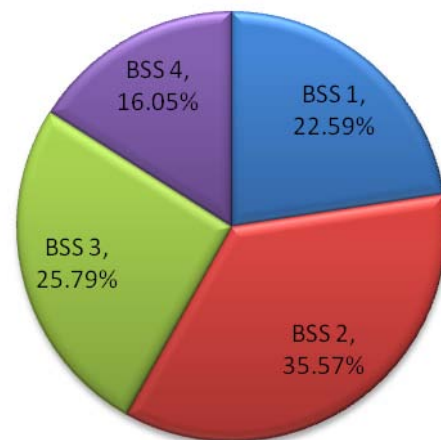


Figure 2. Beaufort Sea States (BSS) Observed

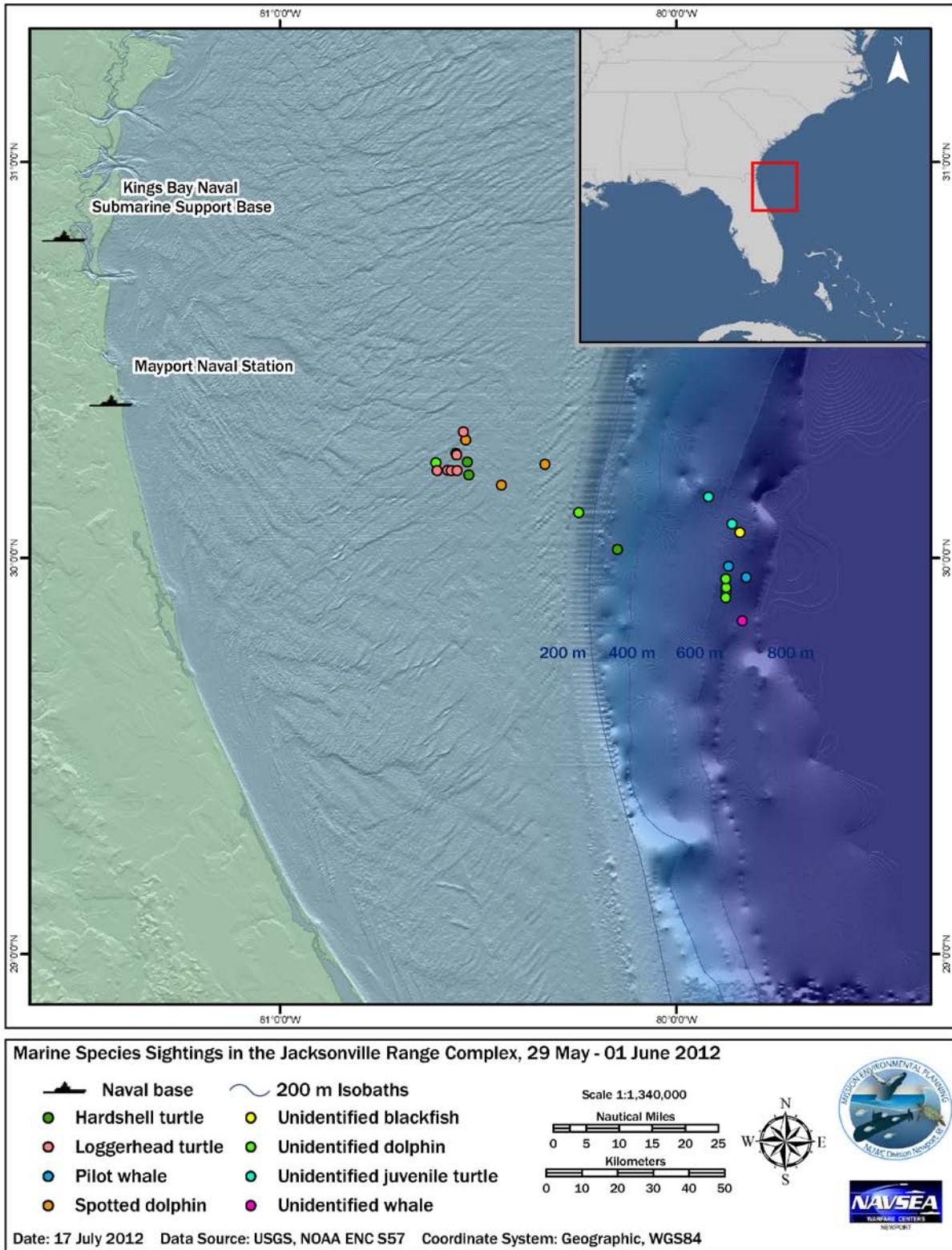


Figure 3. Vessel Locations at Sighting and Position Reports

Table 3. Marine Species Sightings Data

Data Category	Sighting 1	Sighting 2	Sighting 3	Sighting 4	Sighting 5	Sighting 6	Sighting 7
Waypoint	103	109	111	116	117	119	121
Sightings Information							
Effort (on/off)	On	On	On	On	On	On	On
Date	5/29/2012	5/30/2012	5/30/2012	5/30/2012	5/30/2012	5/30/2012	5/30/2012
Time	1409	836	943	1303	1328	1402	1505
Location	30.29793 N 080.53139 W	30.20979 N 080.52386 W	30.24286 N 080.52703 W	30.26439 N 080.55601 W	30.26052 N 080.55448 W	30.31866 N 080.53719 W	30.24009 N 080.60629 W
Detection Sensor	MMO (Farak/Haga)	MMO (Farak)	MMO (Haga)	MMO (Haga/Moll)	MMO (Moll)	MMO (Farak)	MMO (Haga/Farak)
Species/Group	spotted dolphin	hardshell turtle	hardshell turtle	spotted dolphin	loggerhead turtle	loggerhead turtle	unidentified dolphins
Group Size (best/max/min)	10/12/8	1/1/1	1/1/1	3/4/2	1/1/1	1/1/1	2/2/2
# Calves	0	0	0		0	0	0
Bearing	bowriding	300	340	295	20	0	340
Distance (yds)	5	50	1.7	500	20	10	732
Length of contact	11 min	N/A	N/A				
Environmental Information							
Wave height (ft)	M	L	L	L	L	L	L
Visibility	M	M	M	M	M	G	G
BSS	4	3	3	3	3	2	2
Swell direction (true)		295		280	280	248	
Wind direction (true)	170	290	290	350	350	170	
% glare	0%	5%	8%	3%	3%	0%	0%
% cloud cover	90%	68%	55%	13%	13%	5%	23%
Operational Information							
Active sonar in use?	No	No	No	No	No	No	No
Direction of ship travel	NNE	N	N	S	30	0	60
Animal motion	parallel	parallel	parallel	closing	parallel		closing
Behavior	bowriding	traveling	traveling	bowriding	resting	resting	traveling
Mitigation implemented	N/A	N/A	N/A	N/A			
Comments	Distance listed as "bowriding" on datasheet; included as 5 yds here.		turtle identified as 18-24" long; multiple turtles may be present throughout Sargassum		turtle identified as 1.5' length		MMO distance of 5 reticles; converted post-survey.

Wave Height: L = light (0-3 ft), M = moderate (4-6 ft), H = high (> 6 ft)

Visibility: B = bad (<0.5 km), P = poor (0.5-1.5 km), M = moderate (1.5-10 km), G = good (10-15 km), E = excellent (>15 km)

Table 4. Marine Species Sightings Data (Cont.)

Data Category	Sighting 8	Sighting 9	Sighting 10	Sighting 11	Sighting 12	Sighting 13
Waypoint	123	124	125	126	129	130
Sightings Information						
Effort (on/off)	On	On	On	On	On	On
Date	5/30/2012	5/30/2012	5/30/2012	5/30/2012	5/30/2012	5/30/2012
Time	1604	1622	1626	1636	1817	1830
Location	30.22085 N 080.60389 W	30.22117 N 080.57703 W	30.22095 N 080.56829 W	30.22055 N 080.55311 W	30.18380 N 080.44086 W	30.2366 N 080.33148 W
Detection Sensor	MMO (Moll)	MMO (Haga)	MMO (Moll)	MMO (Haga)	MMO (Farak)	MMO (Moll)
Species/Group	loggerhead turtle	loggerhead turtle	loggerhead turtle	loggerhead turtle	spotted dolphin	spotted dolphin
Group Size (best/max/min)	1/1/1	1/1/1	1/1/1	1/1/1	10/14/8	2//
# Calves	0	0	0			-
Bearing	20	270	90	250	30	359
Distance (yds)	1	22	20	40	20 then 400	2
Length of contact		N/A	N/A	N/A		N/A
Environmental Information						
Wave height (ft)	L	L	L	L	L	L
Visibility	G	G	G	G	G	G
BSS	2	2	2	2	1	1
Swell direction (true)	250	250	250	250	128	128
Wind direction (true)	220	220	220	220	111	111
% glare	0%	0%	0%	0%	50%	50%
% cloud cover	30%	30%	30%	30%	10%	10%
Operational Information						
Active sonar in use?	No	No	No	No	No	No
Direction of ship travel	90	90	90	90	90	90
Animal motion	opening	parallel	parallel	parallel	closing	parallel
Behavior	dove	traveling	dove	dove	bowriding	traveling
Mitigation implemented						N/A
Comments	Animal first approached ship, then turned away and dove.			Rose to the surface for a few seconds then dove. At least 2' length.	20 yards at first sighting, then crossed under the bow and departed.	sighted near bow and moved aft

Wave Height: L = light (0-3 ft), M = moderate (4-6 ft), H = high (> 6 ft)

Visibility: B = bad (<0.5 km), P = poor (0.5-1.5 km), M = moderate (1.5-10 km), G = good (10-15 km), E = excellent (>15 km)

Table 5. Marine Species Sightings Data (Cont.)

Data Category	Sighting 14	Sighting 15	Sighting 16	Sighting 17
Waypoint	132	141	142	143
Sightings Information				
Effort (on/off)	On	On	On	On
Date	5/30/2012	5/31/2012	5/31/2012	5/31/2012
Time	1940	1319	1349	1357
Location	30.11489 N 080.24634 W	30.15389 N 079.91846 W	30.08592 N 079.85878 W	30.06465 N 079.83960 W
Detection Sensor	MMO (Farak)	MMO (Haga)	MMO (Farak)	MMO (Farak)
Species/Group	unidentified dolphin	unidentified juvenile turtle	unidentified juvenile turtle	unidentified blackfish
Group Size (best/max/min)	2/4/2	1/1/1	1/1/1	2/2/2
# Calves	0	0	0	
Bearing	340	30	330	345
Distance (yds)	2040	2	10	536
Length of contact	N/A	N/A	N/A	
Environmental Information				
Wave height (ft)	L	L	L	L
Visibility	G	G	G	G
BSS	1	1	1	1
Swell direction (true)		N/A	N/A	N/A
Wind direction (true)		350	350	350
% glare	0%	0%	0%	0%
% cloud cover	20%	0%	0%	0%
Operational Information				
Active sonar in use?	No	No	No	No
Direction of ship travel	90	270	270	
Animal motion	parallel	parallel	parallel	parallel
Behavior	traveling	traveling	traveling	traveling
Mitigation implemented	N/A	N/A	N/A	
Comments	Distance identified as 1.5 reticles; conversion to yards conducted post-survey.	likely loggerhead approx 6" long		relatively large, black animals. One surfacing (slow) for entire length of FFG. Bigger than spotted dolphins we have seen. Quick view of dorsal did not seem pilot whale-like. Distance identified as 7 reticles; conversion to yards conducted post-survey.

Wave Height: L = light (0-3 ft), M = moderate (4-6 ft), H = high (> 6 ft)

Visibility: B = bad (<0.5 km), P = poor (0.5-1.5 km), M = moderate (1.5-10 km), G = good (10-15 km), E = excellent (>15 km)

Table 6. Marine Species Sightings Data (Cont.)

Data Category	Sighting 18	Sighting 19	Sighting 20	Sighting 21	Sighting 22
Waypoint	145	147	150	151	152
Sightings Information					
Effort (on/off)	On	On	On	On	On
Date	5/31/2012	5/31/2012	5/31/2012	5/31/2012	5/31/2012
Time	1439	1550	1803	1839	1839
Location	29.95095 N 079.82343 W	29.97893 N 079.86774 W	29.84105 N 079.83392 W	29.91674 N 079.87363 W	29.92612 N 079.87394 W
Detection Sensor	MMO (Haga)	MMO (Farak)	Lookout	MMO (Moll)	MMO (Haga)
Species/Group	pilot whale	pilot whale	unidentified whale	unidentified dolphin	unidentified dolphin
Group Size (best/max/min)	2/2/2	3/4/3	1/ /	1/1/1	2/2/2
# Calves	0	0			
Bearing	290	340	285	45	270
Distance (yds)	2040	700		200	1154
Length of contact					
Environmental Information					
Wave height (ft)	L	L	L	L	L
Visibility	G	G	G	G	G
BSS	1	1	1	1	1
Swell direction (true)	N/A	N/A	N/A	N/A	N/A
Wind direction (true)	350	350	355	355	355
% glare	0%	0	15%	15%	15%
% cloud cover	8%	40	45%	45%	45%
Operational Information					
Active sonar in use?	No	No	No	No	No
Direction of ship travel	180	350	270		
Animal motion	parallel	opening/closing		parallel	parallel
Behavior	traveling	traveling	dove	traveling	traveling
Mitigation implemented		N/A			
Comments	Probable pilot whale. Saw 1 blow, then 2 dorsals. Traveling in direction of ship. Distance identified as 1.5 reticles; conversion to yards conducted post-survey.	Probable pilot whales. Crossed in front of vessel.	starboard LO saw animals through big eyes on port side. MMO did not see the animal	a white splotch was seen on the side of the animal, but could not identify it.	Distance identified as 3 reticles; conversion to yards conducted post-survey.

Wave Height: L = light (0-3 ft), M = moderate (4-6 ft), H = high (> 6 ft)

Visibility: B = bad (<0.5 km), P = poor (0.5-1.5 km), M = moderate (1.5-10 km), G = good (10-15 km), E = excellent (>15 km)

Table 7. Marine Species Sightings Data (Cont.)

Data Category	Sighting 23	Sighting 24	Sighting 25
Waypoint	153	155	159/160
Sightings Information			
Effort (on/off)	On	On	On
Date	5/31/2012	5/31/2012	6/1/2012
Time	1844	1933	940
Location	29.94738 N 079.87487 W	29.90019 N 079.87489 W	30.02140 N 080.14791 W
Detection Sensor	MMO (Moll)	MMO (Farak)	MMO (Moll)
Species/Group	unidentified dolphin	unidentified dolphin	hardshell turtle
Group Size (best/max/min)	6/8/5	1/1/1	1/1/1
# Calves			
Bearing	20	40	290
Distance (yds)	200	1623	20
Length of contact			
Environmental Information			
Wave height (ft)	L	L	L
Visibility	G	M	M
BSS	1	2	3
Swell direction (true)	N/A	N/A	N/A
Wind direction (true)	355	149	250
% glare	15%	0%	0%
% cloud cover	45%	100%	100%
Operational Information			
Active sonar in use?	No	No	No
Direction of ship travel			
Animal motion	parallel	closing	parallel
Behavior	traveling	traveling	dove
Mitigation implemented			
Comments	Animals were not spotted. It dove like a pilot whale, but seemed only slightly bigger than a spotted dolphins.	Distance identified as 2 reticles; conversion to yards conducted post-survey.	Hit the waypoint twice, hence 159/160.

Wave Height: L = light (0-3 ft), M = moderate (4-6 ft), H = high (> 6 ft)

Visibility: B = bad (<0.5 km), P = poor (0.5-1.5 km), M = moderate (1.5-10 km), G = good (10-15 km),
 E = excellent (>15 km)

SECTION 5: CONCLUSION

5.1. MARINE MAMMAL MONITORING

The goal of the ASWEX 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 ASWEX?

Species observed during the ASWEX included spotted dolphins (most likely Atlantic spotted dolphins, *Stenella frontalis*), pilot whales (*Globicephala* spp.), and loggerhead turtles (*Caretta caretta*). Additional sightings could not be identified to species.

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

During the brief period of MFAS use, no marine mammals or sea turtles were observed, and therefore were not expected to be exposed to MFAS.

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

As no marine mammals or sea turtles were observed during MFAS use, no determinations regarding behavioral responses can be made.

5.2. LESSONS LEARNED

A few lessons learned were noted for the ASWEX, as identified below:

- Updated Effort and Sightings forms would be beneficial. Some data fields are related to the Lookout Effectiveness Study, and are not required for other MMO cruises. The general format of the Lookout Effectiveness Study forms is preferred, as it allows more data to be collected per sheet of paper. Recommended updates will be provided to NAVFAC Atlantic for consideration.
- FFGs are the smallest of the surface combatants used for MMO data collection. As such, collecting environmental data (e.g., wind speed and direction) from a congested pilot house can be difficult while ensuring we do not interfere with shipboard operations. As such, FFGs are not a preferred platform for conducting data collection; however, it is recognized that data collection must occur on platforms that are available.
- Although it is not a requirement, it would be beneficial on future ASW cruises to discuss saving acoustic data with the ASWO when possible. The *USS Halyburton* had the TACTASS deployed while a group of unidentified blackfish traveled past the hydrophones. Post sighting discussion with the Sonar Technicians on watch at the time confirmed that acoustics from the pod were observed, but not saved. Acoustic data may have helped identify the species.

SECTION 6: ACKNOWLEDGEMENTS

We thank the officers and crew of the *USS Halyburton* (FFG 40) for their outstanding support and hospitality during this cruise and Ms. Mandy Shoemaker (NAVFAC Atlantic) for pre-planning coordination.