

May 2016

Cruise Report, Marine Species Monitoring & Lookout Effectiveness Study

Fleet Exercise, March-April 2016, Jacksonville Range Complexes



Prepared for:
Commander, United States Fleet Forces Command



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List of Acronyms and Abbreviations

BSS	Beaufort Sea State
DDG	United States Navy guided missile destroyer
DMMO	data marine mammal observer
ESA	Endangered Species Act
ft	foot (feet)
hr	hour(s)
ICMP	Integrated Comprehensive Monitoring Program
JAX	Jacksonville Range Complex
LMMO	liaison marine mammal observer
LO	Lookout
m	meter(s)
min	minute(s)
MFAS	mid-frequency active sonar
MMO	marine mammal observer
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
SMMO	survey marine mammal observer
U.S.	United States
yd	yard(s)

SECTION 1 INTRODUCTION

In order to train with mid-frequency active sonar (MFAS), the United States (U.S.) Navy has obtained a permit from the National Marine Fisheries Service (NMFS) under the Marine Mammal Protection Act (MMPA) and a Biological Opinion under the Endangered Species Act (ESA). The Navy conducts monitoring within Navy Range Complexes and testing ranges, guided by the Integrated Comprehensive Monitoring Program (ICMP), as required under the MMPA and the ESA (Department of the Navy 2010).

The ICMP provides the overarching framework for coordination of the U.S. Navy Marine Species Monitoring Program (Department of the Navy 2010). The ICMP outlines objectives for marine species monitoring and U.S. Navy-funded research relating to the effects of Naval training and testing activities on protected marine species (Department of the Navy 2010). The ICMP includes the following scientific objectives (Department of the Navy 2010):

1. monitor and assess the effects of Navy activities on protected marine species;
2. ensure that data collected at multiple locations is collected in a manner that allows comparison between and among different geographic locations;
3. assess the efficacy and practicality of the monitoring and mitigation techniques; and
4. add to the overall knowledge base of protected marine species and the effects of Navy activities on these species.

In order to address these objectives, data would be collected through various means, including contracted vessel and aerial surveys, tagging, passive acoustic monitoring, and placing marine mammal observers (MMOs) aboard Navy warships. In accordance with objective 3 above, a study was initiated to determine the effectiveness of the Navy lookout team, including lookouts in the pilot house or on the bridge wings. Trained biologists were utilized for the study to collect data that would characterize the likelihood of detecting marine species in the field from a U.S. Navy destroyer (DDG). The University of St. Andrews, Scotland, under contract to the U.S. Navy, developed an initial protocol for use during this study. Necessary changes to the protocol were identified and made during prior cruises. Data collected are intended to be combined with future monitoring efforts in order to determine the effectiveness of Navy lookout teams as a whole, rather than specific to each vessel.

As part of this data collection effort, four U.S. Navy civilian MMOs (Ms. Danielle Jones, Mr. Andrew DiMatteo, Ms. Jaime Gormley, and Ms. Erin Roach) embarked from 29 March-4 April 2016 during a Fleet Exercise event in the Jacksonville Range Complex (JAX). These MMOs were stationed aboard a U.S. Navy guided missile destroyer, hereafter referred to as DDGO. The goals of the monitoring and this study were to:

1. Collect data to assess the effectiveness of the Navy lookout team.
2. Obtain data to characterize the possible exposure of marine species to MFAS.

SECTION 2 METHODS

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 or maneuvers, and would remove themselves from the bridge wings if necessary for DDGO to accomplish its mission objectives. The exceptions would be if a marine mammal was sighted by the MMO within the shut-down zone during MFAS operations (200 yards [yds], 183 meters [m]) and was not sighted by the Navy lookout team, or if the vessel was in danger of striking the marine species. In these cases, the MMO would report the sighting to the Navy lookout team for appropriate reporting and action. The initial protocol for data collection was developed by the University of St. Andrews, which was modified by the MMOs on prior surveys. Additional changes were made as necessary during these events. The MMO survey on DDGO was conducted on the bridge wings (elevated 65.6 feet [ft; 20 m] above the waterline), with one MMO on each wing (called survey MMOs, or SMMOs). One MMO acted as a liaison to the starboard and port lookouts (called liaison MMO or LMMO). The fourth MMO was primarily responsible for recording data (data MMO or DMMO) reported by the two SMMOs and the LMMO. A rotation schedule was used, such that an SMMO would be on effort for one hour on port, one hour as the LMMO, one hour as an SMMO on starboard, and one hour as DMMO. While on effort, MMOs used naked eye and 7 X 50 magnification binoculars to scan the area from 10 degrees on the opposite side of dead ahead to just aft of the beam. This equates to a 180 degree (°) field in front of the ship that was covered by the MMOs, with a 20° overlap in the area forward of the trackline covered by both observers.

If a marine mammal or sea turtle was visually detected by the SMMOs, information would be collected on both the sighting and concurrent operational parameters. Environmental data were collected routinely. Sightings obtained first by the SMMOs before the Navy lookout were considered to be “trials.” If applicable, photographs would be taken using a Nikon D90 digital camera with a 100 – 300 millimeter zoom lens. No photographs would be taken until the Navy lookout had also made the sighting so as not to inappropriately call attention to the sighting. The track of the DDGO was not altered as result of the sightings. Therefore, the species identification level represents the best ability to recognize species-specific characteristics at a distance from the ship, without approaching the animals for study. The LMMO or SMMOs reported sightings made by the Navy bridge wing lookouts. The LMMO was also responsible for noting sightings made by the bridge team or watchstanders. After a sighting by the Navy lookout or bridge team, the LMMO would also query the personnel to clarify information on the sighting such as animals seen, bearing, distance, and time. All four MMOs were equipped with headset two-way radios in order to maintain communications without leaving their post, as well as communicating sighting and effort data without cueing the Navy lookouts to sightings. The DMMO was responsible for recording all data and making initial determination as to whether sightings were considered a duplicate, e. g., the same animal seen by two observers. The DMMO recorded effort-related events (e.g., begin effort, end effort, observer rotation, weather change) in addition to time, location, and weather information as per the protocol. At the time of events and sightings, a waypoint was immediately taken by the DMMO such that the accurate time and location would be recorded, with associated information to be appended. Effort and environmental information was collected when the MMOs began effort, at each rotation, as weather changes occurred, and when the MMOs went off effort. At the conclusion of each observation day, all photographs were reviewed to assist with species identification.

SECTION 3 RESULTS

The MMO team spent 45 hours, 36 minutes, and 5 seconds searching for marine species during the training event (Table 1). For whole days out at sea, an average of 8.39 hours per day were spent on effort. Figure 1 shows the breakdown of Beaufort Sea State (BSS) as a total of the on-effort observation period and the percentage of sightings that occurred at each BSS. During the event, BSS ranged from 2 to 6 (Table 1). The majority of observation time was spent in a BSS of 2 or 3 (36.8 percent [%] and 28.4%, respectively), which amounts to favorable environmental sighting conditions, with the most sightings occurring in a BSS of 2 (52.8%, Figure 1).

Table 1. Effort Hours and Environmental Conditions

Date	Team Hours On-Effort	Time	Beaufort Sea State (range)	% Cloud Cover (range)	Visibility
29 March	3:39:34	12:39:06-13:22:10, 15:46:47-17:05:40, 17:51:50-19:29:27	2-3	90-100	Good to Excellent
30 March	6:25:16	7:13:40-8:46:21, 9:08:14-11:25:19, 15:55:01-16:56:23, 17:40:08-19:14:16	3-4	30-90	Moderate to Excellent
31 March	8:41:16	7:15:36-11:57:04, 12:35:56-14:43:01, 15:00:49-15:15:42, 15:50:32-17:00:03, 17:44:46-18:13:05	2-4	0-80	Moderate to Good
1 April	10:06:41	7:08:02-9:58:16, 10:12:29-12:03:04, 12:42:05-13:21:33, 13:45:31-16:56:53, 17:39:50-19:14:52	2-3	10-100	Poor to Good
2 April	9:05:25	8:58:43-12:06:00, 12:36:00-17:02:10, 17:47:52-19:19:50	2-6	2.5-100	Moderate to Good
3 April	7:37:53	7:33:10-12:00:01, 15:25:17-17:00:06, 17:48:36-19:24:49	2-6	2.5-20	Good to Excellent
Total	45 hours 36 minutes 5 seconds		2-6	0-100	Poor to Excellent

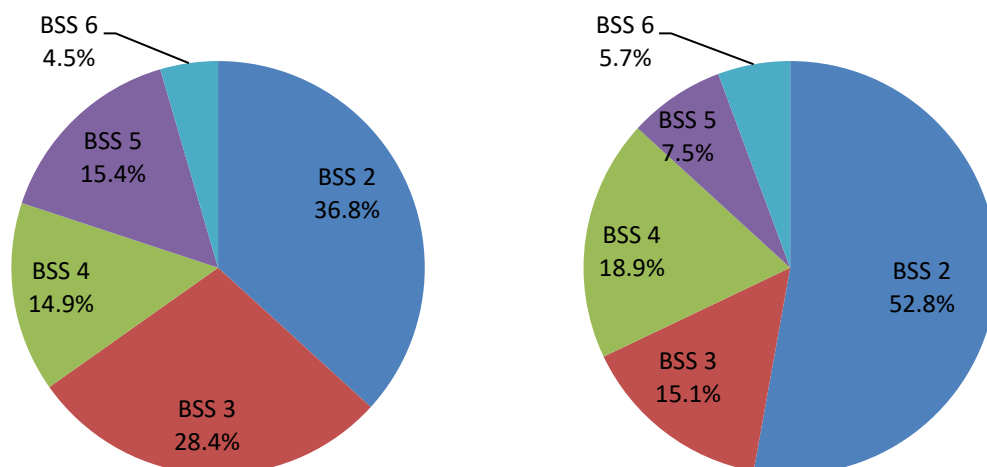


Figure 1. Total percentage of effort (left) and sightings (right) at various Beaufort Sea States (BSS)

In total, 53 unique sightings comprising at least 216 individual marine animals were recorded during the six days of observation (Figure 2 through 4). There were seven additional sightings (Sighting 6, 16, 20, 27, 28, 30, and 43) made by the ship's watchstander team, however, these sightings were recorded outside of the MMO's 270° to 90° survey area, which is relative to the ship. Therefore, these 7 sightings were not included in the data analysis and are not included in this report. MMOs made 19 sightings independent of the ship's watchstander team. The watchstander team made eight sightings independent of the MMOs. There were four sightings made by the watchstander team that were relayed to the MMOs; two of these sightings were not confirmed. The other four sightings were reported in the ship's marine mammal log book but not reported by the MMOs. There were 26 sightings made by both teams.

Seabird sightings were not recorded on this trip. A total of 367 photographs were taken, 211 of which include visible cetaceans. All other photos are of vessels, a helicopter, crew, MMOs, environmental conditions, and procedures.

Table 2. Number of Sightings

Date	Independent MMO Sightings	Independent Navy Watchstander Team Sightings	Sightings by both Teams	Total Number of Sightings
29 March	4	2	5	11
30 March	3	2	5	10
31 March	2	2	2	6
1 April	5	1	6	12
2 April	4	0	6	10
3 April	1	1	2	4
Total	19	8	26	53

Trials were successfully conducted on all days of the event, with 41 of the 53 sightings (77.4%) available for trials. There was an average rate of 1.16 sightings per hour of effort and an average rate of 0.90 trials per hour of effort across all six days (Table 3).

Table 3. Effort hours, sighting rates, and trial rates

Date	Hours MMO Team Effort	# of Unique Sightings	Sightings/ Hour	# of Trials	Trials/Hour
29 March	3:39:34	11	3.01	9	2.46
30 March	6:25:16	10	1.56	8	1.25
31 March	8:41:16	6	0.69	3	0.35
1 April	10:06:41	12	1.19	11	1.09
2 April	9:05:25	10	1.10	8	0.88
3 April	7:37:53	4	0.52	2	0.26
Cumulative	45:36:05	53	1.16	41	0.90

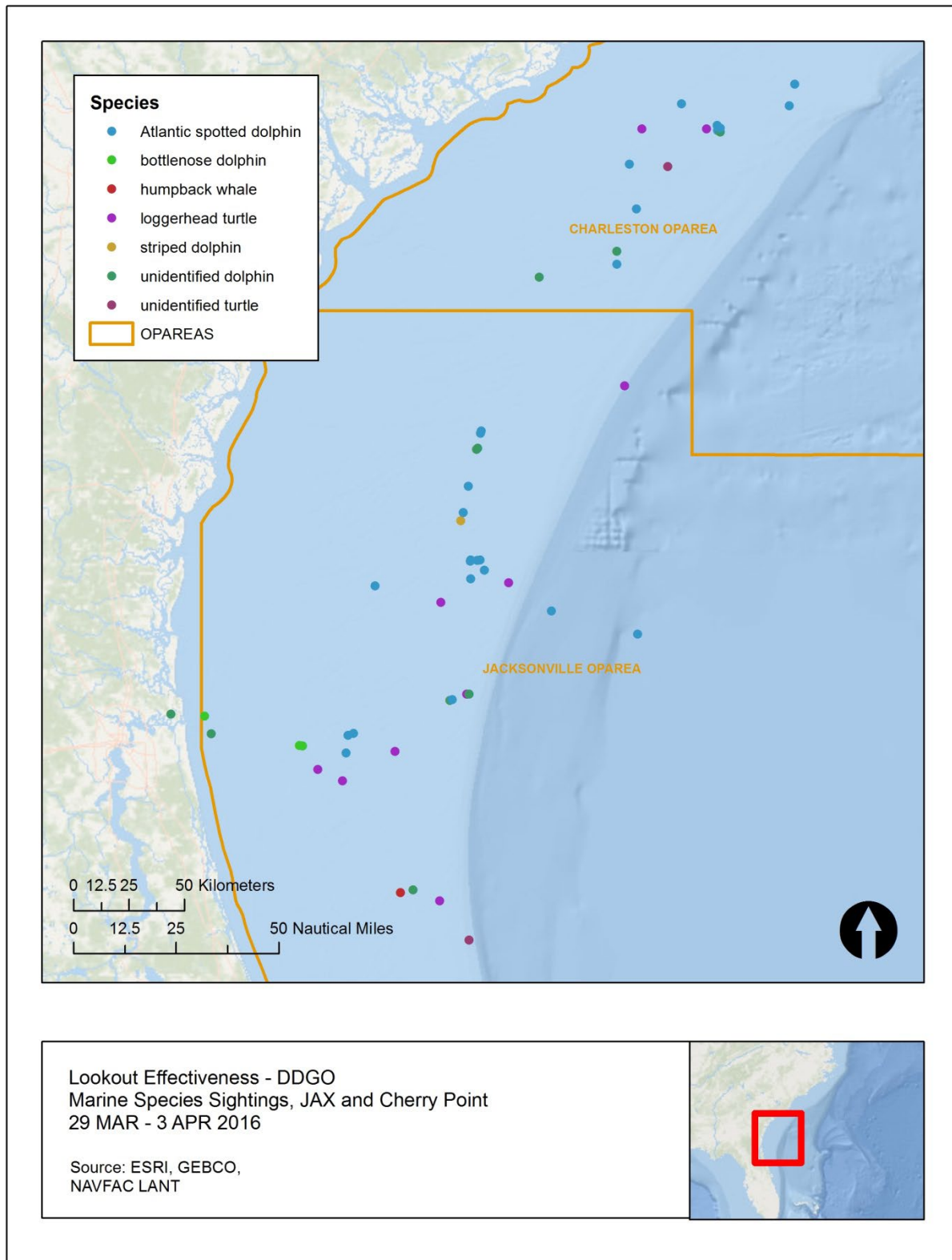


Figure 2. Marine Mammal and Sea Turtle Sightings in the Jacksonville Range Complex

Of the 53 marine animal sightings, 41 were identified to the species level. Visual sightings included 3 *Tursiops truncatus*, 26 *Stenella frontalis*, 1 *Stenella coeruleoalba*, 10 unidentified dolphin, 1 *Megaptera novaeangliae*, 10 *Caretta caretta*, 2 unidentified sea turtle (Table 4). The first day of effort, March 29, had the greatest frequency of unique sightings, with 3.01 sightings per hour of effort (Table 3).



Figure 3. Atlantic spotted dolphin mom and calf pair from Sighting 17 on 30 March 2016



Figure 4. Atlantic spotted dolphin group from Sighting 53 on 2 April 2016

Table 4. Unique Marine Mammal and Sea Turtle Sightings

Data Category	Sighting 1	Sighting 2	Sighting 3	Sighting 4	Sighting 5	Sighting 7	Sighting 8
Sighting Information							
Effort	ON	ON	ON	ON	ON	ON	ON
Date	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016
Time (EDT)	13:11:48	13:14:05	13:19:00	15:49:34	15:55:31	16:53:41	16:58:29
Location							
Detection Sensor	LO	MMO	LO	MMO/LO	MMO/LO	MMO/LO	MMO/LO
Species/Group	Unidentified dolphin	Bottlenose dolphin	Unidentified dolphin	Bottlenose dolphin	Bottlenose dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin
Group Size Estimate (estimated range)	2	6 (5-7)	3	10 (6-12)	4 (3-6)	1	6 (5-7)
# Calves	0	0	0	0	0	0	0
Animal Bearing (relative)	30	350	275*	25	290	90	25
Distance (m)	18.29	1154	4572	200	250	50	150
Animal Motion	Unknown	None	Parallel	Closing	Closing	None	None
Sighting Cue	Unknown	Dorsal fin	Unknown	Dorsal fin	Body	Porpoise	Porpoise
Behavior	Unknown	Milling	Traveling	Traveling	Traveling	Bowriding	Traveling
Environmental Information							
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	Excellent	Excellent	Excellent	Good	Good	Good	Good
Beaufort Sea State	2	2	2	2	2	2	2
Cloud cover (%)	90	90	90	100	100	100	100
Glare (%)	0	0	0	0	0	0	0
Operational Information							
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship Bearing (true)	297	295	297	95	85	70	70
Mitigation Implemented	None	None	None	None	None	None	None
Comments			Recorded as separate sighting from Sighting 2 based on ship's log. MMOs did not see.	Lookouts present on port and starboard wings	Starboard lookout and bridge team saw within seconds after MMO	Lookouts saw less than 2 minutes after MMO	LO saw less than 2 minutes after MMO

*Lookout only recorded a true animal bearing.

Table 5. Unique Marine Mammal and Sea Turtle Sightings (cont'd)

Data Category	Sighting 9	Sighting 10	Sighting 11	Sighting 12	Sighting 13	Sighting 14	Sighting 15
Sighting Information							
Effort	ON	ON	ON	ON	ON	ON	ON
Date	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/30/2016	3/30/2016	3/30/2016
Time (EDT)	18:32:45	18:34:53	18:49:25	18:50:44	7:14:05	7:20:00	7:25:01
Location							
Detection Sensor	MMO	MMO	MMO/LO	MMO	MMO/LO	LO	MMO/LO
Species/Group	Unidentified dolphin	Atlantic spotted dolphin	Loggerhead turtle	Unidentified dolphin	Atlantic spotted dolphin	Unidentified dolphin	Atlantic spotted dolphin
Group Size Estimate (estimated range)	1	1	1	1 (1-2)	9 (7-10)	4	14 (12-15)
# Calves	0	0	0	0	0	0	0
Animal Bearing (relative)	10	20	90	30	90	330*	10
Distance (m)	3	3	100	300	20	2	15
Animal Motion	Parallel	None	None	None	Parallel	Unknown	Closing
Sighting Cue	Dorsal fin	Porpoise	Body	Porpoise	Porpoise	Unknown	Dorsal fin
Behavior	Bowriding	Diving	Unknown	Traveling	Traveling	Unknown	Bowriding
Environmental Information							
Wave Height (ft)	0-3	0-3	0-3	0-3	4-6	4-6	4-6
Visibility	Good	Good	Good	Good	Excellent	Excellent	Excellent
Beaufort Sea State	2	2	2	2	4	4	4
Cloud cover (%)	100	100	98	98	50	50	50
Glare (%)	10	10	20	20	20	20	20
Operational Information							
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship Bearing (true)	70	70	70	70	57	54	56
Mitigation Implemented	None	None	None	None	None	None	None
Comments			Lookouts and bridge team saw at same time		Lookouts saw 30 seconds after MMO	Sighting recorded in ship's log. MMOs did not see	

*Lookout only recorded a true animal bearing.

Table 6. Unique Marine Mammal and Sea Turtle Sightings (cont'd)

Data Category	Sighting 17	Sighting 18	Sighting 19	Sighting 21	Sighting 22	Sighting 23	Sighting 24
Sighting Information							
Effort	ON	ON	ON	ON	ON	ON	ON
Date	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016
Time (EDT)	7:49:06	8:06:14	9:53:59	10:50:46	18:12:48	18:16:00	18:51:35
Location							
Detection Sensor	MMO/LO	MMO	MMO	MMO/LO	MMO	LO	MMO/LO
Species/Group	Atlantic spotted dolphin	Loggerhead turtle	Atlantic spotted dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin	Unidentified dolphin	Atlantic spotted dolphin
Group Size Estimate (estimated range)	25 (20-30)	1	5 (4-6)	13 (12-15)	3	10	1
# Calves	1	0	0	1	0	1	0
Animal Bearing (relative)	315	70	20	25	10	60*	80
Distance (m)	3	619	50	250	3	457.2	500
Animal Motion	Closing	None	Parallel	Closing	Closing	Unknown	Closing
Sighting Cue	Dorsal fin	Body	Dorsal fin	Dorsal fin	Dorsal fin	Unknown	Body
Behavior	Traveling	Logging	Traveling	Traveling	Milling	Unknown	Traveling
Environmental Information							
Wave Height (ft)	4-6	4-6	4-6	4-6	4-6	4-6	4-6
Visibility	Excellent	Good	Good	Good	Excellent	Excellent	Good
Beaufort Sea State	4	3	3	4	4	4	3
Cloud cover (%)	60	75	70	90	50	50	30
Glare (%)	0	0	10	10	20	20	10
Operational Information							
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship Bearing (true)	245	261	165	153	30	20	19
Mitigation Implemented	None	None	None	None	None	None	None
Comments	Lookouts saw within 1 minute after MMO. Animals also picked up by passive sonar.			Lookouts saw at same time		Sighting recorded in ship's log. MMOs did not see	Lookout saw 15 seconds after MMO

*Lookout only recorded a true animal bearing.

Table 7. Unique Marine Mammal and Sea Turtle Sightings (cont'd)

Data Category	Sighting 25	Sighting 26	Sighting 29	Sighting 31	Sighting 32	Sighting 33	Sighting 34
Sighting Information							
Effort	ON	ON	ON	ON	ON	ON	ON
Date	3/31/2016	3/31/2016	3/31/2016	3/31/2016	3/31/2016	3/31/2016	4/1/2016
Time (EDT)	7:27:15	9:06:53	13:07:00	15:07:53	15:15:42	16:46:02	7:42:13
Location							
Detection Sensor	MMO	LO	LO	MMO/LO	MMO/LO	MMO	MMO/LO
Species/Group	Atlantic spotted dolphin	Loggerhead turtle	Unidentified turtle	Unidentified dolphin	Atlantic spotted dolphin	Loggerhead turtle	Atlantic spotted dolphin
Group Size Estimate (estimated range)	20 (10-30)	1	1	3	4	1	1
# Calves	0	0	0	0	0	0	0
Animal Bearing (relative)	315	350	303*	30	20	90	45
Distance (m)	30	100	91.44	400	200	150	1
Animal Motion	Closing	None	Unknown	Closing	Closing	None	None
Sighting Cue	Body	Body	Unknown	Porpoise	Porpoise	Body	Dorsal fin
Behavior	Traveling	Resting	Traveling	Traveling	Traveling	Logging	Bowriding
Environmental Information							
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	4-6	0-3
Visibility	Good	Good	Moderate	Good	Moderate	Good	Moderate
Beaufort Sea State	2	2	2	2	2	4	2
Cloud cover (%)	27.5	17.5	75	55	80	47.5	77.5
Glare (%)	5	5	0	0	0	35	0
Operational Information							
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship Bearing (true)	210	315	303	179	179	180	212
Mitigation Implemented	None	None	None	None	None	None	None
Comments	No Lookout at time of sighting	Bridge team sighted turtle	Sighting recorded in ship's log. MMOs did not see	Bridge team saw at same time	Bridge team and lookout saw at same time		Lookout saw 20 seconds after MMO

*Lookout only recorded a true animal bearing.

Table 8. Unique Marine Mammal and Sea Turtle Sightings (cont'd)

Data Category	Sighting 35	Sighting 36	Sighting 37	Sighting 38	Sighting 39	Sighting 40	Sighting 41
Sighting Information							
Effort	ON	ON	ON	ON	ON	ON	ON
Date	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016
Time (EDT)	8:26:26	9:55:54	11:08:06	13:14:45	14:29:11	14:59:38	16:24:09
Location							
Detection Sensor	MMO	MMO/LO	MMO	LO	MMO	MMO/LO	MMO/LO
Species/Group	Loggerhead turtle	Loggerhead turtle	Loggerhead turtle	Loggerhead turtle	Striped dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin
Group Size Estimate (estimated range)	1	1	1	1	4 (4-6)	4 (4-6)	5 (3-6)
# Calves	0	0	0	0	0	0	0
Animal Bearing (relative)	90	80	45	Unknown	80	90	315
Distance (m)	10	25	20	Unknown	60	25	10
Animal Motion	Parallel	Parallel	None	Unknown	Parallel	Closing	Closing
Sighting Cue	Body	Body	Body	Unknown	Body	Breach	Dorsal fin
Behavior	Traveling	Traveling	Diving	Unknown	Traveling	Milling	Milling
Environmental Information							
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	Bad	Moderate	Good	Good	Good	Good	Good
Beaufort Sea State	2	2	3	3	3	3	2
Cloud cover (%)	85	50	75	22.5	10	72.5	82.5
Glare (%)	0	40	20	20	20	15	25
Operational Information							
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship Bearing (true)	240	150	34	5	21	20	10
Mitigation Implemented	None	None	None	None	None	None	None
Comments		Lookout saw 10 seconds after MMO		MMOs did not see		Lookout saw at same time	Lookout saw 20 seconds after MMO

Table 9. Unique Marine Mammal and Sea Turtle Sightings (cont'd)

Data Category	Sighting 42	Sighting 44	Sighting 45	Sighting 46	Sighting 47	Sighting 48	Sighting 49
Sighting Information							
Effort	ON	ON	ON	ON	ON	ON	ON
Date	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/2/2016	4/2/2016	4/2/2016
Time (EDT)	18:18:35	18:23:16	19:06:11	19:11:08	9:00:28	12:00:48	12:38:31
Location							
Detection Sensor	MMO	MMO/LO	MMO/LO	MMO	MMO	MMO/LO	MMO
Species/Group	Unidentified dolphin	Unidentified dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin
Group Size Estimate (estimated range)	7 (5-7)	1	1	1	25 (15-30)	7 (6-7)	7
# Calves	0	0	0	0	0	0	0
Animal Bearing (relative)	0	20	20	280	90	355	345
Distance (m)	200	100	10	100	50	90	5
Animal Motion	Closing	Closing	Parallel	Opening	Parallel	Closing	None
Sighting Cue	Dorsal fin	Porpoise	Body	Body	Porpoise	Dorsal fin	Body
Behavior	Traveling	Traveling	Traveling	Traveling	Tail slap	Traveling	Bowriding
Environmental Information							
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	>6	4-6
Visibility	Moderate	Moderate	Moderate	Moderate	Good	Moderate	Good
Beaufort Sea State	2	2	2	2	2	6	6
Cloud cover (%)	100	100	100	100	90	22.5	22.5
Glare (%)	0	0	0	0	20	50	50
Operational Information							
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship Bearing (true)	9	11	10	10	91	90	359
Mitigation Implemented	None	None	None	None	None	None	None
Comments		Lookout saw 3 minutes after MMO. Probable resight of Sighting 42	Lookout saw 2 minutes after MMO	Probable resight of Sighting 45	Bridge team saw group before being ON effort	Lookout saw 1 minute after MMO	Group sighted by bridge team while MMOs were at lunch. Probable resight of Sighting 48

Table 10. Unique Marine Mammal and Sea Turtle Sightings (cont'd)

Data Category	Sighting 50	Sighting 51	Sighting 52	Sighting 53	Sighting 54	Sighting 55	Sighting 56
Sighting Information							
Effort	ON	ON	ON	ON	ON	ON	ON
Date	4/2/2016	4/2/2016	4/2/2016	4/2/2016	4/2/2016	4/2/2016	4/2/2016
Time (EDT)	13:01:00	13:14:04	13:32:07	13:34:15	15:47:20	16:57:25	18:47:08
Location							
Detection Sensor	MMO/LO	MMO/LO	MMO	MMO/LO	MMO/LO	MMO/LO	MMO
Species/Group	Atlantic spotted dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin	Atlantic spotted dolphin	Loggerhead turtle	Atlantic spotted dolphin	Atlantic spotted dolphin
Group Size Estimate (estimated range)	7	6 (5-6)	6 (4-6)	18 (15-20)	1	2	1 (1-2)
# Calves	0	0	0	0	0	0	0
Animal Bearing (relative)	350	5	315	90	280	350	10
Distance (m)	10	20	10	800	125	125	3
Animal Motion	None	Closing	Parallel	Closing	None	Closing	Opening
Sighting Cue	Body	Porpoise	Dorsal fin	Porpoise	Body	Porpoise	Body
Behavior	Bowriding	Traveling	Traveling	Traveling	Resting	Traveling	Traveling
Environmental Information							
Wave Height (ft)	4-6	4-6	>6	>6	4-6	4-6	4-6
Visibility	Good	Good	Moderate	Moderate	Good	Good	Good
Beaufort Sea State	5	5	6	6	5	5	4
Cloud cover (%)	2.5	2.5	25	25	75	92.5	95
Glare (%)	20	20	50	50	10	0	0
Operational Information							
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship Bearing (true)	250	248	250	250	148	109	128
Mitigation Implemented	None	None	None	None	None	None	None
Comments	Lookout saw at same time. Probable resight of Sighting 48/49	Lookout saw at same time. Probable resight of Sighting 48/49	Probable resight of Sighting 48/49	Lookout saw 40 seconds after MMO. This new group joined group from Sighting 49	Lookout saw at same time	Lookout saw 10 seconds after MMO.	

Table 11. Unique Marine Mammal and Sea Turtle Sightings (cont'd)

Data Category	Sighting 57	Sighting 58	Sighting 59	Sighting 60
Sighting Information				
Effort	ON	ON	ON	ON
Date	4/3/2016	4/3/2016	4/3/2016	4/3/2016
Time (EDT)	16:06:59	18:43:35	19:14:47	19:19:38
Location				
Detection Sensor	MMO/LO	MMO	LO	MMO/LO
Species/Group	Unidentified turtle	Loggerhead turtle	Unidentified whale	Unidentified dolphin
Group Size Estimate (estimated range)	1	1	1	5 (4-7)
# Calves	0	0	0	0
Animal Bearing (relative)	80	45	330	320
Distance (m)	40	75	Unknown	671
Animal Motion	None	None	None	Closing
Sighting Cue	Body	Body	Blow	Breach
Behavior	Unknown	Traveling	Traveling	Traveling
Environmental Information				
Wave Height (ft)	4-6	0-3	0-3	0-3
Visibility	Good	Excellent	Excellent	Excellent
Beaufort Sea State	3	2	2	2
Cloud cover (%)	2.5	12.5	12.5	12.5
Glare (%)	30	25	25	25
Operational Information				
Sonar	OFF	OFF	OFF	OFF
Ship Bearing (true)	320	317	330	330
Mitigation Implemented	None	None	Ship slowed to bare steerageway (3 kts), kept bearing at 330, and remained 1000 yds away. Implemented mitigation for 20 minutes.	None
Comments	Lookout saw 15 seconds after MMO		CO sighted the blow. MMOs and lookouts saw second blow. MMO identified animal as a humpback whale	Lookout saw at same time

SECTION 4 CONCLUSIONS

The goals of the lookout effectiveness monitoring effort are provided below, with a conclusion regarding each of the goals:

1. Collect data to determine the effectiveness of the Navy lookout team.

This event was the fifteenth aboard a DDG in which data were collected to determine effectiveness; data will be combined with future monitoring efforts in order to determine the effectiveness of Navy lookouts as a whole, rather than specific to each vessel.

2. Obtain data to characterize the possible exposure of marine species to MFAS.

Sighting information included the bearing and distance of the animal to the DDG. This information can be used to determine the level of exposure a marine mammal or sea turtle may experience during an MFAS event.

SECTION 5 REFERENCES

Department of the Navy (2010). United States Navy Integrated Comprehensive Monitoring Program 2010 Update, 20 December 2010.