Appendix D – July 23-26, 2011 Monitoring Report

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NAVSEA
WARFARE CENTERS
PANAMA CITY

Naval Surface Warfare Center
Panama City Division (NSWC PCD)

Marine Species Monitoring

AERIAL MONITORING SURVEYS

TRIP REPORT

September 2011

Acronyms and Abbreviations

DON	Department of the Navy
GOM	Gulf of Mexico
HFAS	High-frequency Active Sonar
ICMP	Integrated Comprehensive Monitoring Program
NSWC PCD	Naval Surface Warfare Center Panama City Division
OPAREA	Operating Area
RDT&E	Research, Development, Test, and Evaluation
SPUE	Sightings Per Unit Effort
SOCAL	Southern California Range Complex
U.S.	United States

Table of Contents

Appendix

Figures

Tables

Section 1 Introduction

Aerial marine-species monitoring for an AN/AQS-20 sonar research, development, test, and evaluation (RDT&E) event occurred, with daily marine-species surveys from 23–26 July 2011. These surveys were taken off the coast of Florida in the Naval Surface Warfare Center Panama City Division (NSWC PCD) Study Area in the Gulf of Mexico (GOM). The AN/AQS-20 is a high-frequency active sonar (HFAS) system used in mine countermeasures detection.

As part of the compliance requirements of the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973, the United States (U.S.) Navy developed the Integrated Comprehensive Monitoring Program (ICMP). The ICMP applies by regulation to those activities on U.S. Navy training ranges and operating areas (OPAREAs) for which the U.S. Navy sought and received incidental take authorizations. To support the U.S. Navy in meeting regulatory requirements for monitoring established under the MMPA Final Rules, and to provide a mechanism to assist with coordination of program objectives under the ICMP, monitoring of marine mammals and sea turtles during this test event included visual surveys from a fixed-wing aircraft.

Section 2 Methods

Study Area

The NSWC PCD Study Area lies primarily off the coast of Florida in the GOM. The area includes both territorial waters 0 to 22 km (0 to 12 nmi) from the shoreline and non-territorial waters (waters that are beyond the 22 km [12 nmi] limit). Monitoring conducted for protected marine species during the AN/AQS-20 sonar test event was focused within the Tango Field of the NSWC PCD Study Area. The Tango Field includes a portion of waters under Warning Area W-151 and is specifically located in the Panama City OPAREA (Figure 1**)**. The testing area for the AN/AQS-20 sonar system is approximately 22 km (12 nmi) offshore, covers an area approximately 21 km^2 (6 nmi^2) in size, and ranges in bottom depth from 28 to 35 (m) (92 to 115 ft).

Aerial-Based Monitoring

Aerial-based monitoring was performed over a four-day period from 23–26 July 2011 (Table 1). Survey methods were consistent with currently accepted Distance Sampling theory (Buckland et al., 2001) and followed a well-established protocol used for surveys in the U.S. Navy's Southern California (SOCAL) Range Complex (Smultea et al., 2009). A survey altitude of approximately 305 m (1,000 ft) and speed of 185 km/h (100 kn) were attempted while on-effort, but might have varied slightly based on weather conditions in the area. Once a marine mammal sighting was made, a focal-follow circling session may have been attempted at 305 m (1,000 ft) or higher. A lower altitude of approximately 210 to 250 m (700 to 800 ft) was established after focal-follows for photography purposes to provide sharper images required for species identification.

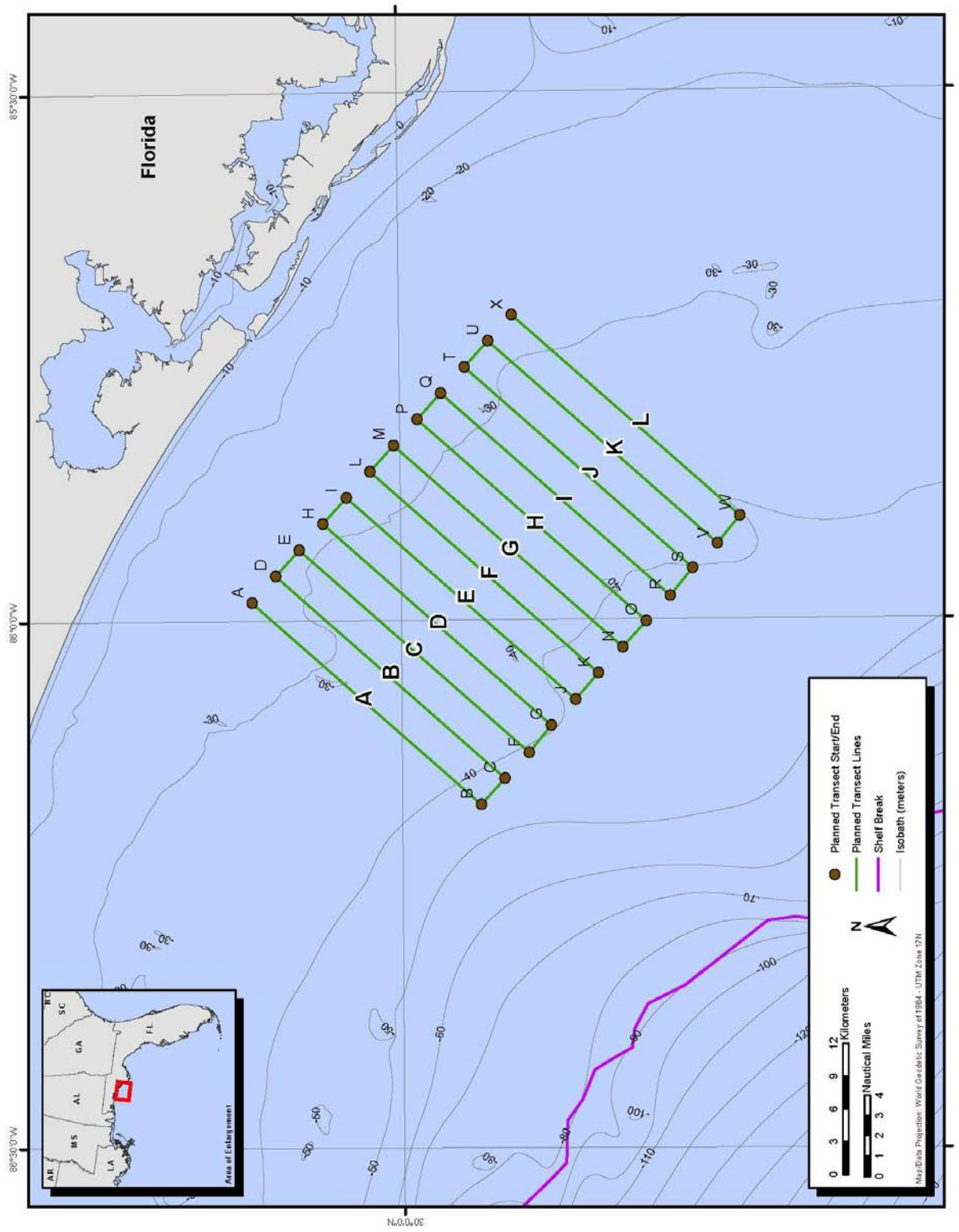

Figure 1. Predetermined Tracklines for the Monitoring Effort for AN/AQS-20 Sonar Test Event for 23–26 July 2011 in the NSWC PCD Study Area.

Table 1. Summary of NSWC PCD Monitoring Effort.

Date (July 2011)	Description	Start Time	Stop Time	Total Survey Minutes*	Total On-Effort Minutes	Trackline On-Effort Distance (km)
23	Transect survey (Pre-Event)	14:39	17:05	146	121	378
24	Transect survey (During-Event)	09:13	11:55	161	103	303
25	Transect survey (During-Event)	13:22	16:11	168	127	400
26	Transect survey (Post-Event)	14:37	17:03	146	118	394
Total				**621 (≈10.3 h)**	**469 (≈7.8 h)**	**1,475 km**

Note: * * Total Survey Minutes reflect minutes occupied in the range/area of interest and include both on-effort (systematic) and off-effort (cross-legs between transects, and circling for focal-follows or species ID) total minutes. Total Survey Minutes may not match the difference between Start Time and Stop Time in the table due to differences in rounding.

The observation platform was a Cessna T337H Turbo Skymaster aircraft operating out of Northwest Florida Beaches International Airport, Panama City Beach, Florida. Four surveys were conducted following pre-determined transect lines covering the study area (approximately 986 km^2 [287 nmi^2]). The endpoints of the lines were waypoints designed to extend beyond the entire range (if permitted by U.S. Navy and U.S. Air Force flight operations) during each survey day for a total flight-time window up to 4 h (Table 1, Figure 1).

The two aerial observers (Table 2) were experienced with line-transect survey methodology, had experience in identification of Atlantic marine mammal and sea turtle species, were knowledgeable of marine mammal biology and behavior, and had previous experience conducting marine mammal and sea turtle observations.

Table 2. Observers and Roles.

Observer	Role(s)
Lenisa Blair	Chief Scientist/Observer
Jennifer Latusek-Nabholz	Observer

Twelve parallel tracklines running northeast-southwest, measuring 27.8 km (15 nmi) in length, and spaced approximately 3.7 km (2 nmi) apart were flown during "systematic" efforts throughout the surveys, providing a total survey coverage area of approximately 986 km^2 (287 nmi^2) (Figure 1). The originally defined lines were followed when possible, but exact transects followed for each survey day were subject to modifications as a result of range exclusion by U.S. Navy and U.S. Air Force operations in the area, or unfavorable weather conditions in the Tango Field of the NSWC PCD Study Area (Table 1, Figures 2 through 6).

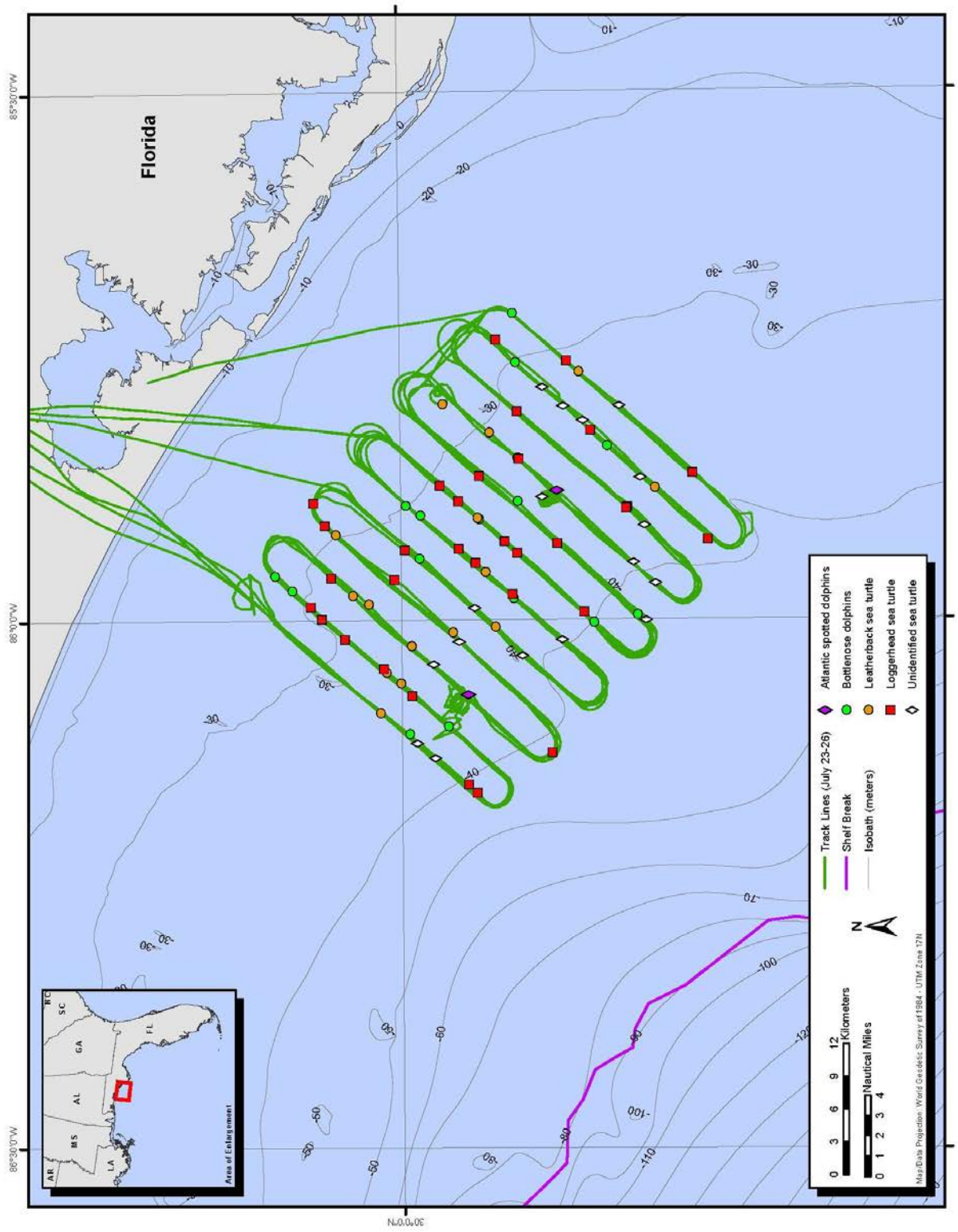

Figure 2. Location of All Cetacean and Sea Turtle Sightings Recorded During the AN/AQS-20 Survey Period (23–26 July 2011).

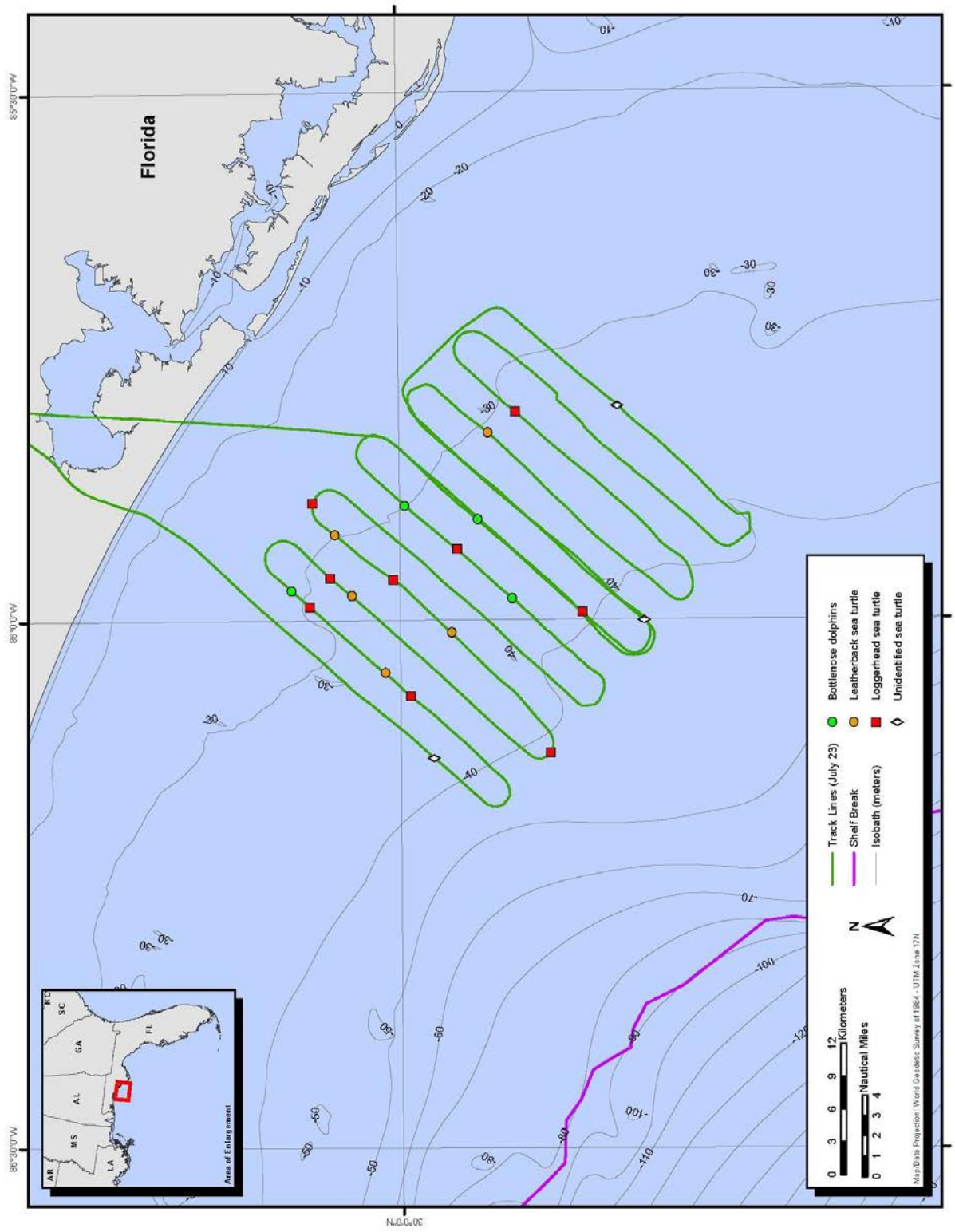

Figure 3. Location of Cetacean and Sea Turtle Sightings Recorded Before the AN/AQS-20 Sonar Event (23 July 2011).

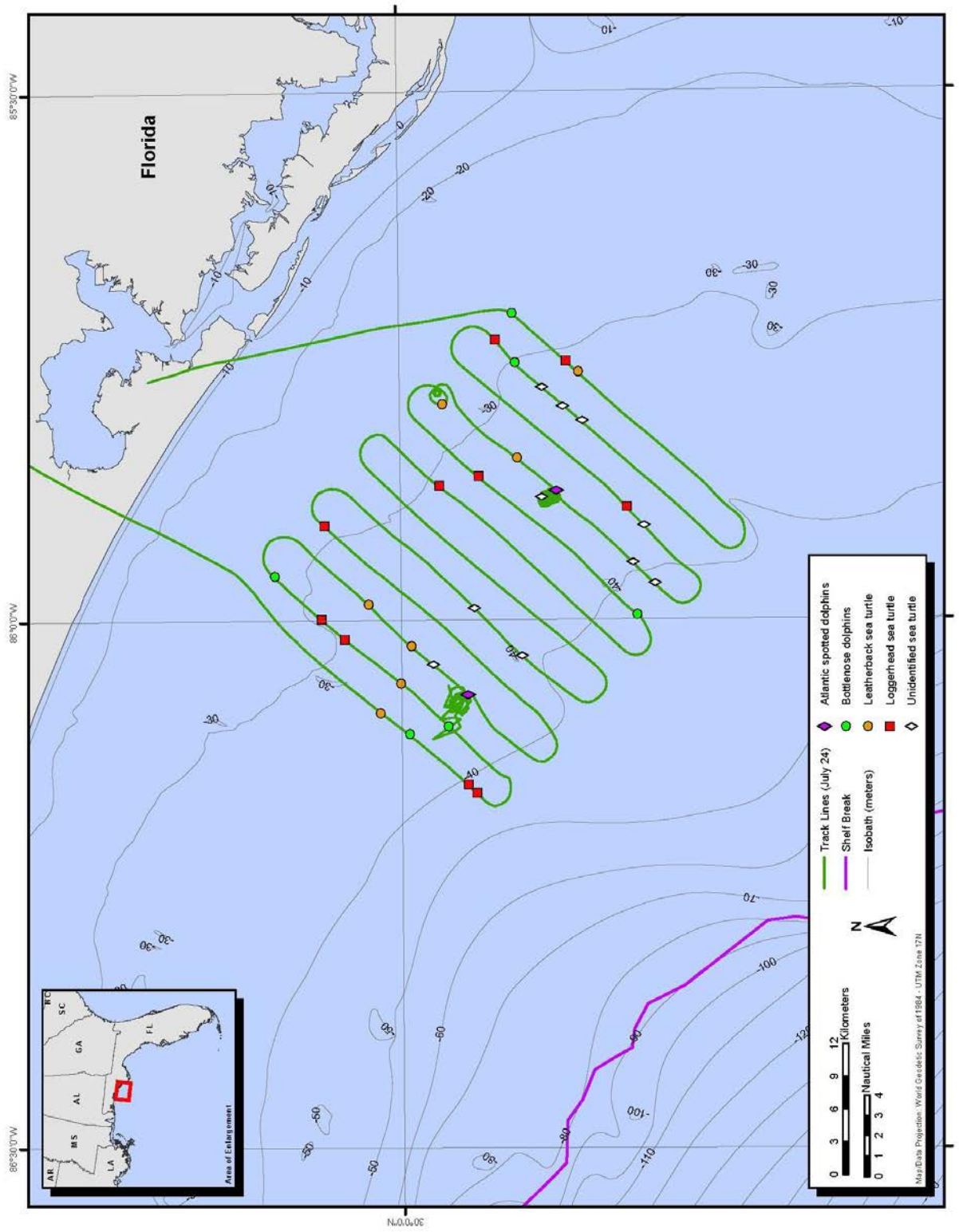

Figure 4. Location of Cetacean and Sea Turtle Sightings Recorded During AN/AQS-20 Sonar Event (24 July 2011).

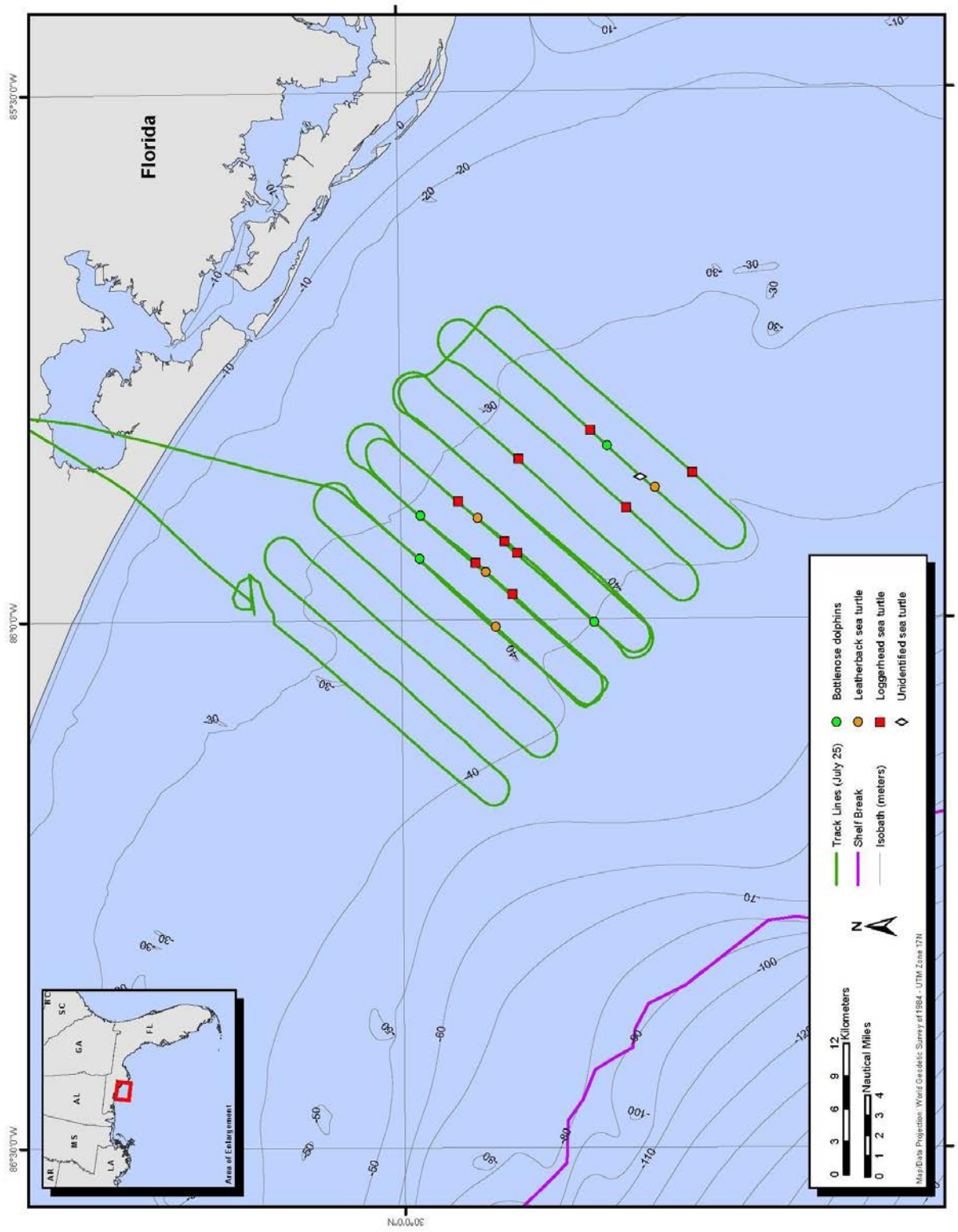

Figure 5. Location of Cetacean and Sea Turtle Sightings Seen During AN/AQS-20 Sonar Event (25 July 2011).

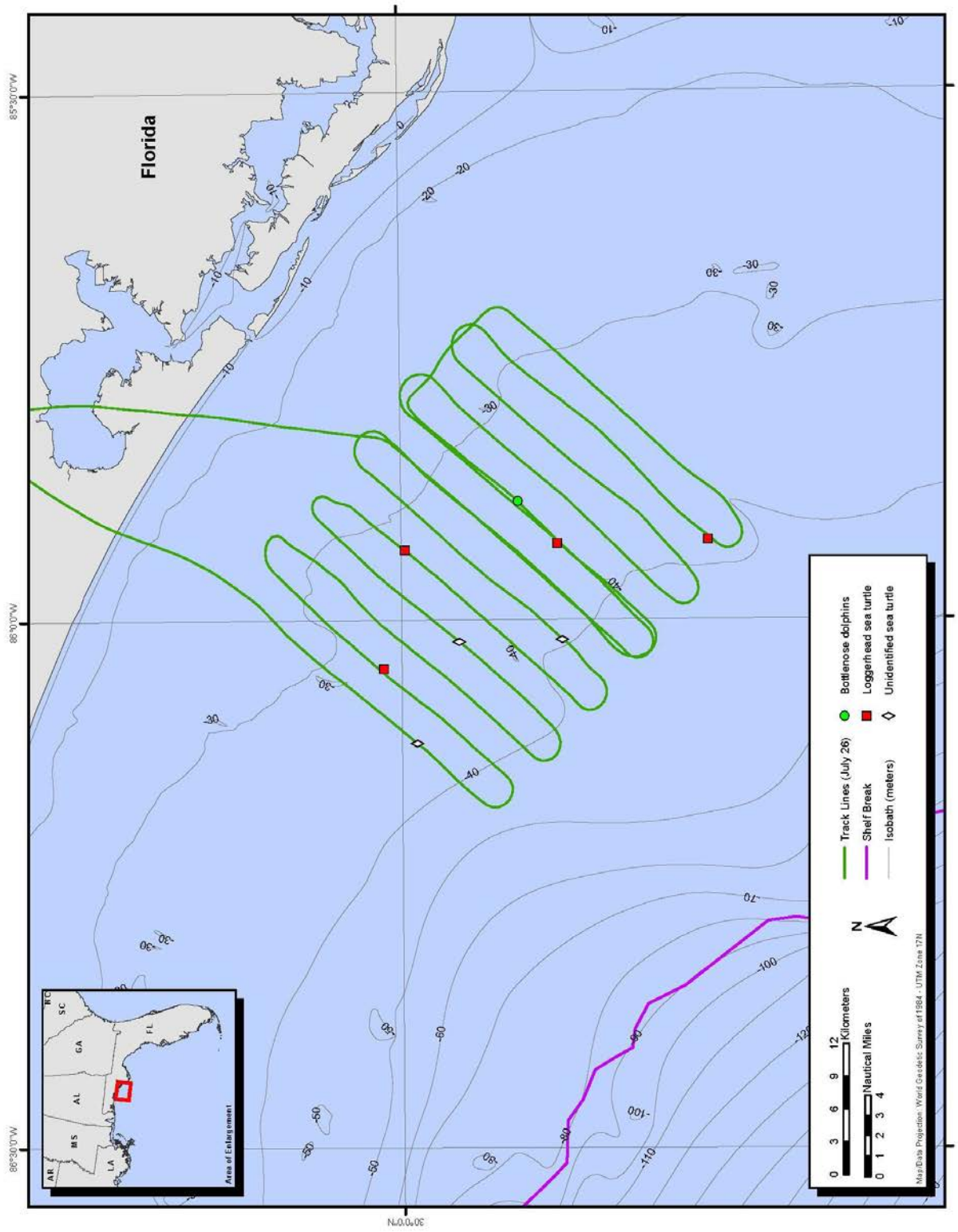

Figure 6. Location of Cetacean and Sea Turtle Sightings Recorded After AN/AQS-20 Sonar Event (26 July 2011).

The general survey approach was as follows:

5. Followed pre-determined transect lines and waypoints using methods described by Smultea et al. (2009) until a sighting occurred. Variables such as sea state, glare, and visibility were recorded.
6. Upon sighting a marine mammal/sea turtle group, recorded basic sighting information per established protocol (see Smultea et al., 2009). As outlined in the NSWC PCD Study Area Monitoring Plan (DON, 2010), information included: (1) species identification and group size; (2) location (relative to observation platform); (3) the behavior of marine mammals and sea turtles; (4) date, time, and environmental and oceanographic conditions associated with each observation; (5) direction of travel; and (6) duration of the observation.
7. If the sighting appeared suitable for a focal-follow, the aircraft increased altitude to approximately 365 to 455 m (1,200 to 1,500 ft) and radial distance increased approximately 0.5 to 1.0 km (0.3 to 0.5 nmi). Then, the aircraft circled the sighting to obtain detailed behavioral information as long as possible and logistically feasible (i.e., Beaufort sea state, visibility, group size, behavior, dive times, aircraft considerations [e.g., fuel], etc.). Focal-follows occurred for a minimum time of 5 min and included an observer taking digital photographs of the group when possible.
8. If the sighting was not selected for a focal-follow, and species and group size were unknown, the aircraft circled the sighting to obtain digital photographs for confirmation on species identification and to estimate group size/composition.

Section 3 Results

Survey Effort

Observers visually surveyed 1,475 km (796 nmi) of systematic (on-effort) track line and 1,937 km (1,046 nmi) of total track line (including the systematic transects, cross-legs between transects, and circling for focal-follows or species ID) during four days for 7.8 h of on-effort status (Table 1). There was two days of pre-event monitoring, one survey day during the event, and one day of post-event survey (Figures 2–6). Beaufort sea state ranged from 1 to 4 and all sightings were made in Beaufort sea states between 1 and 4 (Table 3). A detailed description of environmental, oceanographic, and sighting conditions was recorded and is available, if requested. Sightings per unit effort (SPUE) was calculated as the total number of cetacean (n=16) or sea turtle (n=62) sightings made on-effort divided by the total survey effort (hrs/km [nmi]) . For this monitoring event, the SPUE for cetaceans was equal to 2.05 sightings per hr or 0.011 sightings per km (0.020 sightings per nmi) and the SPUE for sea turtles was equal to 7.95 sightings per hr or 0.042 sightings per km (0.078 sightings per nmi).

Sightings

Seventeen sightings of cetaceans and 65 sightings of sea turtles were recorded during 10.3 h of total survey flight time within the NSWC PCD Study Area (Figure 2, Table 3).

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Table 3. Summary of Sightings.

Sighting No.	Date	Species*	Group Size Best/High/Low			Calves	Start Time	Stop Time	Beaufort Sea State	Latitude	Longitude	Vert. Angle	Distance off Track (km)	Heading	Bottom Depth (m)**	Behavioral Summary
Pre-Event Sightings																
1	7/23/11	Unid ST	1	1	1	-	14:46	-	2	29.973	-86.131	30	0.5	Unk.	30	Unidentified sea turtle at the surface. No disturbance detected.
2	7/23/11	CC	1	1	1	-	14:53	-	2	29.992	-86.072	46	0.3	225	30	Loggerhead turtle at the surface. No disturbance detected.
3	7/23/11	DC	1	1	1	-	14:54	-	2	30.013	-86.050	28	0.6	045	30	Leatherback turtle at the surface. No disturbance detected.
4	7/23/11	CC	1	1	1	-	14:57	-	2	30.075	-85.987	40	0.4	225	30	Loggerhead turtle at the surface. No disturbance detected.
5	7/23/11	TT	3	3	3	-	14:57	-	2	30.090	-85.972	30	0.5	Unk.	20	Three bottlenose dolphins sighted. No disturbance detected.
6	7/23/11	CC	1	1	1	-	15:01	-	2	30.058	-85.960	32	0.5	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
7	7/23/11	DC	1	1	1	-	15:02	-	2	30.040	-85.977	38	0.4	225	30	Leatherback turtle at the surface. No disturbance detected.
8	7/23/11	CC	1	1	1	-	15:09	-	2	29.877	-86.126	26	0.6	045	40	Loggerhead turtle at the surface while off effort. No disturbance detected.
9	7/23/11	DC	2	2	2	-	15:14	-	2	29.958	-86.012	35	0.4	225	30	Leatherback turtle resting at the surface. No disturbance detected.
10	7/23/11	CC	1	1	1	-	15:16	-	2	30.006	-85.962	40	0.4	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
11	7/23/11	DC	1	1	1	-	15:18	-	2	30.054	-85.919	50	0.3	225	20	Leatherback turtle resting at the surface. No disturbance detected.
12	7/23/11	CC	1	1	1	-	15:19	-	2	30.072	-85.889	39	0.4	225	20	Loggerhead turtle resting at the surface while off effort. No disturbance detected.
13	7/23/11	TT	2	2	2	1	15:34	-	3	29.908	-85.980	59	0.2	315	30	Bottlenose dolphin mother and calf travelling NW. No disturbance detected.

Sighting No.	Date	Species*	Group Size Best/High/Low			Calves	Start Time	Stop Time	Beaufort Sea State	Latitude	Longitude	Vert. Angle	Distance off Track (km)	Heading	Bottom Depth (m)**	Behavioral Summary
Pre-Event Sightings (Continued)																
14	7/23/11	CC	1	1	1	-	15:36	-	3	29.953	-85.933	40	0.4	315	30	Loggerhead turtle resting at the surface. No disturbance detected.
15	7/23/11	TT	2	2	2	0	15:38	-	3	29.996	-85.892	50	0.3	090	30	Two bottlenose dolphins travelling East. No disturbance detected.
16	7/23/11	TT	3	3	3	0	15:44	-	3	29.936	-85.905	32	0.5	270	30	Three bottlenose dolphins milling. No disturbance detected.
17	7/23/11	CC	1	1	1	-	15:48	-	3	29.850	-85.993	38	0.4	315	30	Loggerhead turtle resting at the surface. No disturbance detected.
18	7/23/11	DC	1	1	1	-	16:03	-	3	29.927	-85.823	27	0.6	090	30	Leatherback turtle resting at the surface. No disturbance detected.
19	7/23/11	CC	1	1	1	-	16:18	-	4	29.904	-85.803	39	0.4	090	30	Loggerhead turtle resting at the surface. No disturbance detected.
20	7/23/11	Unid ST	1	1	1	-	16:37	-	3	29.820	-85.798	31	0.5	225	30	Unidentified sea turtle resting at the surface. No disturbance detected.
21	7/23/11	Unid ST	1	1	1	-	16:55	-	4	29.799	-86.001	44	0.3	315	40	Unidentified sea turtle resting at the surface. No disturbance detected.
During Event Sightings																
22	7/24/11	DC	1	1	1	-	09:18	-	1	30.018	-86.088	32	0.5	000	30	Leatherback turtle resting at the surface. No disturbance detected.
23	7/24/11	TT	12	12	12	4	09:19	-	1	29.994	-86.108	36	0.4	045	30	Group of 12 bottlenose dolphins milling. No disturbance detected.
24	7/24/11	CC	1	1	1	-	09:21	-	1	29.946	-86.156	42	0.3	270	40	Loggerhead turtle resting at the surface. No disturbance detected.
25	7/24/11	CC	1	1	1	-	09:21	-	1	29.939	-86.164	55	0.2	000	40	Loggerhead turtle resting at the surface. No disturbance detected.
26	7/24/11	TT	2	2	2	0	09:25	-	1	29.962	-86.101	37	0.4	000	30	Two bottlenose dolphins travelling NE. No disturbance detected.
27	7/24/11	DC	2	2	2	-	09:27	-	1	30.001	-86.060	39	0.4	225	30	Two leatherback turtles resting at the surface. No disturbance detected.

Sighting No.	Date	Species*	Group Size Best/High/Low			Calves	Start Time	Stop Time	Beaufort Sea State	Latitude	Longitude	Vert. Angle	Distance off Track (km)	Heading	Bottom Depth (m)**	Behavioral Summary
During Event Sightings (Continued)																
28	7/24/11	CC	1	1	1	-	09:29	-	1	30.047	-86.018	42	0.3	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
29	7/24/11	CC	1	1	1	-	09:30	-	1	30.066	-85.999	28	0.6	135	30	Loggerhead turtle resting at the surface. No disturbance detected.
30	7/24/11	TT	3	3	3	0	09:32	-	1	30.104	-85.958	25	0.7	225	20	Three bottlenose dolphins travelling SW. Off effort sighting. No disturbance detected.
31	7/24/11	DC	2	2	2	-	09:36	-	1	30.027	-85.985	33	0.5	315	30	Two leatherback turtles resting at the surface. No disturbance detected.
32	7/24/11	DC	1	1	1	-	09:38	-	1	29.992	-86.025	58	0.2	225	30	Leatherback turtle resting at the surface. No disturbance detected.
33	7/24/11	Unid ST	1	1	1	-	09:39	-	1	29.974	-86.042	25	0.7	225	30	Unidentified sea turtle resting at the surface. No disturbance detected.
34	7/24/11	SF	16	16	16	2	09:40	-	1	29.946	-86.071	30	0.5	180	30	Group of 16 Atlantic spotted dolphins travelling with surface activity. Varying levels of dispersion. See Appendix for focal-follow data.
35	7/24/11	CC	1	1	1	-	10:12	-	1	30.063	-85.910	30	0.5	225	20	Loggerhead turtle resting at the surface. No disturbance detected.
36	7/24/11	Unid ST	1	1	1	-	10:19	-	1	29.940	-85.989	32	0.5	225	30	Unidentified sea turtle resting at the surface. No disturbance detected.
37	7/24/11	Unid ST	1	1	1	-	10:21	-	1	29.901	-86.034	27	0.4	Unk.	30	Unidentified sea turtle resting at the surface. No disturbance detected.
38	7/24/11	CC	1	1	1	-	10:37	-	2	29.968	-85.873	41	0.4	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
39	7/24/11	TT	1	1	1	0	10:46	-	2	29.806	-85.996	26	0.6	225	40	Lone bottlenose dolphin milling. No disturbance detected.
40	7/24/11	CC	1	1	1	-	10:52	-	1	29.936	-85.864	31	0.5	315	30	Loggerhead turtle resting at the surface. No disturbance detected.

Sighting No.	Date	Species*	Group Size Best/High/Low			Calves	Start Time	Stop Time	Beaufort Sea State	Latitude	Longitude	Vert. Angle	Distance off Track (km)	Heading	Bottom Depth (m)**	Behavioral Summary
41	7/24/11	DC	1	1	1	-	10:57	-	1	29.965	-85.796	39	0.4	225	20	Leatherback turtle resting at the surface. No disturbance detected.
During Event Sightings (Continued)																
42	7/24/11	DC	1	1	1	-	11:02	-	1	29.904	-85.847	60	0.2	180	30	Leatherback turtle resting at the surface. No disturbance detected.
43	7/24/11	SF	14	14	12	0	11:04	-	1	29.872	-85.878	25	0.7	337	30	Group of 14 Atlantic spotted dolphins travelling slowly. See Appendix for focal-follow data.
44	7/24/11	Unid ST	1	1	1	-	11:14	-	1	29.884	-85.884	Unk.	Unk.	Unk.	30	Unidentified sea turtle resting at the surface off effort. No disturbance detected.
45	7/24/11	Unid ST	1	1	1	-	11:22	-	1	29.809	-85.946	27	0.6	Unk.	30	Unidentified sea turtle resting at the surface. No disturbance detected.
46	7/24/11	Unid ST	1	1	1	-	11:23	-	1	29.791	-85.966	55	0.2	Unk.	40	Unidentified sea turtle resting at the surface. No disturbance detected.
47	7/24/11	Unid ST	1	1	1	-	11:27	-	1	29.800	-85.911	20	0.8	045	30	Unidentified sea turtle resting at the surface. No disturbance detected.
48	7/24/11	CC	1	1	1	-	11:28	-	1	29.814	-85.894	22	0.8	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
49	7/24/11	CC	1	1	1	-	11:36	-	1	29.921	-85.735	40	0.4	270	20	Loggerhead turtle resting at the surface. No disturbance detected.
50	7/24/11	TT	1	1	1	0	11:37	-	1	29.905	-85.757	45	0.3	225	30	Lone bottlenose dolphin travelling SW. No disturbance detected.
51	7/24/11	Unid ST	1	1	1	-	11:38	-	1	29.883	-85.780	35	0.4	270	30	Unidentified sea turtle resting at the surface. No disturbance detected.
52	7/24/11	Unid ST	1	1	1	-	11:39	-	1	29.866	-85.798	28	0.7	225	30	Unidentified sea turtle resting at the surface. No disturbance detected.
53	7/24/11	Unid ST	1	1	1	-	11:39	-	1	29.850	-85.812	40	0.4	270	30	Unidentified sea turtle resting at the surface. No disturbance detected.
54	7/24/11	DC	1	1	1	-	11:52	-	1	29.853	-85.766	30	0.5	045	30	Leatherback turtle resting at the surface. No disturbance detected.

Sighting No.	Date	Species*	Group Size Best/High/Low			Calves	Start Time	Stop Time	Beaufort Sea State	Latitude	Longitude	Vert. Angle	Distance off Track (km)	Heading	Bottom Depth (m)**	Behavioral Summary
55	7/24/11	CC	1	1	1	-	11:53	-	1	29.863	-85.755	50	0.3	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
56	7/24/11	TT	1	1	1	-	11:55	-	1	29.907	-85.710	30	0.5	315	20	Lone bottlenose dolphin sighted briefly. No disturbance detected.
During Event Sightings (Continued)																
57	7/25/11	CC	1	1	1	-	14:17	-	3	29.909	-85.976	30	0.5	270	30	Loggerhead turtle resting at the surface. No disturbance detected.
58	7/25/11	CC	1	1	1	-	14:18	-	3	29.939	-85.946	24	0.7	270	30	Loggerhead turtle resting at the surface. No disturbance detected.
59	7/25/11	TT	3	3	3	1	14:20	-	3	29.984	-85.901	35	0.4	338	30	Three bottlenose dolphins travelling NNE. No disturbance detected.
60	7/25/11	CC	1	1	1	-	14:27	-	3	29.953	-85.888	40	0.4	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
61	7/25/11	CC	1	1	1	-	14:29	-	3	29.915	-85.926	45	0.3	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
62	7/25/11	CC	1	1	1	-	14:29	-	3	29.905	-85.937	27	0.6	315	30	Loggerhead turtle resting at the surface. No disturbance detected.
63	7/25/11	CC	1	1	1	-	14:49	-	3	29.903	-85.848	35	0.4	180	30	Loggerhead turtle resting at the surface. No disturbance detected.
64	7/25/11	CC	1	1	1	-	14:59	-	3	29.815	-85.895	29	0.6	270	30	Loggerhead turtle resting at the surface. No disturbance detected.
65	7/25/11	CC	1	1	1	-	15:12	-	2	29.844	-85.821	32	0.5	225	30	Loggerhead turtle resting at the surface. No disturbance detected.
66	7/25/11	TT	2	2	2	0	15:12	-	2	29.830	-85.836	18	0.9	270	40	Two bottlenose dolphins travelling W. No disturbance detected.
67	7/25/11	Unid ST	1	1	1	-	15:14	-	2	29.803	-85.866	22	0.8	045	30	Unidentified sea turtle resting at the surface. No disturbance detected.
68	7/25/11	DC	1	1	1	-	15:14	-	2	29.791	-85.876	30	0.5	045	30	Leatherback turtle resting at the surface. No disturbance detected.
69	7/25/11	CC	1	1	1	-	15:20	-	2	29.760	-85.862	38	0.4	270	30	Loggerhead turtle resting at the surface. No disturbance detected.

Sighting No.	Date	Species*	Group Size Best/High/Low			Calves	Start Time	Stop Time	Beaufort Sea State	Latitude	Longitude	Vert. Angle	Distance off Track (km)	Heading	Bottom Depth (m)**	Behavioral Summary
70	7/25/11	TT	2	2	2	0	15:43	-	3	29.842	-86.003	41	0.4	203	30	Two bottlenose dolphins travelling SSW. No disturbance detected.
71	7/25/11	DC	1	1	1	-	15:47	-	3	29.937	-85.904	45	0.3	225	30	Leatherback turtle resting at the surface. No disturbance detected.
During Event Sightings (Continued)																
72	7/25/11	DC	1	1	1	-	15:56	-	3	29.931	-85.955	28	0.6	270	30	Leatherback turtle resting at the surface. No disturbance detected.
73	7/25/11	DC	1	1	1	-	16:05	-	3	29.923	-86.007	24	0.7	270	30	Leatherback turtle resting at the surface. No disturbance detected.
74	7/25/11	TT	1	1	1	-	16:08	-	3	29.985	-85.942	33	0.5	270	30	Lone bottlenose dolphin travelling W. No disturbance detected.
Post-Event Sightings																
75	7/26/11	Unid ST	1	1	1	-	14:43	-	4	29.988	-86.117	38	0.4	315	30	Unidentified sea turtle resting at the surface. No disturbance detected.
76	7/26/11	CC	1	1	1	-	14:51	-	4	30.015	-86.046	25	0.7	090	30	Loggerhead turtle resting at the surface. No disturbance detected.
77	7/26/11	Unid ST	1	1	1	-	15:11	-	4	29.953	-86.021	31	0.5	135	30	Unidentified sea turtle resting at the surface. No disturbance detected.
78	7/26/11	CC	1	1	1	-	15:20	-	4	29.997	-85.934	28	0.6	045	30	Loggerhead turtle resting at the surface. No disturbance detected.
79	7/26/11	Unid ST	1	1	1	-	15:30	-	4	29.868	-86.019	15	1.1	203	30	Unidentified sea turtle resting at the surface. No disturbance detected.
80	7/26/11	CC	1	1	1	-	16:30	-	4	29.748	-85.925	28	0.6	270	30	Loggerhead turtle resting at the surface. No disturbance detected.
81	7/26/11	TT	1	1	1	0	16:48	-	4	29.904	-85.888	35	0.4	225	30	Lone bottlenose dolphin travelling SW. No disturbance detected.
82	7/26/11	CC	1	1	1	-	16:50	-	4	29.872	-85.928	30	0.5	090	30	Loggerhead turtle resting at the surface. No disturbance detected.

*Key: CC = Loggerhead turtle (*Caretta caretta*); DC = Leatherback turtle (*Dermochelys coriacea*); Unid ST = Unidentified sea turtle; TT = Bottlenose dolphin (*Tursiops truncatus*); SF = Atlantic spotted dolphin (*Stenella frontalis*)

**Bottom depths were estimated by mapped figures. Precise estimation was not conducted here, but is available upon request

Four sightings of cetaceans and 17 sightings of sea turtles were made prior to the test event on 23 July 2011 (Figure 3, Table 3). Twelve sightings of cetaceans and 41 sightings of sea turtles were made during the sonar test event during 24–25 July 2011 (Figures 4-5, Table 3). One sighting of cetaceans and seven sightings of sea turtles were made after the test event on 26 July 2011 (Figure 6, Table 3).

Sightings included 15 groups of bottlenose dolphins (*Tursiops truncatus*); 2 groups of Atlantic spotted dolphins (*Stenella frontalis*); 15 loggerhead sea turtles (*Caretta caretta*); 16 groups of leatherback sea turtles (*Dermochelys coricea*); and 17 unidentified sea turtles (Figure 2, Table 3). Due to difficulties associated with relocating sea turtles in a high Beaufort sea state and heavy glare, digital photographs to determine or confirm species identification were not collected for all sea turtle sightings; therefore, some turtles could not be identified to species. Table 4 provides a summary of the sightings made, which includes sightings information and environmental data. Bottom depths for each sighting were estimated in 10 m (30 ft) ranges from the maps and were not estimated more precisely for individual sightings.

Table 4. Summary of Sightings Recorded during Monitoring for AN/AQS-20 Sonar Tests.

Species	Number of sightings	Bottom Depths
Bottlenose dolphin	15	20–50 m (66–164 ft)
Atlantic spotted dolphin	2	30–40 m (98–131 ft)
Loggerhead turtle	32	20–50 m (66–164 ft)
Leatherback turtle	16	20–40 m (66–131 ft)
Unidentified turtle	17	30–40 m (98–131 ft)

Behavior

No visible evidence of distress or unusual behavior was observed for the surveys before the test event, during the test event, or after the test event for the AN/AQS-20 sonar system (Table 3). The team was able to attempt two focal-follows on 24 July 2011 during the test event. The first focal-follow occurred for a period of 13 min spent with a group of 16 Atlantic spotted dolphins. The second focal-follow occurred for a period of 14 min spent with a group of 14 Atlantic spotted dolphins. Detailed behavioral observations made during the focal-follows are presented in Appendix A. Photographs of suitable quality for species identification purposes were collected during several sightings of dolphins and sea turtles.

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APPENDIX A

Focal-Follow Data

Table A-1. Focal-follow behavioral data from the 23–26 July 2011 monitoring efforts before, during, and after the NSWC PCD AN/AQS-20 sonar RDT&E test event. Two focal-follow events were conducted on 24 July 2011; both were from groups of Atlantic spotted dolphins within the survey area.

Record Number	Time	Date	Latitude	Longitude	Recorded Behavior
Sighting Number 34					
Species: *Stenella frontalis*					
1	09:45	7/24/11	29.975	-86.113	Fast travel in tight group heading 225. Min Dispersal = 1, Max Dispersal = 6.
2	09:46	7/24/11	*	*	Travel and splashing heading 225. Min Dispersal = 1, Max Dispersal = 6.
3	09:47	7/24/11	*	*	Travel and splashing heading 225. Min Dispersal = 1, Max Dispersal = 6.
4	09:48	7/24/11	*	*	Travel and splashing heading 225. 12 individuals. Min Dispersal = 1, Max Dispersal = 6.
5	09:49	7/24/11	*	*	Travel and splashing heading 225. Now 16 individuals; groups joining. Min Dispersal = 1, Max Dispersal = 6.
6	09:50	7/24/11	29.952	-86.094	Travel and splashing heading 225. Min Dispersal = 1, Max Dispersal = 6.
7	09:51	7/24/11	29.965	-86.094	Travel and splashing heading 225. Getting in more of a straight line. Min Dispersal = 1, Max Dispersal = 4.
8	09:53	7/24/11	29.955	-86.079	Travel and splashing heading 225. Still in line. Min Dispersal = 1, Max Dispersal = 4.
9	09:54	7/24/11	29.946	-86.078	Travel heading 225. Groups getting more dispersed - still in line. Min Dispersal = 1, Max Dispersal = 4.
10	09:55	7/24/11	29.960	-86.072	Travel heading 203. Not in line now; bunching back up. Min Dispersal = 1, Max Dispersal = 4.
11	09:56	7/24/11	29.950	-86.074	Travel heading 203. Straggling group of 4 milling. Min Dispersal = 1, Max Dispersal = 4.
12	09:57	7/24/11	29.955	-86.075	Group turned around. Travel heading 000. Min Dispersal = 1, Max Dispersal = 4.
13	09:59	7/24/11	29.960	-86.082	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4.
Sighting Number 43					

Record Number	Time	Date	Latitude	Longitude	Recorded Behavior
Species: *Stenella frontalis*					
1	11:04	7/24/11	29.869	-85.882	Slow travel heading 270. Min Dispersal = 1, Max Dispersal = 3. Groups - 6 between groups; within 1-3; Slow travel; 1 diving and swimming around the others.
2	11:06	7/24/11	29.878	-85.877	Slow travel heading 270. Min Dispersal = 1, Max Dispersal = 3. Groups - 6 between groups; within 1-3; Slow travel; 1 diving and swimming around the others.
3	11:07	7/24/11	29.878	-85.887	Slow travel heading 293. Min Dispersal = 1, Max Dispersal = 3. Forming one group now; circular group packed in together.
4	11:08	7/24/11	29.880	-85.885	Slow travel heading 315. Min Dispersal = 1, Max Dispersal = 4. Forming one group now; circular group packed in together.
5	11:09	7/24/11	29.876	-85.879	Slow travel heading 315. Min Dispersal = 1, Max Dispersal = 4. Forming one group now; circular group packed in together.
6	11:09	7/24/11	29.873	-85.888	Slow travel heading 293. Min Dispersal = 1, Max Dispersal = 4. 4 have broken off from rest of group and 5 or 6 body lengths; pairing up in 2s within the groups.
7	11:10	7/24/11	29.882	-85.883	Slow travel heading 293. Min Dispersal = 1, Max Dispersal = 4.
8	11:11	7/24/11	29.883	-85.889	Slow travel heading 293. Min Dispersal = 1, Max Dispersal = 3. Forming more of a double file line now; but still swimming.
9	11:12	7/24/11	29.878	-85.892	Slow travel heading 293. Min Dispersal = 1, Max Dispersal = 3. Lead group of 4-5 within 1 body length of one another - chorus line.
10	11:13	7/24/11	29.878	-85.892	Under water.
11	11:14	7/24/11	29.874	-85.889	Slow travel heading 293. Min Dispersal = 1, Max Dispersal = 4. Back up and surfacing and splashing.
12	11:16	7/24/11	29.877	-85.891	Slow travel heading 293. Min Dispersal = 1, Max Dispersal = 4.
13	11:17	7/24/11	29.876	-85.883	Slow travel heading 293. Min Dispersal = 1, Max Dispersal = 4.
14	11:18	7/24/11	29.880	-85.880	All underwater.
15	11:19	7/24/11	29.883	-85.881	Still down – end focal-follow.

*GPS lost signal

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