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Cruise Report, Marine Species Monitoring & Lookout Effectiveness Study Fleet Exercise, August 2014, Cherry Point & Jacksonville Range Complexes



Prepared for:
Commander, United States Fleet Forces Command



Prepared by:

Ms. Jacqueline Bort –United States Fleet Forces, SAIC
Mr. Andrew DiMatteo – Naval Facilities Engineering Command, Atlantic
Ms. Jennifer James –Naval Undersea Warfare Center Division, Newport
Ms. Mandy Shoemaker – Naval Facilities Engineering Command, Atlantic

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List of Acronyms and Abbreviations

BSS	Beaufort Sea State
CG	United States Navy guided missile cruiser
DMMO	data marine mammal observer
ESA	Endangered Species Act
ft	foot (feet)
GPS	global positioning system
hr	hour(s)
JAX	Jacksonville Range Complex
CHPT	Cherry Point Range Complex
ICMP	Integrated Comprehensive Monitoring Program
LMMO	liaison marine mammal observer
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 has developed Monitoring Plans for individual Navy Range Complexes, guided by the Integrated Comprehensive Monitoring Program (ICMP), to provide marine mammal and sea turtle monitoring guidelines 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 Monitoring Program (Department of the Navy 2010). The ICMP outlines objectives for range/project-specific Monitoring Plans 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 a concerted effort to address the eighth scientific objective 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 cruiser (CG). 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. Mandy Shoemaker, Mr. Andrew DiMatteo, Ms. Jacqueline Bort, and Ms. Jennifer James) embarked from 18-23 August 2014 during a Fleet Exercise event in JAX & CHPT. These MMOs were stationed aboard a U.S. Navy guided missile cruiser, hereafter referred to as CG-C. 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 wing if necessary for CG-C 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 CG-C was conducted on the bridge wings (elevated 61.7 feet [ft; 18.8 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 MMO 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 degree 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 CG-C 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 26 hours and 24 minutes searching for marine species during the training event (Table 1). For whole days out at sea, an average of 8.45 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. Note that BSS was accidentally not recorded on the first day (18 Aug) and therefore not included in the BSS analysis. During the event, BSS ranged from 1 to 3/4 (Table 1). The majority of observation time was spent in a BSS of 1 or 3 (40.1% and 25.8%, respectively) which amounts to favorable environmental sighting conditions, with the most sightings occurring in either BSS 1 and 2 (38.5% in both categories, Figure 1).

Table 1. Effort Hours and Environmental Conditions

Date	Team Hours On-Effort	Time	Beaufort Sea State (range)	% Cloud Cover (range)	Visibility
18 Aug	1 hour 2 minutes	1822-1924	NR	70	Excellent
19 Aug	7 hours 24 minutes	738-1033, 1046-1145, 1327-1656	2-3/4	0-25	Good to Excellent
20 Aug	7 hours 52 minutes	744-1143, 1251-1645	1-3	5-65	Moderate to Good
21 Aug	9 hours 56 minutes	726-924, 958-1158, 1245-1644, 1755-1956	1-2	5-62.5	Moderate
Total	26 hours 24 minutes		1 – 3/4	5 – 65	Moderate-Excellent

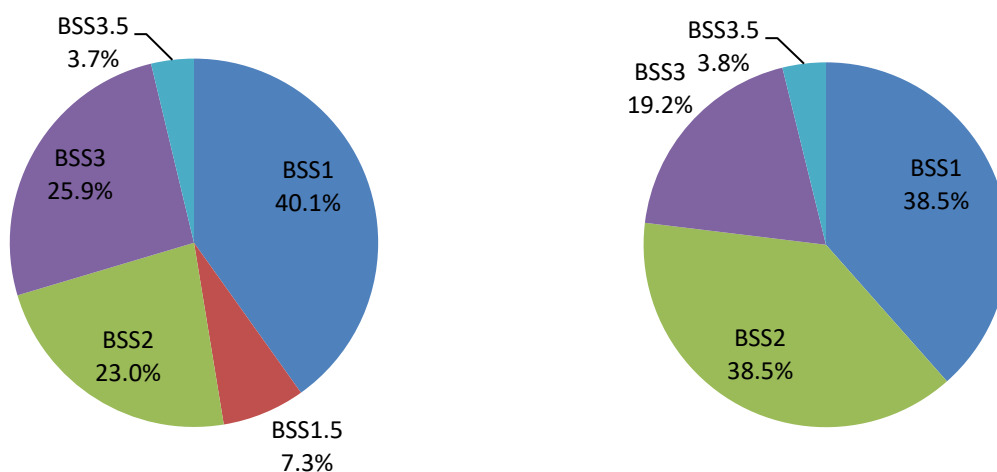


Figure 1. Total percentage of effort (left) and sightings (right) at various Beaufort Sea States (BSS) (18 Aug not included)

In total, 26 unique sightings comprising at least 58 individual marine animals were recorded during the four days of observation (Figure 2 through Figure 5). MMOs made 17 sightings independent of the ship's watchstander team (Table 2). There were three sightings made initially by the watchstander team that were reported in the ship marine mammal log book but not reported by the MMOs. There was an additional sighting made by a watchstander that was relayed to the MMOs but not confirmed. There were five sightings made by both teams.

Seabird sightings were not recorded on this trip. A total of 92 photographs were taken, 25 of which include visible cetaceans. All other photos are of vessels, helicopters, staff, and procedures.

Table 2. Number of Sightings

Date	Independent MMO Sightings	Independent Navy Watchstander Team Sightings	Sightings by both Teams
18 Aug	1	0	0
19 Aug	3	2	5
20 Aug	8	0	0
21 Aug	5	2	0
Total	17	4	5

Trials were successfully conducted on all days of the event, with 22 of the 26 sightings (87%) available for trials, or an average rate of 0.83 trials per hour of effort across all four 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
18 Aug	1 hour 2 minutes	1	0.97	1	0.97
19 Aug	7 hours 24 minutes	10	1.30	7	0.90
20 Aug	7 hours 52 minutes	8	1.01	8	1.01
21 Aug	9 hours 56 minutes	7	0.72	6	0.615
Cumulative	29 hr 51 min	26	0.98	22	0.83

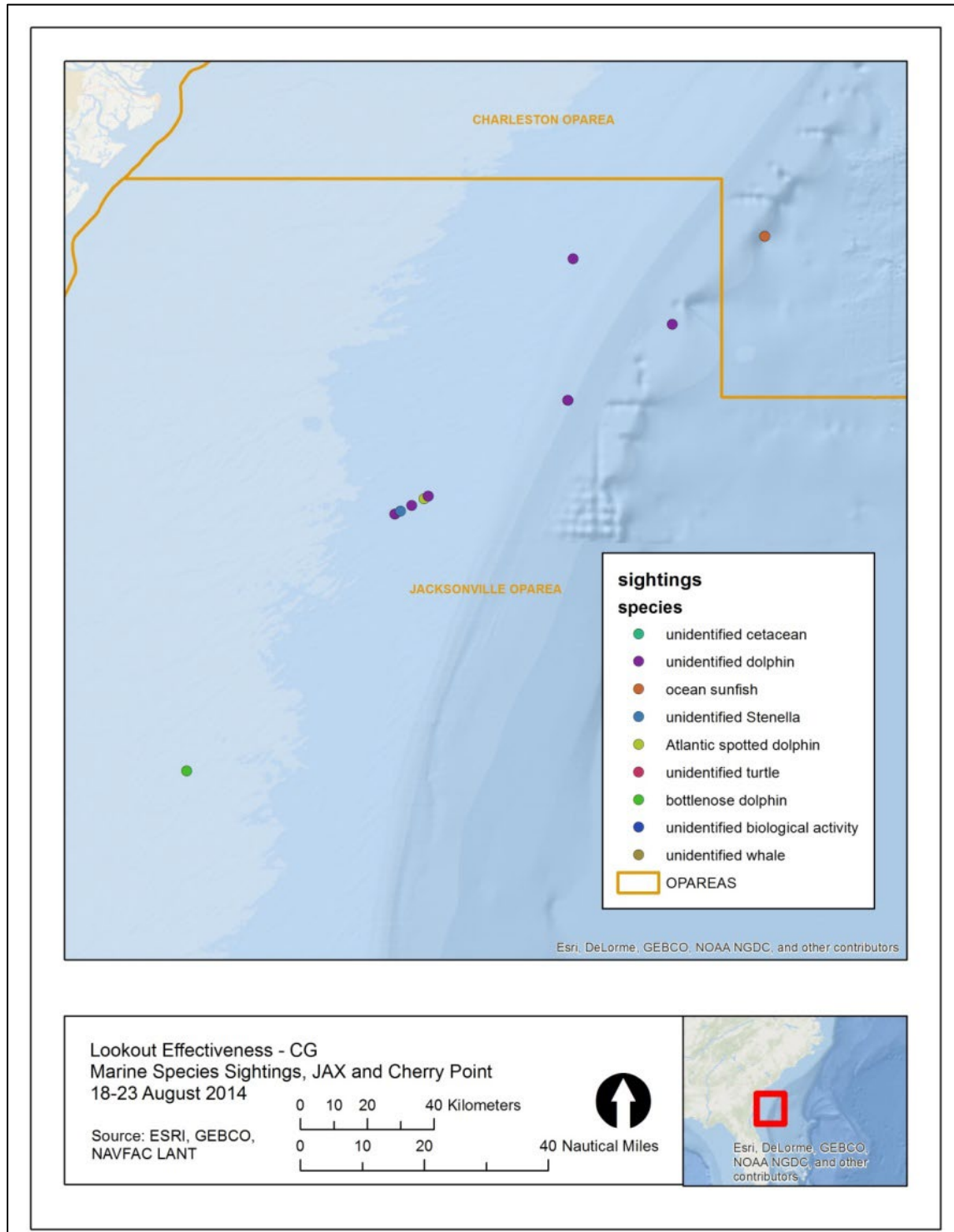


Figure 2. Marine Species Sightings in Jacksonville

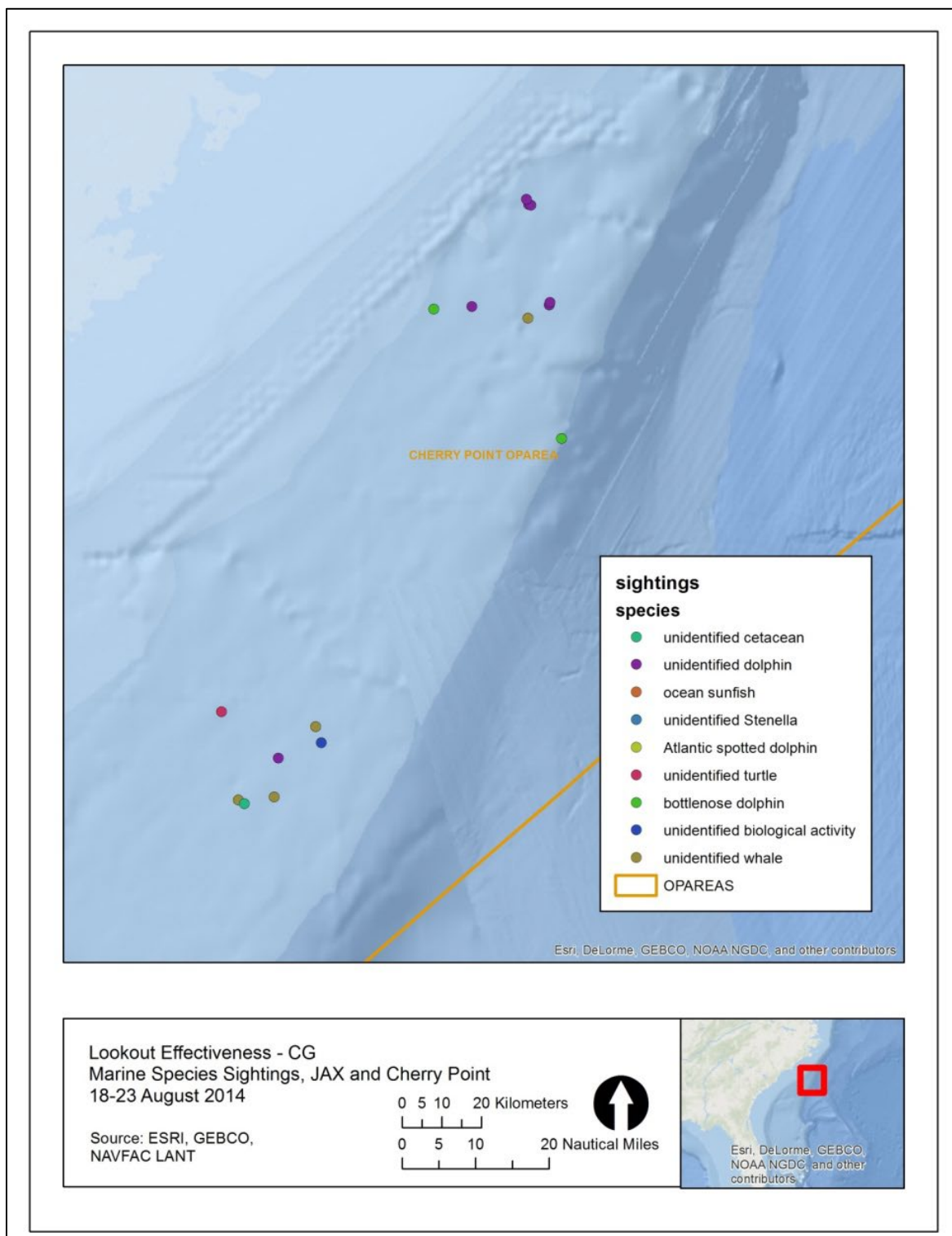


Figure 3. Marine species sightings in Cherry Point

Of the 26 sightings, 5 were identified to the species level, 4 additional to the genus level. Visual sightings included three *Tursiops truncatus*, 1 *Stenella frontalis*, 4 unidentified *Stenella*, 10 unidentified dolphin, 4 unidentified whale, 1 unidentified sea turtle, 1 unidentified cetacean and 1 *Mola mola* (ocean sunfish.) While the *Mola mola* is not a protected marine species and does not require Navy mitigation measures, it was decided to include it as a datapoint since it was of similar size to a sea turtle and the aft lookout alerted the bridge/MMOs upon seeing it, which is noteworthy given that the fish was submerged. The second day of effort had the greatest frequency of unique sightings, with 1.30 sightings/hour of effort.



Figure 4. Spotted dolphin from sighting 6 on 19 August 2014



Figure 5. Spotted dolphin mom and calf pair from sighting 6 on 19 August 2014

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	8/18/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014
Time (EDT)	18:22:25	7:41:15	7:45:42	7:56:58	8:09:51	8:14:12	10:16:53
Location	30.470611 -80.7716	31.063856 -80.211551	31.07055 -80.1964	31.08362 -80.16673	31.09893 -80.13362	31.104625 -80.122042	31.324984 -79.747291
Detection Sensor	MMO	MMO/LO	LO	MMO	MMO	MMO	MMO
Species/Group	Bottlenose Dolphin	Unidentified Dolphin	Unidentified Stenella (spotted)	Unidentified Dolphin	Atlantic spotted dolphin	Unidentified Stenella (spotted)	Unidentified Stenella (spotted)
Group Size estimate (estimated range)	6 (3-10)	4 (2-6)	3 (2-6)	2 (1-4)	2 (1-4)	4 (1-6)	4 (2-6)
# Calves	0	0	0	0	0	1	0
Bearing (relative)	355	70	350	3	280	340	5
Distance (m)	10	20	10	5	5	50	5
Animal motion	Closing	Closing	Closing	Closing	Closing	Closing	Closing
Sighting Cue	Body	Body	Body	Body	Body	Body	Body
Behavior	Travel	Jump/Bowride	Bowride	Bowride	Bowride	Bowride	Bowride
Environmental Information							
Wave height (ft)	L	L	L	L	L	L	L
Visibility	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Good
Beaufort Sea State	Not recorded	2	2	2	2	2	2
Cloud cover (%)	70	5	5	5	5	5	25
Glare (%)	0	50	50	50	50	50	45
Operational Information							
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship bearing (true)	90	60.8	60	59.6	59	60	53
Mitigation implemented	None	None	None	None	None	None	None
Comments	No Lookouts on Bridge Wing	Lookouts saw at same time as MMO	Spotted dolphin but unsure of which species. Lookout saw before observer	Probable resight of 2	Lookouts saw soon after	Lookouts saw soon after. Photo of calf taken	No Lookouts on Starboard

Table 4. 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	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/20/2014	8/20/2014	8/20/2014	8/20/2014
Time (EDT)	10:17:11	14:17:00	15:33:43	15:57:00	8:24:49	8:50:44	9:21:36	11:28:29
Location	31.325777 -79.7466	31.65 -79.73333	31.701026 -79.2172	31.5 -79.46667	33.586833 -76.463044	33.591407 -76.376404	33.341622 -76.17299	33.569394 -76.24925
Detection Sensor	MMO/LO	LO	MMO	LO	MMO	MMO	MMO	MMO
Species/Group	Unidentified Stenella (spotted)	Unidentified Dolphin	Mola mola	Unidentified Dolphin	Bottlenose Dolphin	Unidentified Dolphin	Bottlenose Dolphin	Unidentified Whale
Group Size estimate (estimated range)	6 (4-7)	3	1	10	3 (2-4)	1	4 (3-6)	Unknown
# Calves	0	0	0	0	0	0	0	Unknown
Bearing (relative)	270	350	80	1	295	100	0	340
Distance (m)	30	2.74	50	9.14	625	50	30	626
Animal motion	Closing	Unknown	Parallel	Unknown	Closing	Closing	Closing	Unknown
Sighting Cue	Body	Unknown	Body	Unknown	Splash	Body	Body	Blow
Behavior	Bowride	Unknown	Travel	Unknown	Porpoising/Bowride	Travel	Bowriding	Unknown
Environmental Information								
Wave height (ft)	L	M	M	M	M	M	M	L
Visibility	Good	Good	Good	Good	Moderate	Moderate	Moderate	Good
Beaufort Sea State	2	3 to 4	3	3	3	3	3	2
Cloud cover (%)	25	25	25	25	5	40	40	25
Glare (%)	45	30	30	30	10	15	15	5
Operational Information								
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Ship bearing (true)	53	52	351	Not recorded	90.7	90	144	331
Mitigation implemented	None	None	None	None	None	None	None	None
Comments	Lookouts saw at same time as MMO	Lookouts saw, but MMOs did not. Taken from ship MM sighting log book	Aft lookout saw animal about 3 minutes after MMO	Lookouts saw but MMOs did not. Taken from ship MM sighting log book	No lookouts outside	Lookout was observed walking away from bow	No lookouts outside	Lookouts were on deck but floating between the Port and Starboard sides

Table 4. 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
Effort	ON	ON	ON	ON	ON	ON	ON
Date	8/20/2014	8/20/2014	8/20/2014	8/20/2014	8/21/2014	8/21/2014	8/21/2014
Time (EDT)	12:48:33	12:51:09	14:57:36	15:05:11	10:04:08	13:07:00	14:23:06
Location	33.59393 -76.2010	33.59911 -76.1995	33.78436 -76.2474	33.79396 -76.2528	32.82125 -76.9452	32.73317 -76.8167	32.65266 -76.9076
Detection Sensor	MMO	MMO	MMO	MMO	LO	LO	MMO
Species/Group	Unidentified Dolphin	Unidentified Dolphin	Unidentified Dolphin	Unidentified Dolphin	Unidentified Turtle	Unidentified Dolphin	Unidentified Whale
Group Size estimate (estimated range)	2 (1-2)	2 (2-3)	unknown	3 (2-5)	1	2	2 (2-3)
# Calves	0	0	0	0	0	0	0
Bearing (relative)	280	270	10	290	90	100	40
Distance (m)	470	376	1879	626	20	18.28	1879
Animal motion	parallel	parallel	unknown	parallel	none	unknown	unknown
Sighting Cue	Body	Body	splash	Body	Body	unknown	Blow
Behavior	Travel	Milling	Unknown	Travel	Unknown	unknown	Unknown
Wave height (ft)	L	L	L	L	L	L	L
Visibility	Good	Good	Moderate	Moderate	Moderate	Moderate	Moderate
Beaufort Sea State	2	2	1	1	1	1	1
Cloud cover (%)	7.5	7.5	37.5	37.5	25	35	5
Glare (%)	2.5	2.5	25	25	7.5	15	12.5
Sonar	OFF	OFF	OFF	OFF	OFF	OFF	ON
Ship bearing (true)	349.5	349.5	350	11.4	180	90	245
Mitigation implemented	None	None	None	None	None	None	None
Comments	No lookouts outside	No lookouts outside	Three lookouts "hanging out" outside	No lookouts outside	MMOs did not see	MMOs did not see	Training lookout had just came outside, did not see

Table 4. Unique Marine Mammal and Sea Turtle Sightings (cont'd)

Data Category	Sighting 23	Sighting 24	Sighting 25	Sighting 26
Sighting Information				
Effort	ON	ON	ON	ON
Date	8/21/2014	8/21/2014	8/21/2014	8/21/2014
Time (EDT)	14:35:18	15:09:09	17:55:51	18:29:28
Location	32.64581 -76.8934	32.65863 -76.8259	32.76221 -76.7191	32.79292 -76.7317
Detection Sensor	MMO	MMO	MMO	MMO
Species/Group	Unidentified cetacean	Unidentified Whale	Unidentified	Unidentified Whale
Group Size estimate (estimated range)	2 (2-3)	2 (2-3)	1	3 (3-4)
# Calves	0	0	0	0
Bearing (relative)	270	300	280	90
Distance (m)	752	940	50	1879
Animal motion	unknown	unknown	unknown	unknown
Sighting Cue	splash	Blow	splash	Blow
Behavior	Unknown	Travel	Unknown	Unknown
Environmental Information				
Wave height (ft)	L	L	L	L
Visibility	Moderate	Moderate	Moderate	Moderate
Beaufort Sea State	1	1	1	1
Cloud cover (%)	5	10	55	57.5
Glare (%)	12.5	1	30	15
Operational Information				
Sonar	ON	ON	ON	ON
Ship bearing (true)	180.9	84.9	151.4	290
Mitigation implemented	None	None	None	None
Comments	No lookouts on Port	Two lookouts on bridge, did not see	Large splash just off bow; Lookouts did not see	Lookouts did not see

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 third aboard a CG 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 CG-C. This information can be used to determine the level of exposure a marine mammal or sea turtles 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.