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Cruise Report, Marine Species Monitoring & Lookout Effectiveness Study

Fleet Exercise, August 2016, VACAPES Range Complex



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
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
VACAPES	Virginia Capes Range Complex
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 Letter of Authorization 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 are 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 current and future data 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. Cara Hotchkin, Mr. Andrew DiMatteo, Ms. Brittany Bartlett, and Ms. Jennifer James) embarked from 22 August-26 August 2016 during a Fleet Exercise event in the Virginia Capes Range Complex (VACAPES). These MMOs were stationed aboard a U.S. Navy guided missile destroyer, hereafter referred to as DDGP. 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 did not replace required Navy lookouts, would not dictate operational requirements or maneuvers, and would remove themselves from the bridge wings if necessary for DDGP 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 DDGP 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 generally 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, SMMOs 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° 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 routinely collected. The goal of the survey was to set up “trials” for the Navy lookout team such that the SMMO observed an animal before the Navy lookout, and determined if the Navy lookout subsequently detected that animal or not, and at what distance. Sightings that were between 270° and 90° relative to the ship and obtained first by the SMMOs and before the Navy lookout or at the same time as 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 DDGP 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, and as weather changes occurred. At the conclusion of each observation day, all photographs were reviewed to assist with species identification.

SECTION 3 RESULTS

The MMO team spent 35 hours searching for marine species during the training event (Table 1). For whole days out at sea, an average of 7 hours per day was spent on effort. Several training evolutions occurred that precluded full days of observing (bridge wings occupied, underway replenishment [two ships side-by-side for extended periods of time], muster of shipriders, etc). 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 1 to 3 (Table 1). The majority of observation time was spent in a BSS of 2 or 3 (51.1% and 28.7%, respectively), which amounts to favorable environmental sighting conditions, with the most sightings occurring in a BSS of 1 (56.9%, Figure 1).

Table 1. Effort Hours and Environmental Conditions

Date	Team Hours On-Effort	Time	Beaufort Sea State (range)	% Cloud Cover (range)	Visibility
22 August	5:13:00	12:13-12:57 13:04-13:49 13:54-14:39 14:46-15:31 15:35-17:05 17:52-18:37 18:39- 19:23	2-3	0-10	Good to Excellent
23 August	5:29:00	7:27-8:13 8:15-11:30 12:06-12:50 18:43-19:27	2-3	5-55	Good to Excellent
24 August	11:13:29	9:38-12:08 12:56-21:39	2	5-72.5	Good to Excellent
25 August	7:59:00	6:47-7:48 10:16 -12:14 13:00-17:15 18:21-19:06	1-2	5-70	Good to Excellent
26 August	4:21:00	8:58-12:06, 12:36-17:02, 17:47-19:19	2-3	2.5-52.5	Moderate to Good
Total	35 hours 00 minutes 29 seconds		1-3	0-72.5	Moderate to Excellent

Visibility: Bad (0.5km); Poor (0.5-1.5km); Moderate (1.5-10km); Good (10-15km); Excellent (>15km)



Figure 1. Total Percentage of Effort (Left) and Sightings (Right) at Various Beaufort Sea States (BSS)

In total, 44 unique sightings comprising at least 226 individual marine animals were recorded during the five days of observation (Figure 2). MMOs made 30 sightings independent of the ship's watchstander team (Table 2). The watchstander team made one sighting independent of the MMOs. There were 13 sightings made by both teams. On August 22, there was one sighting of a non-target species, an unidentified hammerhead shark, by the MMOs that was not included in the data analysis. The ship log was obtained at the end of the cruise, but did not contain any additional marine mammal or sea turtle information.

Seabird sightings were not recorded on this trip. A total of 10 photographs were taken, none of which include visible cetaceans. All other photos are of vessels and environmental conditions.

Table 2. Number of Sightings

Date	Independent MMO Sightings	Independent Navy Watchstander Team Sightings	Sightings by both Teams	Total Number of Sightings
22 August	7	0	0	7
23 August	0	0	1	1
24 August	5	0	1	6
25 August	16	0	9	25
26 August	2	1	2	5
Total	30	1	13	44

Trials were successfully conducted on all days of the event, with 35 of the 44 sightings (79.5%) available for trials. There was an average rate of 1.28 sightings per hour of effort and an average rate of 1.02 trials per hour of effort across all five days (Table 3). The fourth day of effort (August 25) had the greatest frequency of trials, with 2.26 trials per hour of effort. The greatest frequency of unique sightings also occurred on August 25, with 3.13 sightings per hour of effort (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
22-Aug	5:13:00	7	1.34	7	1.34
23-Aug	5:29:00	1	0.18	1	0.18
24-Aug	11:13:29	6	0.53	5	0.44
25-Aug	7:59:00	25	3.13	18	2.25
26-Aug	4:21:00	5	1.15	4	0.92
Cumulative	34:15:29	44	1.28	35	1.02

Of the 44 marine animal sightings, 8 were identified to the species level. Visual sightings included 2 bottlenose dolphins (*Tursiops truncatus*), 2 Atlantic spotted dolphins (*Stenella frontalis*), 22 unidentified dolphin, 1 unidentified pilot whale, 5 unidentified small cetaceans, 3 loggerhead sea turtle (*Caretta caretta*), 1 *Kemp's Ridley sea turtle* (*Lepidochelys kempii*), and 8 unidentified sea turtles (Table 4, Figure 2).

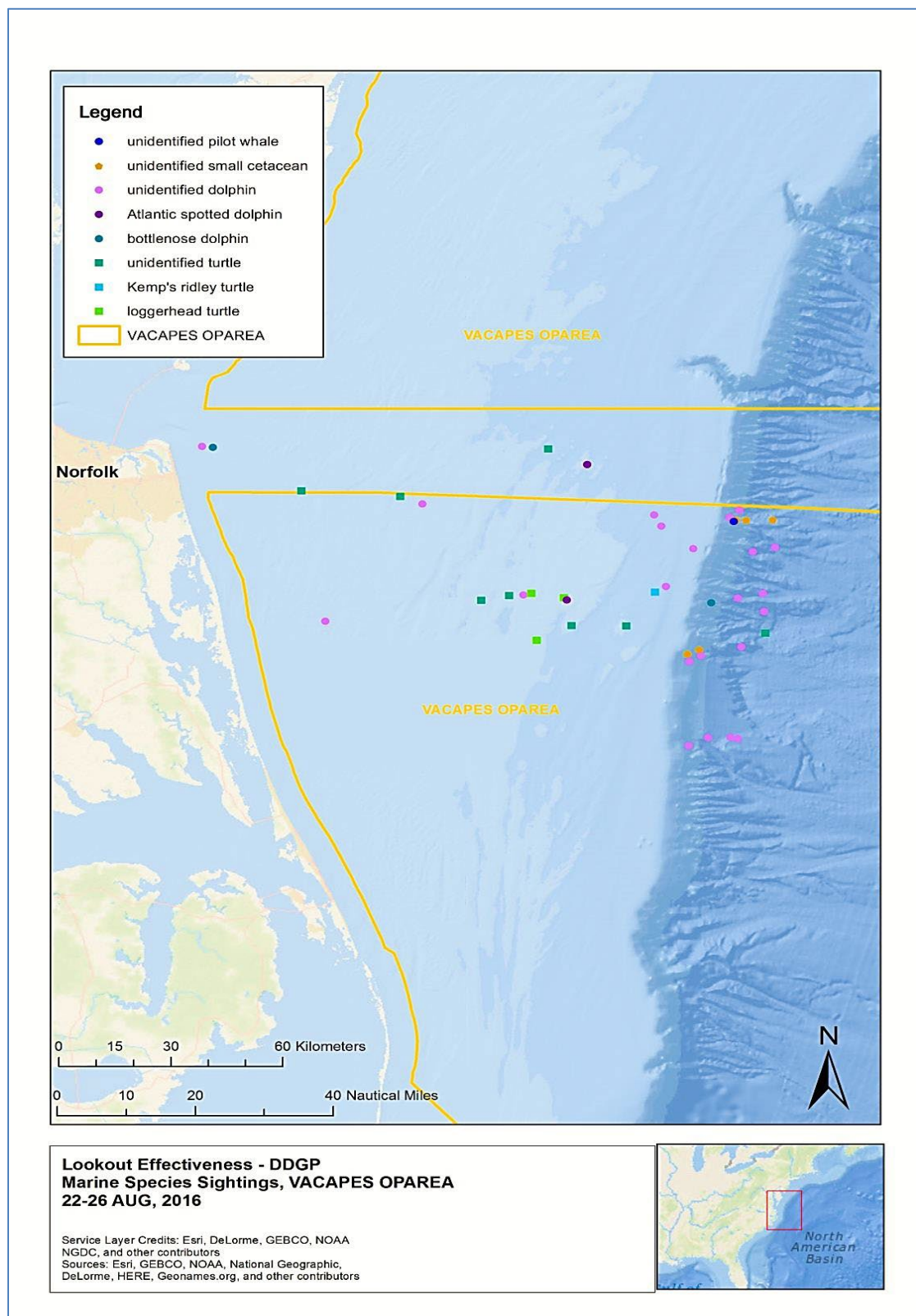


Figure 2. Marine Mammal and Sea Turtle Sightings in the VACAPES Range Complex

Table 4. Unique Marine Mammal and Sea Turtle Sightings

Data Category	Sighting 1	Sighting 2	Sighting 3	Sighting 4	Sighting 5	Sighting 6	Sighting 7
Sighting Information							
Effort	On	On	On	On	On	On	On
Date	08/22/16	08/22/16	08/22/16	08/22/16	08/22/16	08/22/16	08/22/16
Time (EDT)	14:00	14:29	15:05	15:24:00	16:52:00	18:20:00	18:53:00
Location	36.58104	36.58743	36.59309	36.58862	36.5831	36.52006	36.48925
	-75.23456	-75.16627	-75.11881	-75.12797	-75.04032	-75.01997	-75.10480
Detection Sensor	MMO	MMO	MMO	MMO	MMO	MMO	MMO
Species/Group	Unidentified Turtle	Unidentified Turtle	Loggerhead Turtle	Unidentified Dolphin	Loggerhead Turtle	Unidentified Turtle	Loggerhead Turtle
Group Size estimate (min/max/best)	1/1/1	1/1/1	1/1/1	1/3/1	1/1/1	1/1/1	1/1/1
# Calves	0	0	0	0	0	0	0
Bearing (relative)	270	355	90	90	280	90	285
Distance (m)	400	300	50	500	40	200	10
Animal motion	Opening	Opening	Opening	Opening	Closing	Opening	None
Sighting Cue	Body	Splash	Body	Blow	Body	Splash	Body
Behavior	Logging	Traveling	Traveling	Other	Traveling	Traveling	Traveling
Environmental Information							
Beaufort Sea State	3	3	3	3	3	2	2
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent
Glare (%)	30	0	0	0	10	5	25
Cloud Cover (%)	2.5	2.5	2.5	2.5	5	0	2.5
Operational Information							
Sonar	Off	Off	Off	Off	Off	Off	Off
Ship bearing (true)	113	58	168	227	35	270	299
Mitigation implemented	No	No	No	No	No	No	No
Comments							

Visibility: Bad (0.5km); Poor (0.5-1.5km); Moderate (1.5-10km); Good (10-15km); Excellent (>15km)

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

Data Category	Sighting 8	Sighting 9	Sighting 10	Sighting 11	Sighting 12	Sighting 13	Sighting 14	Sighting 15
Sighting Information								
Effort	On	On	On	On	On	On	On	On
Date	8/23/2016	08/24/16	08/24/16	08/24/16	08/24/16	08/24/16	08/24/16	08/25/16
Time (EDT)	9:34:15	9:48:00	10:36:00	10:43:00	11:20:00	11:33:00	11:53:00	6:49:00
Location	36.57869	36.57219	36.74196	36.76682	36.50515	36.87306	36.91227	36.46908
	-75.03268	-74.68517	-74.80482	-74.82177	-74.55518	-74.99251	-75.07903	-74.71244
Detection Sensor	MMO/LO	MMO	MMO	MMO	MMO	LO/MMO	MMO	LO/MMO
Species	Atlantic spotted dolphin	Bottlenose Dolphin	Unidentified Dolphin	Unidentified Dolphin	Unidentified Turtle	Atlantic spotted dolphin	Unidentified Turtle	Unidentified small cetacean
Group Size estimate (min/max/best)	20/20/20	3/10/5	1/3/1	1/5/3	1/1/1	1/5/5	1/1/1	2/6/4
# Calves	0	0	0	0	0	0	0	0
Bearing (relative)	350	340	300	60	280	340	270	300
Distance (m)	10	1000	1000	800	40	914	100	40
Animal motion	Closing	Closing	Closing	Parallel	Parallel	Closing	Parallel	Closing
Sighting Cue	Body	Body	Body	Body	Body	Body	Body	Body
Behavior	Bowriding	Traveling	Breaching	Traveling	Traveling	Traveling	Traveling	Traveling
Environmental Information								
Beaufort Sea State	3	2	2	2	2	2	2	1
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Glare (%)	35	0	0	0	0	0	0	105
Cloud Cover (%)	50	5	5	5	5	5	5	15
Operational Information								
Sonar	Off	Off	Off	Off	Off	Off	Off	Off
Ship bearing (true)	170.5	330	331	330	299	298	298	201
Mitigation implemented	No	No	No	No	No	No	No	No
Comments	Lookouts saw sightings 10-15 seconds following MMO	Midship crew saw dolphins going AFT and reported that to bridge team.				LO saw first		XO on bridge and saw animals first

Visibility: Bad (0.5km); Poor (0.5-1.5km); Moderate (1.5-10km); Good (10-15km); Excellent (>15km)

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

Data Category	Sighting 16	Sighting 17	Sighting 18	Sighting 19	Sighting 20	Sighting 21	Sighting 22	Sighting 23
Sighting Information								
Effort	On	On	On	On	On	On	On	On
Date	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16
Time (EDT)	6:50:00	6:54:00	7:00:00	7:21:00	7:31:00	7:40:00	7:46:00	11:08:00
Location	36.46688	36.45372	36.43927	36.48156	36.52262	36.5554	36.58478	36.27066
	-74.71355	-74.71988	-74.69931	-74.61529	-75.59507	-74.57893	-74.56557	-74.62250
Detection Sensor	MMO	MMO	MMO	MMO	MMO/LO	MMO	MMO	MMO/LO
Species/Group	Unidentified Dolphin	Unidentified small cetacean	Unidentified Dolphin	Unidentified Dolphin	Unidentified Dolphin	Unidentified Dolphin	Unidentified Dolphin	Unidentified Dolphin
Group Size estimate (min/max/best)	5/10/8	1/4/2	1/2/1	4/10/6	6/15/8	10/20/12	1/1/1	15/25/20
# Calves	0	0	0	0	0	0	0	0
Bearing (relative)	30	345	15	10	20	30	20	5
Distance (m)	1333.3	1000	1333.3	750	1333.3	1000	1000	50
Animal motion	Closing	None	None	Opening	None	Opening	None	Closing
Sighting Cue	Body	Blow	Body	Body	Body	Splash	Blow	Body
Behavior	Traveling	Traveling	Other	Traveling		Traveling	Other	Bowriding
Environmental Information								
Beaufort Sea State	1	1	1	1	1	1	1	1
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Glare (%)	105	105	105	40	40	40	40	60
Cloud Cover (%)	15	15	15	70	70	70	70	22.5
Operational Information								
Sonar	Off	Off	Off	Off	Off	Off	Off	Off
Ship bearing (true)	201	162	101	20	20	20	19	260
Mitigation implemented	No	No	No	No	No	No	No	No
Comments	UNREP approach	UNREP approach. Possible pilot whale but couldn't confirm	UNREP approach	UNREP approach	UNREP approach. Series of sightings seen by both MMO and LO	UNREP approach		Bridge team sighted soon after

Visibility: Bad (0.5km); Poor (0.5-1.5km); Moderate (1.5-10km); Good (10-15km); Excellent (>15km)

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

Data Category	Sighting 24	Sighting 25	Sighting 26	Sighting 27	Sighting 28	Sighting 29	Sighting 30	Sighting 31
Sighting Information								
Effort	On	On	On	On	On	On	On	On
Date	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16
Time (EDT)	11:14:00	11:20:00	11:23:00	13:51:00	14:46:00	14:56:00	15:39:00	16:07:00
Location	36.26572	36.26013	36.25751	36.52131	36.59546	36.61707	36.68712	36.75671
	-74.65213	-74.68573	-74.70074	-74.88952	-74.82005	-74.79084	-74.71359	-74.64259
Detection Sensor	MMO	MMO	MMO	MMO	MMO	MMO	MMO	MMO/LO
Species/Group	Unidentified Dolphin	Unidentified Dolphin	Unidentified Dolphin	Unidentified Turtle	Kemp's Ridley Sea Turtle	Unidentified Dolphin	Unidentified Dolphin	Unidentified Dolphin
Group Size estimate (min/max/best)	2/5/3	2/2/2	4/15/6	1/1/1	1/1/1	13/30/22	1/1/1	1/1/1
# Calves	0	0	0	0	0	0	0	0
Bearing (relative)	340	330	5	355	10	285	30	35
Distance (m)	1000		2000	10	60	1000	1000	571.4
Animal motion	None	Parallel	None	None	None	Closing	None	None
Sighting Cue	Body	Body	Body	Body	Body	Body	Body	Body
Behavior	Other	Logging	Traveling	Traveling	Other	Traveling	Breaching	Logging
Environmental Information								
Beaufort Sea State	1	1	1	1	1	1	1	1
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Good
Glare (%)	60	60	60	5	0	0	5	0
Cloud Cover (%)	22.5	22.5	22.5	5	20	20	10	10
Operational Information								
Sonar	Off	Off	Off	Off	Off	Off	Off	Off
Ship bearing (true)	261	260	260	61	55	40	41.7	92
Mitigation implemented	No	No	No	No	No	No	No	No
Comments								

Visibility: Bad (0.5km); Poor (0.5-1.5km); Moderate (1.5-10km); Good (10-15km); Excellent (>15km)

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

Data Category	Sighting 32	Sighting 33	Sighting 34	Sighting 35	Sighting 36	Sighting 37	Sighting 38
Sighting Information							
Effort	On	On	On	On	On	On	On
Date	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16	08/25/16
Time (EDT)	16:08	16:08:00	16:11:00	16:17:00	16:29:00	16:46:00	16:57:00
Location	36/75642	36.75586	36.75595	36.75565	36.7511	36.7069	36.68373
	-74.63644	-74.63444	-74.62840	-74.60184	-74.54922	-74.5435	-74.5804
Detection Sensor	LO/MMO	LO/MMO	LO/MMO	MMO	LO/MMO	MMO	MMO
Species/Group	Unidentified Dolphin	Unidentified pilot whale	Unidentified small cetacean	Unidentified small cetacean	Unidentified small cetacean	Unidentified Dolphin	Unidentified Dolphin
Group Size estimate (min/max/best)	10/12/15	2/10/6	1/10/5	6/15/12	2/10/3	5/15/10	10/30/20
# Calves	0	0	0	0	0	0	0
Bearing (relative)	85	0	45	45	15	330	5
Distance (m)	2666.7	500	75	75	1000	1500	300
Animal motion	None	Closing	Parallel	Closing		Closing	Closing
Sighting Cue	Splash	Body	Body	Splash	Body	Body	Body
Behavior	Milling	Traveling	Traveling	Traveling	Traveling	Traveling	Other
Environmental Information							
Beaufort Sea State	1	1	1	1	1	2	2
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	Good	Good	Good	Good	Good	Excellent	Excellent
Glare (%)	0	0	0	0	0	10	10
Cloud Cover (%)	10	10	10	10	10	6	6
Operational Information							
Sonar	Off	Off	Off	Off	Off	Off	Off
Ship bearing (true)	92	87	87	87	105	230	230
Mitigation implemented	No	No	No	No	No	No	No
Comments	LO Saw first with Bigeyes; MMO Confirmed.	LO Saw first; MMO Confirmed.	LO saw first, MMO Confirmed. Most likely same group as Sighting #34. Possible pilot whale	Possible pilot whale	LO Saw First; MMO Confirmed.		Other = Travel & Bowriding; LO heard on Passive Sonar

Visibility: Bad (0.5km); Poor (0.5-1.5km); Moderate (1.5-10km); Good (10-15km); Excellent (>15km)

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

Data Category	Sighting 39	Sighting 40	Sighting 41	Sighting 42	Sighting 43	Sighting 44
Sighting Information						
Effort	On	On	On	On	On	On
Date	08/25/16	08/26/16	08/26/16	08/26/16	8/26/2016	8/26/2016
Time (EDT)	18:52:00	6:52	9:31	10:41	11:43	11:48
Location	36.5996	36.79999	36.8074	36.82011	36.91131	36.92264
	-74.6358	-75.3765	-75.4333	-75.6737	-75.9020	-75.9145
Detection Sensor	LO/MMO	MMO	MMO	LO	MMO/LO	MMO/LO
Species/Group	Unidentified Dolphin	Unidentified Dolphin	Unidentified Turtle	Unidentified Turtle	Bottlenose Dolphin	Unidentified Dolphin
Group Size estimate (min/max/best)	2/8/5	1/3/1	1/1/1	1/1/1	3/10/5	3/10/5
# Calves	0	0	0	0	0	0
Bearing (relative)	90	345	270	5	30	270
Distance (m)		1000	60	3	1333.3	500
Animal motion	None	Parallel	None	None	Opening	Opening
Sighting Cue	Splash	Blow	Body	Body	Body	Splash
Behavior	Other	Traveling	Logging		Traveling	Traveling
Environmental Information						
Beaufort Sea State	1	2	2	2	2	2
Wave Height (ft)	0-3	0-3	0-3	0-3	0-3	0-3
Visibility	Good	Good	Good	Moderate	Good	Good
Glare (%)	30	0	10	10	0	0
Cloud Cover (%)	5	40	40	7.5	2.5	2.5
Operational Information						
Sonar	Off	Off	Off	Off	Off	Off
Ship bearing (true)	179	277	269	276	316	315
Mitigation implemented	No	No	No	No	No	No
Comments	LO Spotted; MMO Confirmed			MMO did not confirm	LO spotted shortly after MMO	LO saw shortly after MMO. Dolphins Bowriding

Visibility: Bad (0.5km); Poor (0.5-1.5km); Moderate (1.5-10km); Good (10-15km); Excellent (>15km)

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 sixteenth aboard a DDG in which data were collected to determine effectiveness; data will be combined with current and future data sets 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 if the ship was using sonar during an MFAS event.

SECTION 5 REFERENCES

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