

**Protected Species Monitoring in the Jacksonville OPAREA
Jacksonville, Florida
January 2013 – December 2013**



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Introduction

This report forms part of a multi-institutional monitoring project intended to provide information on the species composition, population identity, density and baseline behavior of marine mammals and sea turtles present in Navy range complexes along the Atlantic coast. This program began in 2007, with baseline aerial and vessel surveys and a passive acoustic monitoring program in Onslow Bay, North Carolina and has since expanded to include study areas off Jacksonville, Florida and Cape Hatteras, North Carolina. In Onslow Bay, six years of monitoring have yielded a comprehensive picture of the density, distribution and abundance of marine mammals and sea turtles and provided new insights into residency patterns among pelagic delphinid cetaceans in this region. More than four years of monitoring in Jacksonville have provided similar information on the density and distribution of marine mammals and sea turtles in this area. In Cape Hatteras, almost three years of surveys have provided preliminary information on the complex patterns of distribution and diversity of the marine mammals and sea turtles in this highly productive area. The current report builds on this past body of work and describes monitoring activities that occurred between January and December 2013.

Acknowledgements

For collaborative efforts we thank our colleagues at Duke University Marine Lab (Kim Urian, Andy Read, Heather Foley, Zach Swaim, Jennifer Dunn, and Lynne Hodge) and St. Andrews University (Charles Paxton). We thank Ed Coffman, owner and operator of Orion Aviation, and his highly skilled pilots: Dave Huddle, Stan Huddle, Cameron Radford, Ryan Macgregor, Greg Souther, Collin Mendenhall, Rocky Walker, John Esties, and Bob Stickle, for excellent flying and a high level of professionalism. We thank Joel Bell for his support of this work. Surveys are conducted under NOAA Scientific Permit No 16473, held by UNCW, and NOAA General Authorization Letter of Confirmation No. 16185 held by Duke University.

Summary of JAX Aerial Surveys

This document is an annual progress report to the U.S. Department of the Navy on aerial surveys conducted in the offshore waters of Jacksonville, Florida between January 2013 and December 2013. The goal was to survey the entire site (10 tracklines) twice per calendar month, which was achieved in May where 20 tracklines were flown and September where 23 tracklines were flown. In March, 10 tracklines were flown, followed by 12 in June and 8 in October. During the months of January, February, April, July, August, November and December of 2013 no surveys were conducted due to unfavorable weather conditions or complications with aircraft. A total of 73 tracklines covering 5913km were surveyed across five months.

A total of 100 sightings of 915 cetaceans were recorded while on effort in the study area (Table 1a, Figure 1). Four species of cetaceans were observed while on effort including: bottlenose dolphins (*Tursiops truncatus*; 54 sightings of 309 individuals), Atlantic spotted dolphins (*Stenella frontalis*; 34 sightings of 503 individuals), Risso's dolphins (*Grampus griseus*; six sightings of 71 individuals), pantropical spotted dolphins (*Stenella attenuata*; one sighting of 25 individuals). During five sightings (totaling seven individuals) dolphin species identity could not be established with 100 percent certainty (*i.e.* "unidentified delphinids"). Two off effort sightings, one of short-finned pilot whales (*Globicephala macrorhynchus*) and one of bottlenose dolphins, were observed just offshore of the survey site while transiting between tracklines. These off effort sightings are included in the individual species sighting maps and tables but are excluded from all other calculations. Cetacean sighting rates varied across months with peaks in May and September.

A total of 301 sea turtles were recorded during the study period. Of these turtle sightings, 270 were identified as loggerheads (*Caretta caretta*), 16 as leatherbacks (*Dermochelys coriacea*), and 15 as "unidentified sea turtles" (Tables 9 and 10, Figure 12 and 13). Sea turtles were detected during each day of survey effort, with higher abundances observed in May and September (Figures 11a-c).

As has been demonstrated in our earlier reports and in other aerial survey studies, sightings drop off dramatically as the Beaufort Sea State increases (e.g. Gómez de Segura *et al.* 2006, DeMaster *et al.* 2001, McAlarney *et al.* 2011). Effort corrected cetacean and sea turtle sightings were higher in sea states of 1 or 2 than in sea states ≥ 3 (Figures 4b & 11b).

In addition to cetaceans and sea turtles, other pelagic marine vertebrates, including ocean sunfish and multiple species of sharks and rays, were observed (Tables 11-14, Figure 14). Military, commercial, and recreational vessel traffic was also recorded inside the survey area (Tables 15-17, Figures 15-17).

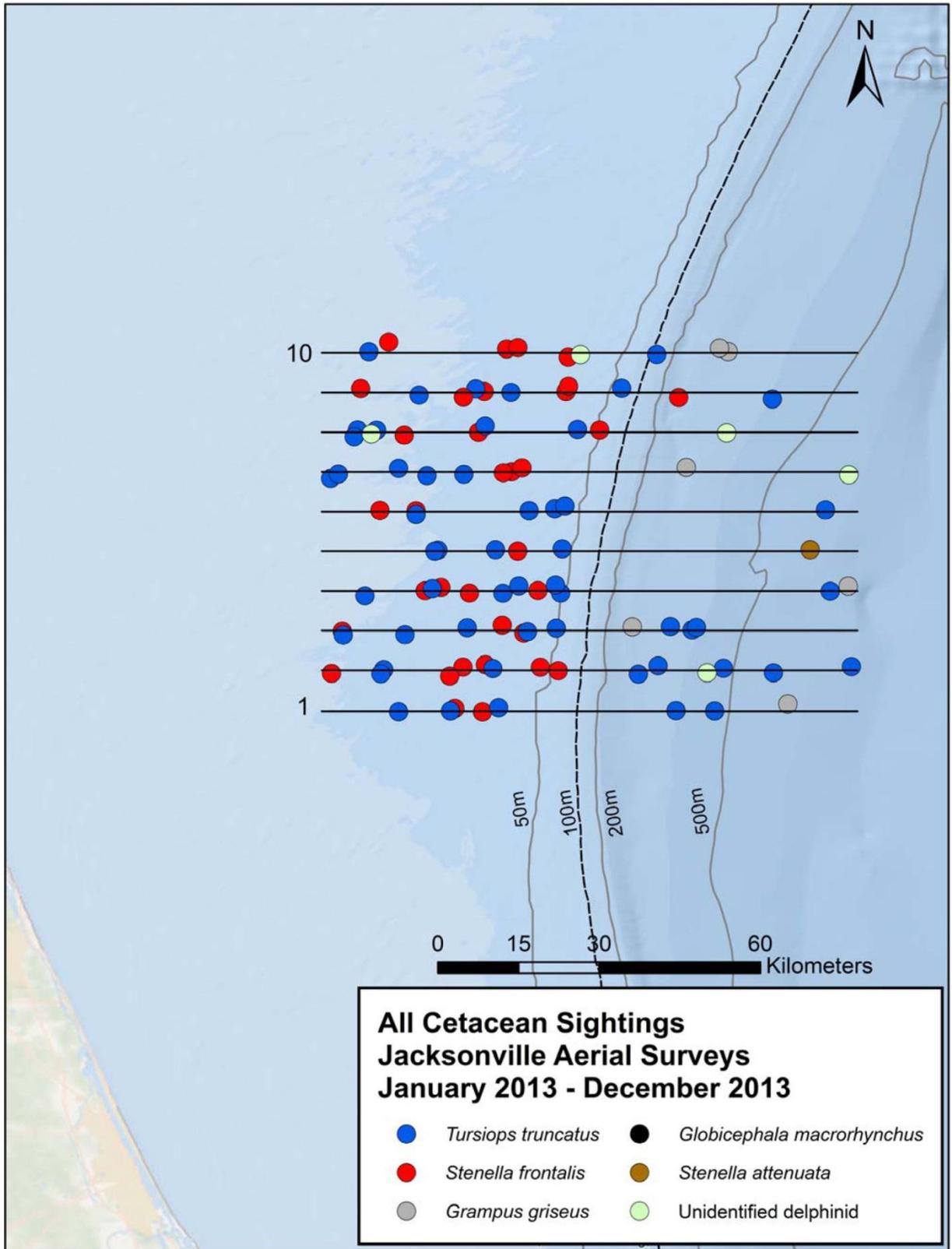


Figure 1. All cetacean sightings during aerial surveys conducted in Jacksonville, Florida from January 2013 to December 2013.

Methodology

Survey design and logistics

The Jacksonville offshore survey area consists of ten 86 km long tracklines spaced 7.4km apart covering 5727km² (Table 2, Figure 2). The site is located offshore of the primary calving grounds for the highly endangered North Atlantic right whale (*Eubalaena glacialis*), which is located off the coast of the southeastern US (reviewed in Waring *et al.* 2010, but see Foley *et al.* 2011). Aerial Early Warning System (EWS) surveys have been conducted in northern Florida and southern Georgia for the past 16 years to warn mariners in real time about the presence of right whales in the region. These surveys are conducted on a daily basis, weather permitting, from December through March. Aerial survey effort in the Jacksonville offshore survey area provided additional coverage, both of the surrounding geographic region and during the months preceding and following the EWS surveys. In past years this has resulted in a number of ancillary right whale sightings that have helped augment inshore activity.

Safety and communication protocols for transiting through the EWS areas were established in January 2009 when offshore survey effort began. The offshore survey team talked with researchers from the Florida Wildlife Service prior to the start of EWS surveys. The protocols outlined included coordination between survey team leaders on the morning of a survey, plane to plane communication at the start of an aerial survey, and the maintenance of a 1000m altitude for the offshore survey plane while transiting through the EWS area between December and March. The protocols also established the 9.3km (5 nm) “buffer zone” between the western margin of the offshore survey area and the eastern margin of the EWS surveys (Figure 2). We have maintained these safety and communication protocols throughout the reporting period.

All aerial surveys were based out of the local Fixed-base Operator (FBO) in Fernandina Beach, Florida. Prior to an aerial survey, pilots with Orion aviation would contact SeaLord at FACFASJAX in Jacksonville, Florida, to get event codes for passage out of and into U.S. territorial waters.

Table 2. Coordinates for trackline end points for the Jacksonville, Florida survey area.

Transect Line		Eastern Waypoint		Western Waypoint	
Line	Latitude	Longitude	Latitude	Longitude	
1	29.965011	-79.801416	29.965011	-80.700000	
2	30.031263	-79.801416	30.031263	-80.700000	
3	30.099694	-79.801416	30.099694	-80.700000	
4	30.165763	-79.801416	30.165763	-80.700000	
5	30.232227	-79.801416	30.232227	-80.700000	
6	30.299477	-79.801416	30.299477	-80.700000	
7	30.365152	-79.801416	30.365152	-80.700000	
8	30.432797	-79.801416	30.432797	-80.700000	
9	30.498866	-79.801416	30.498866	-80.700000	
10	30.566233	-79.801416	30.566233	-80.700000	

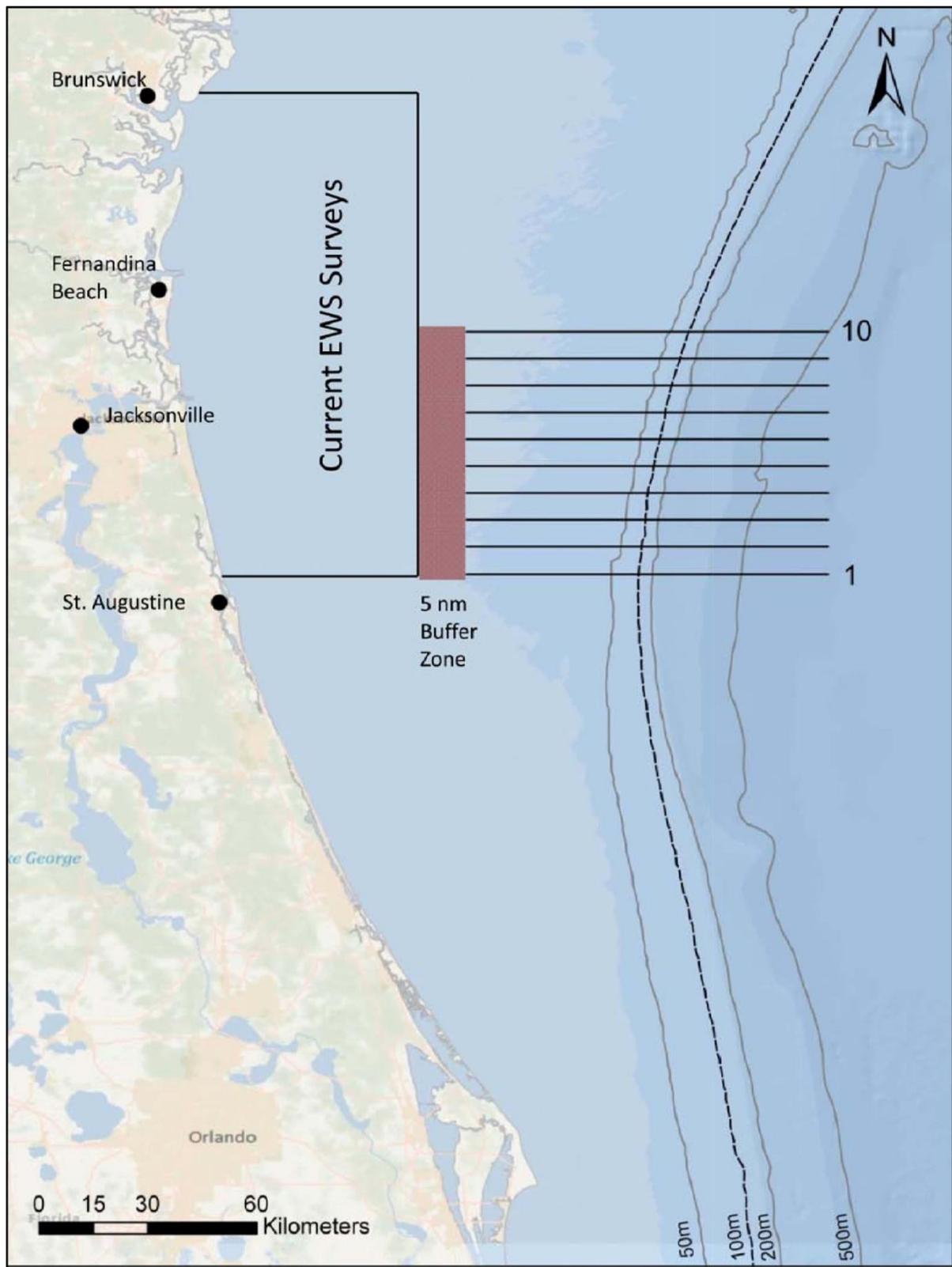


Figure 2. Tracklines 1-10 that compose the Jacksonville, Florida survey site.

Results

A total of 73 tracklines comprising 5913km were surveyed during the 12 month reporting period from January 2013 through December 2013. Minimum coverage of ten tracklines was achieved in four of 12 months, and in October eight tracklines were flown. Unfavorable survey conditions and complications with the planes precluded surveys from being conducted during the other seven months (Table 3).

An average Beaufort Sea State (BSS) value was calculated each survey month to compare conditions across time. The average was calculated by taking the distance flown at each sea state multiplied by the BSS number (*i.e.* BSS 1 distances would be multiplied by 1). These values were summed and divided by the total distance flown that month. Survey effort was terminated when BSS values persisted above a 4. Survey conditions ranged from a BSS 0 to 4, with the majority of the surveys flown in a BSS 2 (49.5%) (Figures 3a-c). Cetacean sighting rates dropped off dramatically at sea state greater than 2. Lower sighting rates in BSS 0 and 1 is likely a result of limited survey time spent in these conditions rather than decreased detection of cetaceans (Figures 4a-c).

The mean sighting distance for all cetacean sightings was 0.72km with greater than 75% of sightings occurring within 1km of the trackline (Figure 5a). The mean sighting distance varied less than 0.15km across the BSS values recorded (Figure 5b). Average sighting distances were calculated after removing a single outlier (1.94km from trackline), which was defined as a value in excess of three standard deviations from the mean.

Table 3. Tracklines, km flown and Hobbs hours during aerial surveys of the Jacksonville, Florida survey area from January 2013 to December 2013. Trackline numbers are listed in the order in which they were flown.

Date	Tracklines Flown AM	Tracklines Flown PM	Total km Flown	Hobbs Hours
22-Mar-2013	10 to 5	1 to 4	864.3	6.4
9-May-2013	10 to 7	6 to 1	836.4	8.0
10-May-2013	5 to 10	1 to 4	803.7	7.6
20-Jun-2013	10 to 5	N/A	510.7	4.2
21-Jun-2013	1 to 6	N/A	386.9	4.8
4-Sep-2013	10 to 7	1 to 6	839.7	7.4
5-Sep-2013	5 to 10	4 to 1	839.6	7.9
6-Sep-2013	10 to 8	N/A	175.9	2.4
17-Oct-2013	10 to 7	1 to 4	656.2	7.0
9 days	73 tracklines		5913.3 km	55.7 hrs

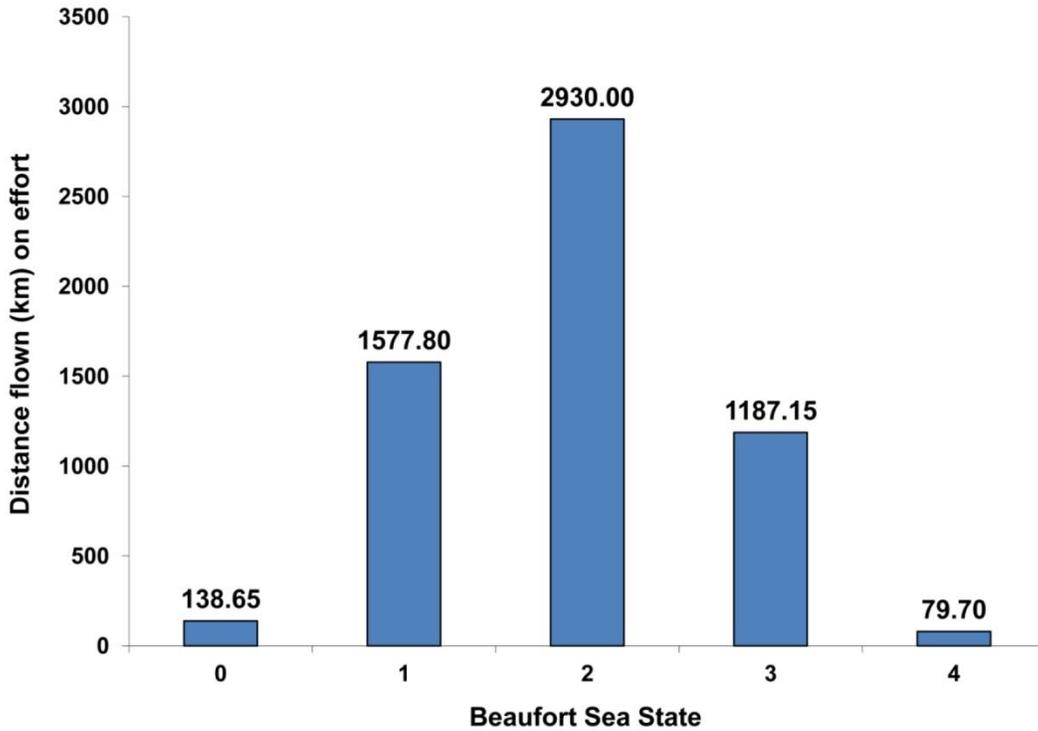


Figure 3a. Total distance surveyed per Beaufort Sea State from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

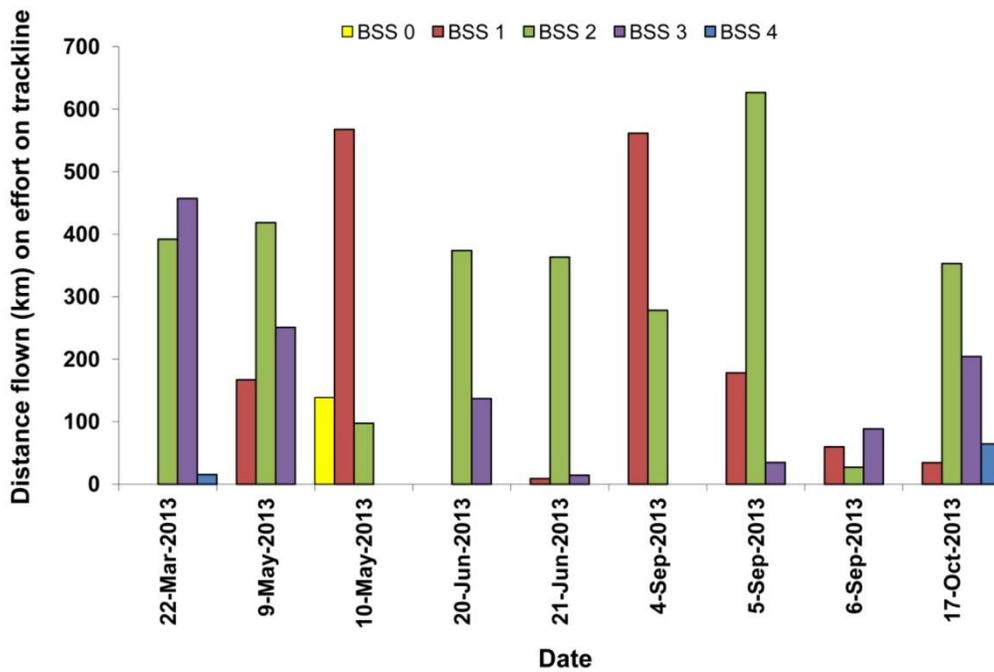


Figure 3b. Effort by Beaufort Sea State for each day from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

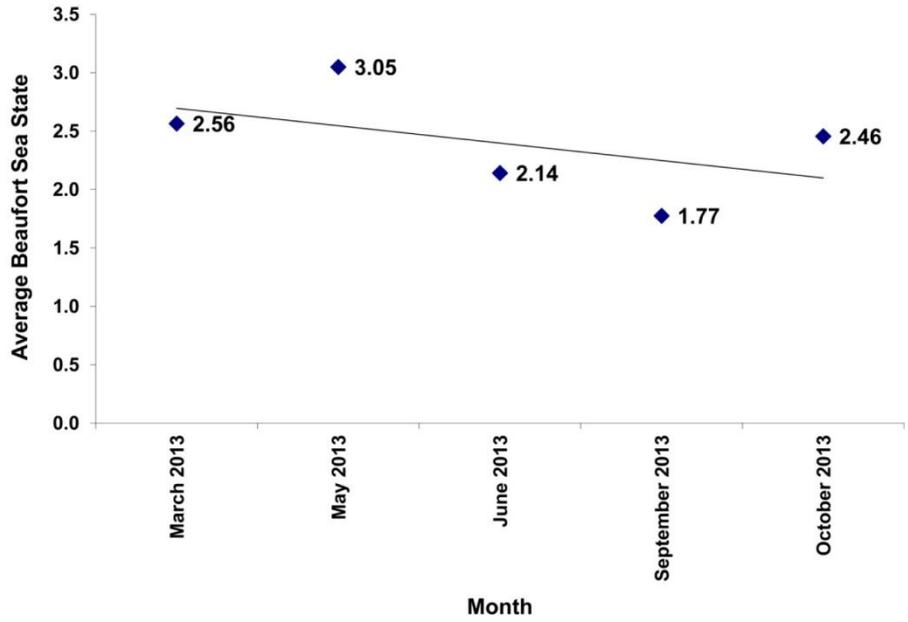


Figure 3c. Average Beaufort Sea State for each month from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area. Values were calculated using the formula $AvgBSS = [(Distance @ 1*1) + \dots / Total\ distance\ flown\ that\ day]$

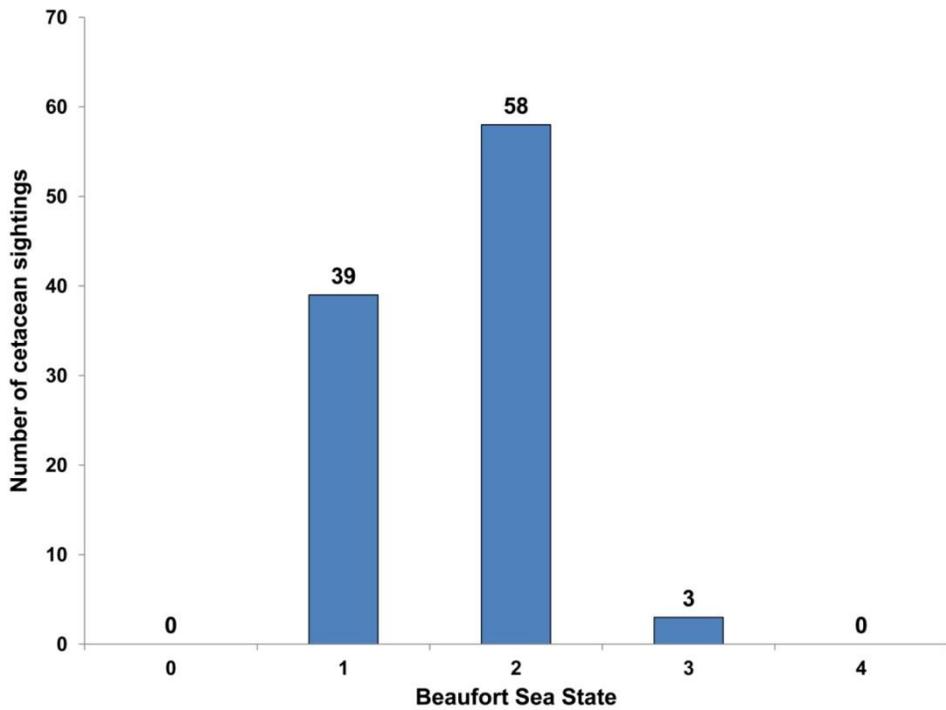


Figure 4a. Number of cetacean sightings per Beaufort Sea State from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

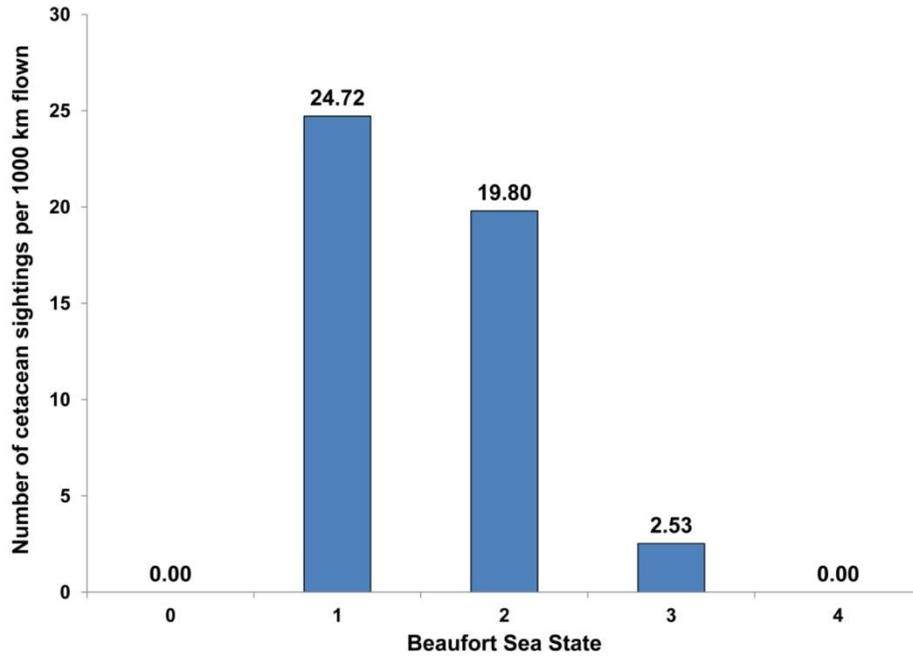


Figure 4b. Cetacean sightings per 1000 km flown by Beaufort Sea State from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

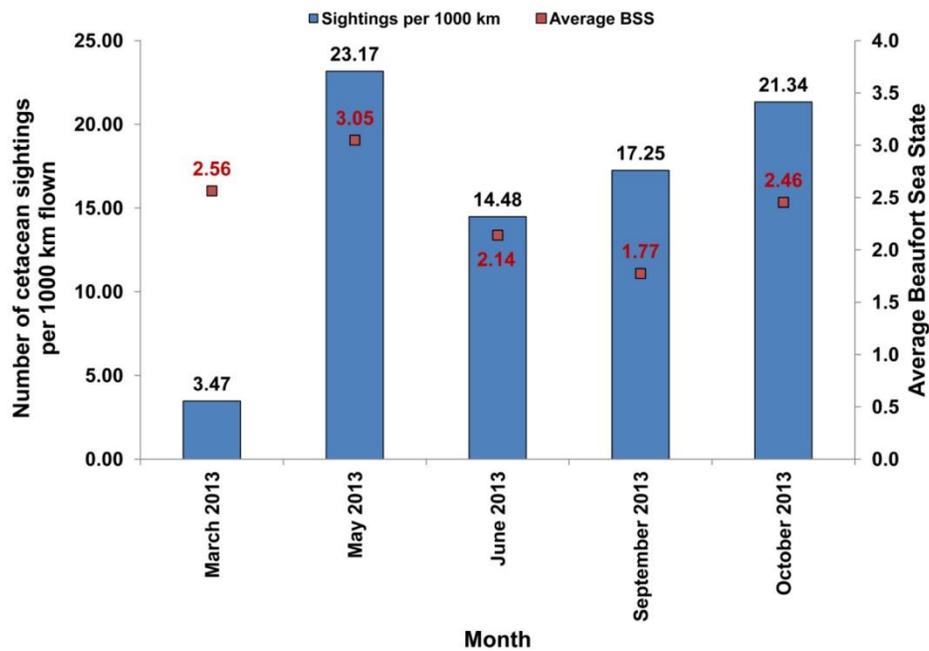


Figure 4c. Cetacean sightings per 1000 km surveyed and the average Beaufort Sea State per month from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

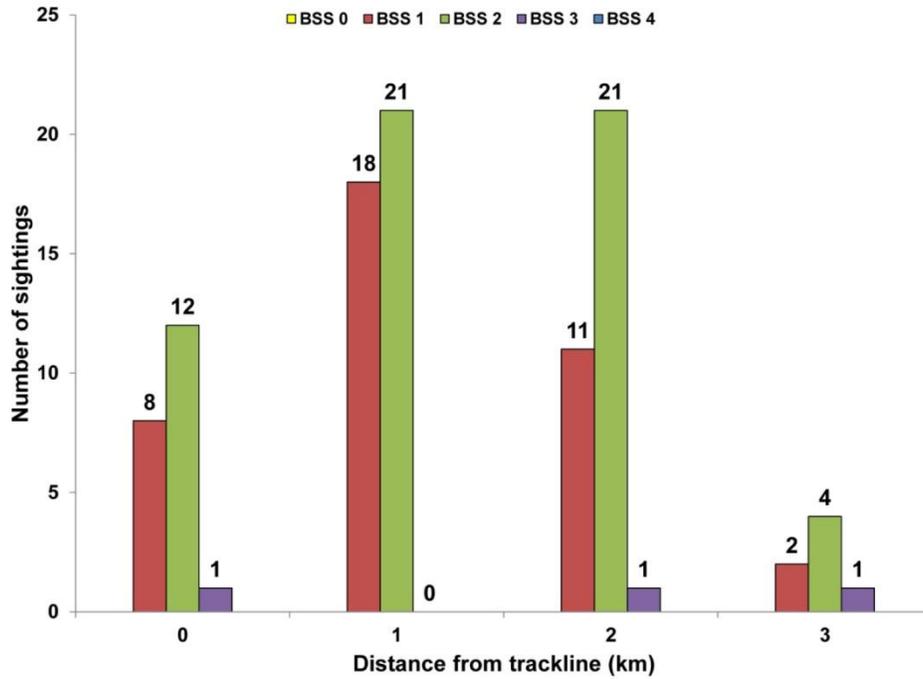


Figure 5a. Sighting distances by Beaufort Sea State for 99 of 99 on effort cetacean sightings from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

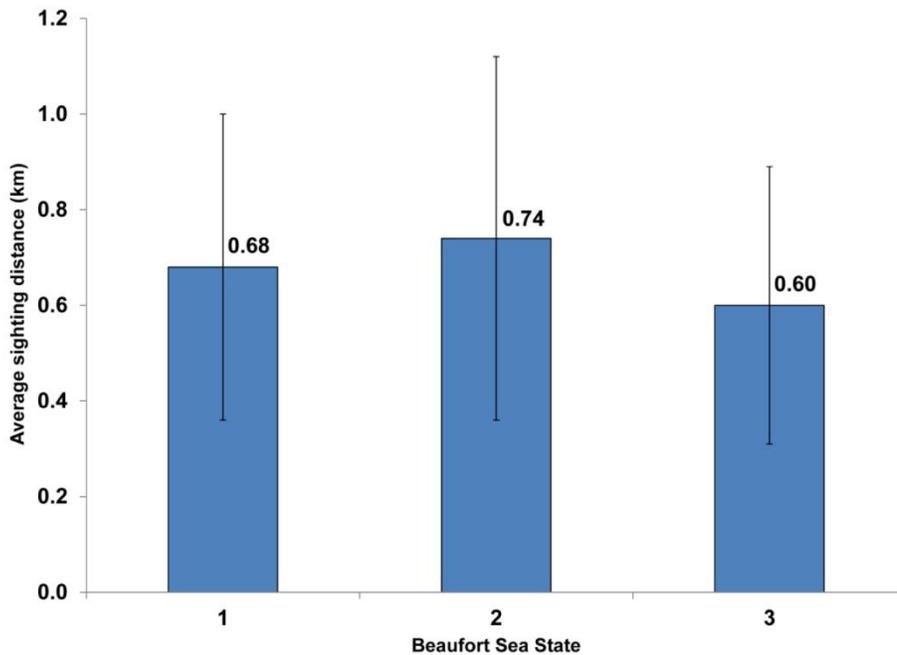


Figure 5b. Average sighting distances by Beaufort Sea State for 99 of 99 on effort cetacean sightings from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area. Error bars denote standard deviation for each category.

Marine Mammal Sightings

A total of 100 sightings of 915 individual cetaceans, representing four species, were observed while on effort during the reporting period. There were no endangered species encountered inside the study area during this reporting period. All identified species encountered are listed below in order of decreasing number of sightings (*i.e.* most commonly sighted species first). While the only sighting of short-finned pilot whales this year occurred while off effort, this species is included here as it has been observed inside the range during previous year. Total number of individuals is based upon the best estimate of group size. Information on individual sighting summaries are in Appendix C. Daily sightings are summarized in Appendix D.

Bottlenose dolphin (*Tursiops truncatus*) (Table 4, Figure 6)

Bottlenose dolphins were the most frequently encountered cetacean (54 sightings for a total of 309 individuals). While group size ranged from 1 to 20 (mean=5.7), 89% of sightings contained 10 or fewer individuals. Based on the distance from shore (*e.g.* greater than 34 km), the bottlenose dolphins observed in this study are most likely of the offshore ecotype (Torres *et al.* 2003). Genetic analysis of biopsy samples (n=16) collected inside the survey area confirm that all dolphins sampled belong to the offshore ecotype (Swaim *et al.* 2013). Bottlenose dolphins were encountered throughout the study area and there was no obvious relationship between group size and bathymetry (Figure 6). This species was encountered during each month surveyed. The current best estimate of offshore bottlenose dolphins in the Western Atlantic Ocean, between central Florida and Canada, is 81588 (CV=0.17) (NOAA Stock Assessment Report; Waring *et al.* 2008). The status of the offshore bottlenose dolphins stock in the Northwest Atlantic is unknown (Waring *et al.* 2008).

Table 4. Bottlenose dolphin (*Tursiops truncatus*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013. Asterisk denotes off effort sightings.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
22-Mar-13	15:18	41	30.106511	-80.117174	E	3	1	90°	3
22-Mar-13	15:37	47	30.165759	-79.849605	W	4	3	60°	3
9-May-13	9:44	8	30.499629	-80.383822	W	9	2	60°	15
9-May-13	10:14	16	30.437419	-80.272449	E	8	3	90°	6
9-May-13	11:04	30	30.359587	-80.524511	W	7	3	100°	3
9-May-13	11:15	35	30.362490	-80.672674	W	7	2	90°	2
9-May-13	13:03	46	30.308573	-80.293577	E	6	2	90°	2
9-May-13	13:39	58	30.236874	-80.298098	W	5	2	90°	1
9-May-13	13:56	66	30.233065	-80.511431	W	5	1	45°	6
9-May-13	14:14	73	30.158026	-80.628438	E	4	2	90°	4
9-May-13	14:26	80	30.162511	-80.300768	E	4	2	100°	3
9-May-13	15:11	101	30.103609	-80.307910	W	3	1	90°	8
9-May-13	15:44	114	30.035930	-80.414157	E	2	2	90°	7
9-May-13	16:03	123	30.028715	-79.944436	E	2	1	90°	3
10-May-13	9:05	5	30.235295	-80.409763	E	5	1	90°	4
10-May-13	9:30	15	30.302153	-79.857351	W	6	1	45°	13
10-May-13	9:46	21	30.304065	-80.310493	W	6	3	100°	2
10-May-13	10:12	34	30.361910	-80.462921	E	7	2	90°	5
10-May-13	11:15	62	30.424997	-80.646442	W	8	2	90°	20
10-May-13	11:47	76	30.506527	-80.198527	E	9	2	60°	8
10-May-13	12:29	92	30.563264	-80.139916	W	10	1	90°	3
10-May-13	12:53	101	30.567770	-80.621680	W	10	2	60°	6
10-May-13	16:22	152	30.174365	-80.370741	W	4	1	90°	5
20-Jun-13	12:41	33	30.266891	-79.788749			3	90°	7
21-Jun-13	9:14	8	29.965022	-80.107845	E	1	2	130°	3
21-Jun-13	9:53	23	30.026501	-80.170572	W	2	1	90°	6
21-Jun-13	10:18	32	30.092055	-80.664690	E	3	2	90°	4
21-Jun-13	10:37	39	30.097726	-80.356120	E	3	2	130°	2
21-Jun-13	10:50	45	30.104927	-80.073517	E	3	2	80°	7
21-Jun-13	11:24	53	30.169890	-80.515658	W	4	2	100°	8
21-Jun-13	12:08	70	30.294445	-80.542902	W	6	2	110°	6
4-Sep-13	11:28	40	30.372094	-80.571879	W	7	2	90°	4
4-Sep-13	11:34	46	30.355202	-80.685832	W	7	2	100°	4
4-Sep-13	13:23	57	29.963326	-80.571982	E	1	1	90°	7
4-Sep-13	13:27	61	29.964453	-80.485104	E	1	2	90°	8
4-Sep-13	13:37	65	29.970169	-80.404552	E	1	2	90°	1
4-Sep-13	13:50	69	29.964516	-80.043015	E	1	2	90°	18
4-Sep-13	14:12	75	30.036378	-80.028405	W	2	1	120°	8
4-Sep-13	14:34	80	30.027039	-80.601611	W	2	1	120°	2
4-Sep-13	14:50	89	30.104249	-80.457311	E	3	1	90°	2
4-Sep-13	15:49	99	30.234601	-80.506338	E	5	2	90°	1
5-Sep-13	9:48	13	30.300761	-80.353526	W	6	1	90°	8
5-Sep-13	11:00	29	30.443162	-80.427117	W	8	3	90°	3
5-Sep-13	11:21	38	30.505443	-80.442981	E	9	2	100°	1
5-Sep-13	11:46	47	30.488333	-79.946208	E	9	2	90°	4
5-Sep-13	14:24	76	30.162144	-80.397471	E	4	3	90°	16
5-Sep-13	15:17	88	30.092804	-80.561323	W	3	2	90°	6
5-Sep-13	15:50	96	30.040520	-80.137770	E	2	2	45°	9

Table 4 (continued). Bottlenose dolphin (*Tursiops truncatus*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013. Asterisk denotes off effort sightings.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
5-Sep-13	16:00	100	30.039238	-79.814079	E	2	2	60°	19
6-Sep-13	10:00	128	30.495026	-80.537739	W	9	2	90°	1
6-Sep-13	10:12	135	30.436669	-80.640863	E	8	2	60°	4
17-Oct-13	10:24	29	30.436226	-80.608824	E	8	1	90°	6
17-Oct-13	14:15	70	30.034130	-80.596828	W	2	1	90°	2
17-Oct-13	15:04	94	30.100921	-80.080960	E	3	1	60°	5
17-Oct-13	15:38	102	30.175892	-80.309161	W	4	2	90°	2

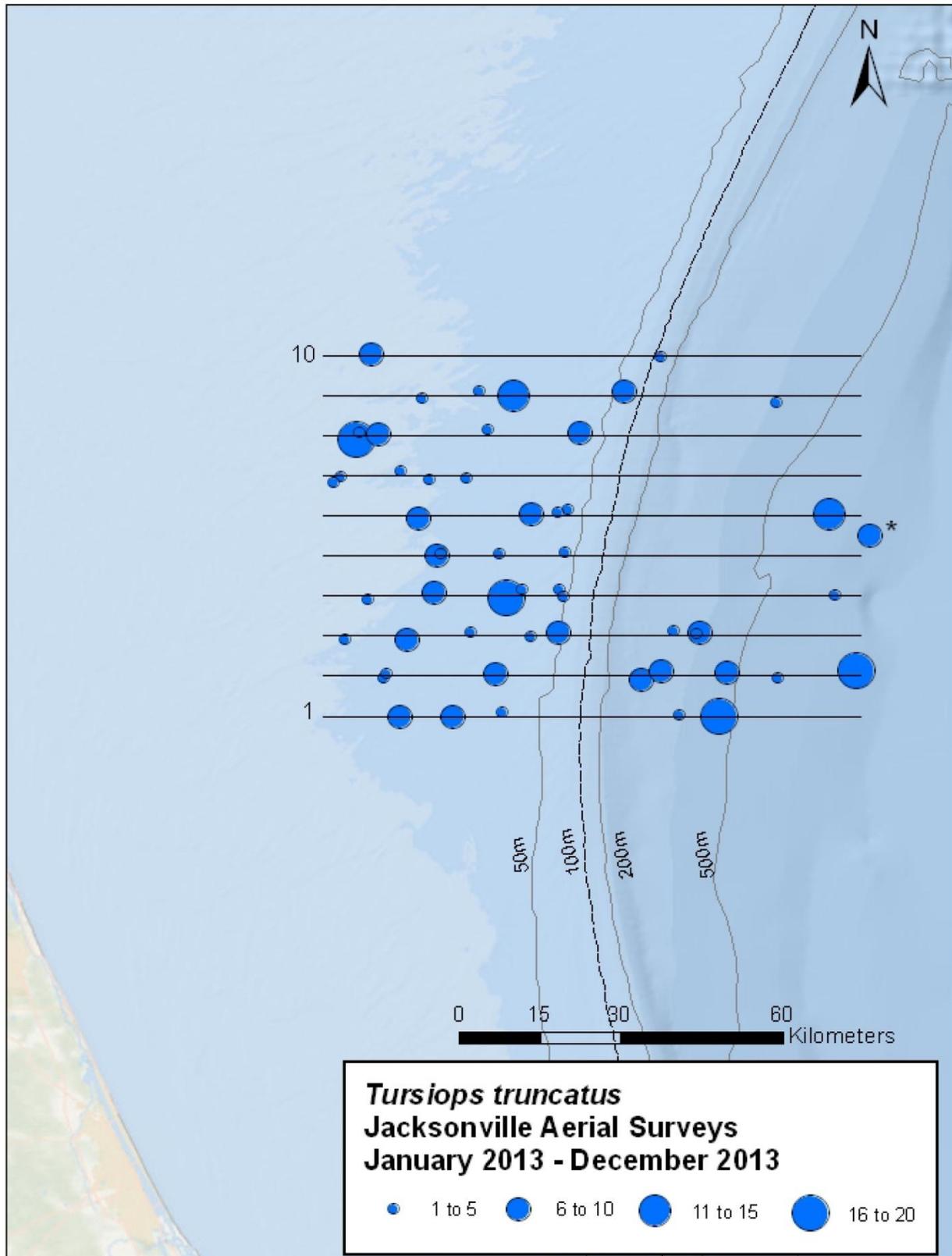


Figure 6. Bottlenose dolphin (*Tursiops truncatus*) sightings indicating group size. Asterisk denotes off effort sightings.

Atlantic spotted dolphin (*Stenella frontalis*) (Table 5, Figure 7)

The Atlantic spotted dolphin was the second most frequently sighted, and numerically most abundant, species encountered in the survey area and were seen in every month surveyed (34 sightings for a total of 503 individuals). Group size ranged from 1 to 58 (mean=14.8). This species was encountered predominantly in shallow water over the continental shelf (Figure. 7). There are two distinct forms, or ecotypes, of the Atlantic spotted dolphin in the western North Atlantic: a heavily spotted form that typically occurs on the continental shelf and is most often encountered at or within the 200m isobath, and a less spotted, smaller form that occurs further offshore and around deep island archipelagoes (Perrin *et al.* 1987, 1994). It is likely, based upon the features observed, that the spotted dolphins seen during the present study belong to the continental shelf variety. The abundance estimate for *S. frontalis* (both the inshore and the offshore forms) in the western North Atlantic is 26798 (CV=0.66) and was determined by aerial and vessel observations; the status of the stock(s) is/are unknown (Waring *et al.* 2012).

Table 5. Atlantic spotted dolphin (*Stenella frontalis*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
22-Mar-13	15:00	36	30.108723	-80.398359	E	3	1	90°	14
9-May-13	10:56	26	30.364507	-80.396673	W	7	1	90°	16
9-May-13	13:46	62	30.233078	-80.372391	W	5	2	90°	9
9-May-13	15:33	110	30.038290	-80.464253	E	2	2	45°	14
9-May-13	15:50	118	30.038170	-80.334790	E	2	2	90°	3
9-May-13	16:36	134	29.962992	-80.431610	W	1	3	90°	6
10-May-13	9:56	26	30.301435	-80.603184	W	6	1	90°	3
10-May-13	10:17	38	30.372800	-80.365265	E	7	2	90°	8
10-May-13	10:56	51	30.436293	-80.235362	W	8	2	60°	58
10-May-13	11:04	56	30.432531	-80.438154	W	8	1	60°	6
10-May-13	11:39	72	30.509741	-80.287540	E	9	2	90°	27
10-May-13	11:55	81	30.491044	-80.103064	E	9	3	90°	30
10-May-13	14:40	114	29.968842	-80.477942	E	1	1	90°	17
10-May-13	15:25	134	30.042331	-80.426692	W	2	2	100°	18
21-Jun-13	12:16	71	30.300538	-80.542854	W	6	2	100°	45
4-Sep-13	9:35	8	30.572533	-80.390993	E	10	1	60°	35
4-Sep-13	10:24	20	30.505879	-80.635534	W	9	1	90°	20
4-Sep-13	11:17	34	30.366270	-80.382744	W	7	2	45°	10
5-Sep-13	11:29	42	30.500759	-80.291870	E	9	2	100°	16
5-Sep-13	12:17	58	30.574702	-80.372299	W	10	2	60°	5
5-Sep-13	14:13	69	30.171990	-80.501133	E	4	2	100°	1
5-Sep-13	14:19	72	30.162467	-80.453415	E	4	2	90°	5
5-Sep-13	14:32	80	30.166837	-80.338649	E	4	3	90°	5
6-Sep-13	9:51	119	30.501176	-80.428540	W	9	3	90°	35
6-Sep-13	9:55	123	30.491543	-80.463564	W	9	2	90°	20
17-Oct-13	9:14	6	30.584009	-80.588475	E	10	3	120°	10
17-Oct-13	9:29	13	30.558824	-80.288020	E	10	2	100°	12
17-Oct-13	10:29	33	30.427726	-80.562642	E	8	2	90°	10
17-Oct-13	13:48	61	30.032212	-80.304650	W	2	1	90°	12
17-Oct-13	14:00	65	30.023095	-80.486503	W	2	3	110°	3
17-Oct-13	14:25	74	30.027669	-80.684144	W	2	1	90°	7
17-Oct-13	14:33	80	30.098440	-80.666253	E	3	1	90°	5
17-Oct-13	14:48	86	30.095534	-80.362398	E	3	2	90°	12
17-Oct-13	15:48	105	30.166598	-80.527591	W	4	2	90°	6

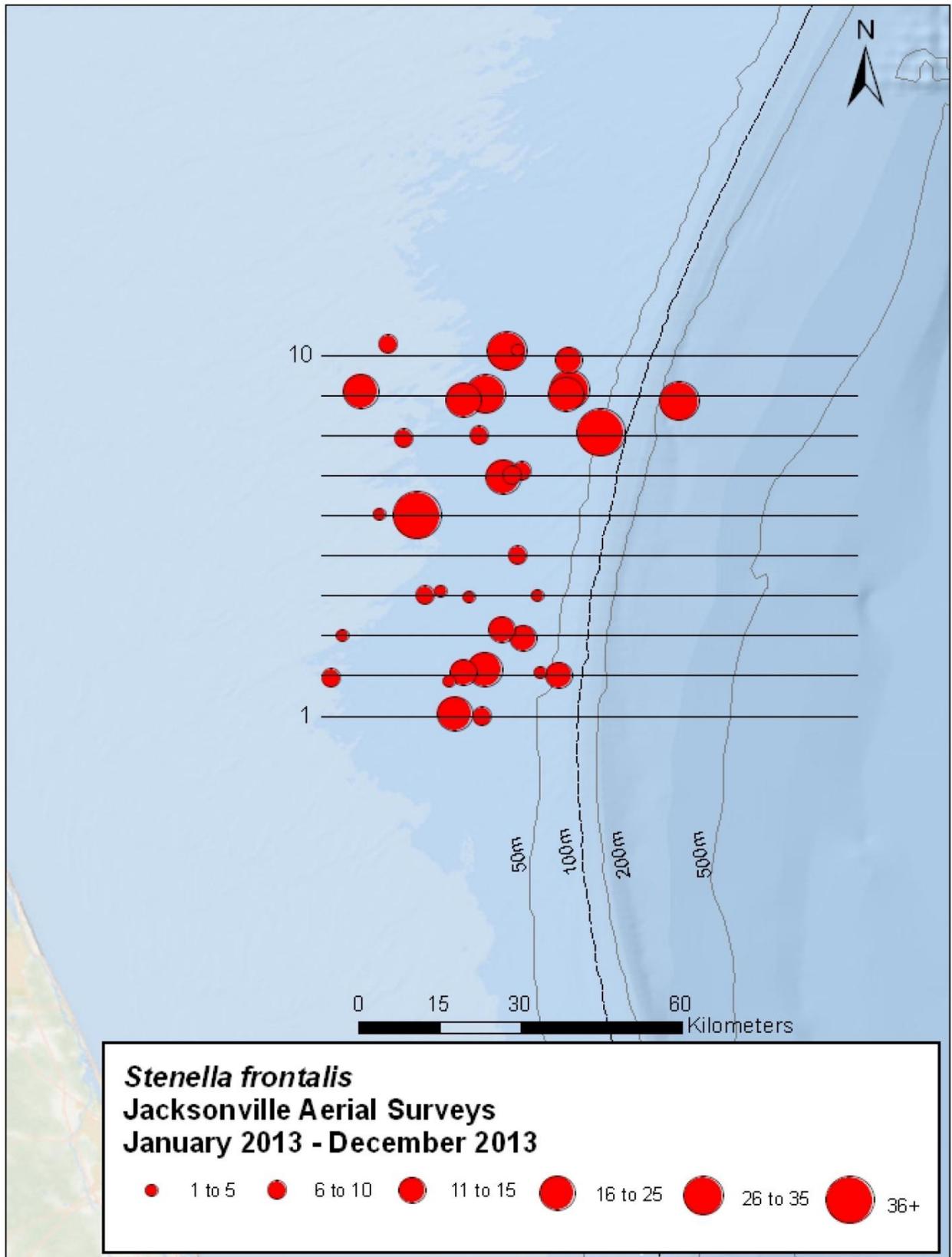


Figure 7. Atlantic spotted dolphin (*Stenella frontalis*) sightings indicating group size.

Risso's dolphin (*Grampus griseus*) (Table 6, Figure 8)

This species was encountered six times for a total of 71 individuals (Figure 8). Group size for this species ranged from 6 to 19 individuals (mean=11.8). Risso's dolphins were recorded in four of the five months surveyed, and were only observed in deeper, offshore waters. Risso's dolphin have been found along the mid-Atlantic continental shelf edge year round, with some movement north during spring, summer and fall, and into the mid-Atlantic bight during winter (Waring *et al.* 2011). The best available estimate for Risso's dolphins, based on results from US Atlantic surveys conducted in 2011, is 15197 (CV=0.55) (Waring *et al.* 2012). The status of this species in the western Atlantic is unknown (Waring *et al.* 2012).

Table 6. Risso's dolphin (*Grampus griseus*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-May-13	14:42	86	30.174165	-79.819369	E	4	3	90°	18
10-May-13	10:30	44	30.373555	-80.090506	E	7	3	100°	6
10-May-13	12:16	88	30.568157	-80.020547	W	10	3	110°	19
21-Jun-13	9:26	13	29.976420	-79.920542	E	1	1	120°	10
5-Sep-13	12:02	54	30.573902	-80.035006	W	10	2	45°	11
17-Oct-13	14:57	90	30.105991	-80.180904	E	3	1	90°	7

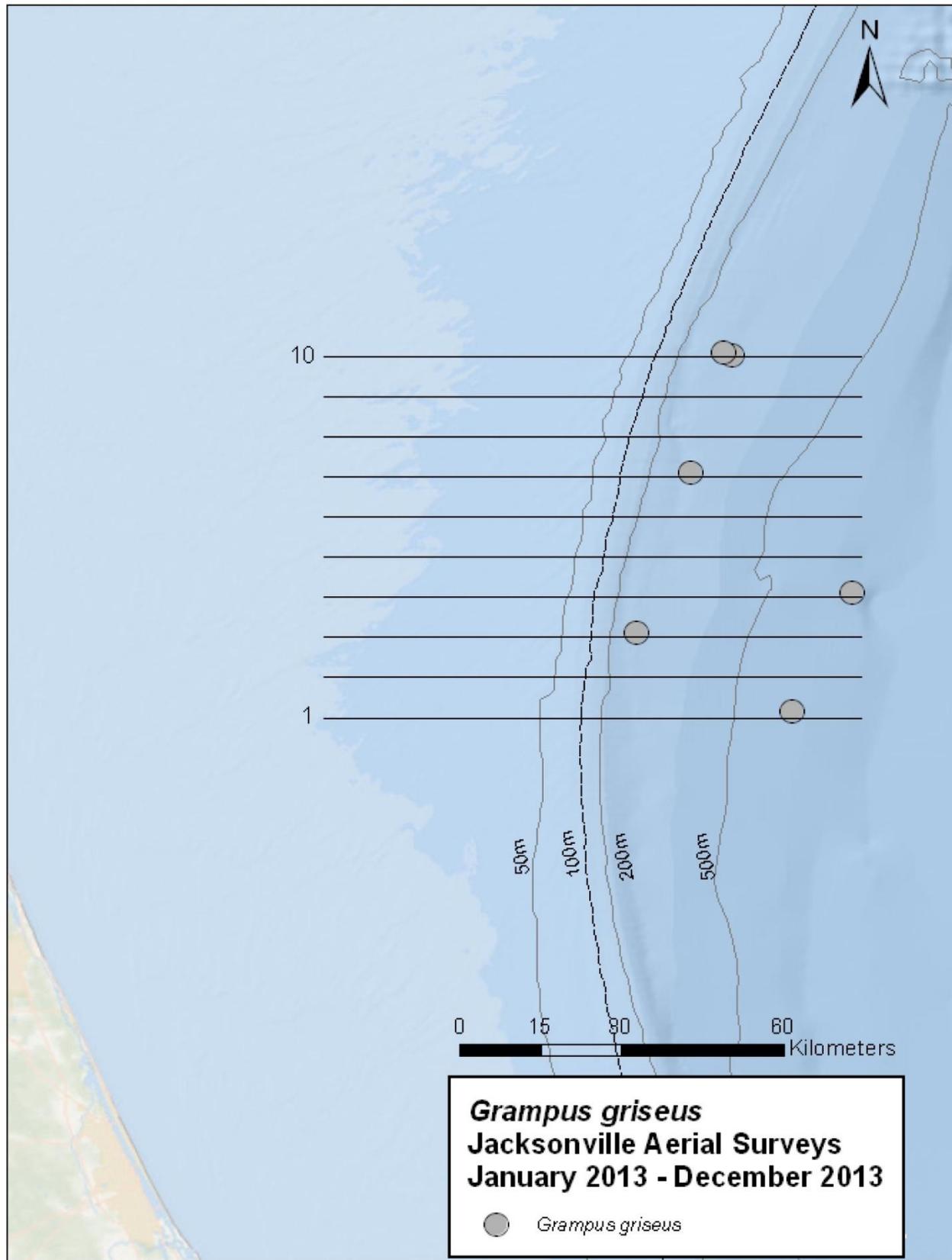


Figure 8. Risso's dolphin (*Grampus griseus*) sightings.

Pantropical spotted dolphin (*Stenella attenuata*) (Table 7, Figure 9)

A single sighting of a group of 25 pantropical spotted dolphins occurred beyond the 500m isobath in the month of September, and represents the first sighting of this species since our surveys began in 2009. The best available abundance estimate for this species is 4439 (CV=0.49) based upon combined estimates of two vessel based surveys conducted in 2004. The status of pantropical spotted dolphins in the western U.S. Atlantic is currently unknown (Waring *et al.* 2007).

Table 7. Pantropical spotted dolphin (*Stenella attenuata*) sighting in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
5-Sep-13	9:13	6	30.235449	-79.883109	E	5	2	100°	25

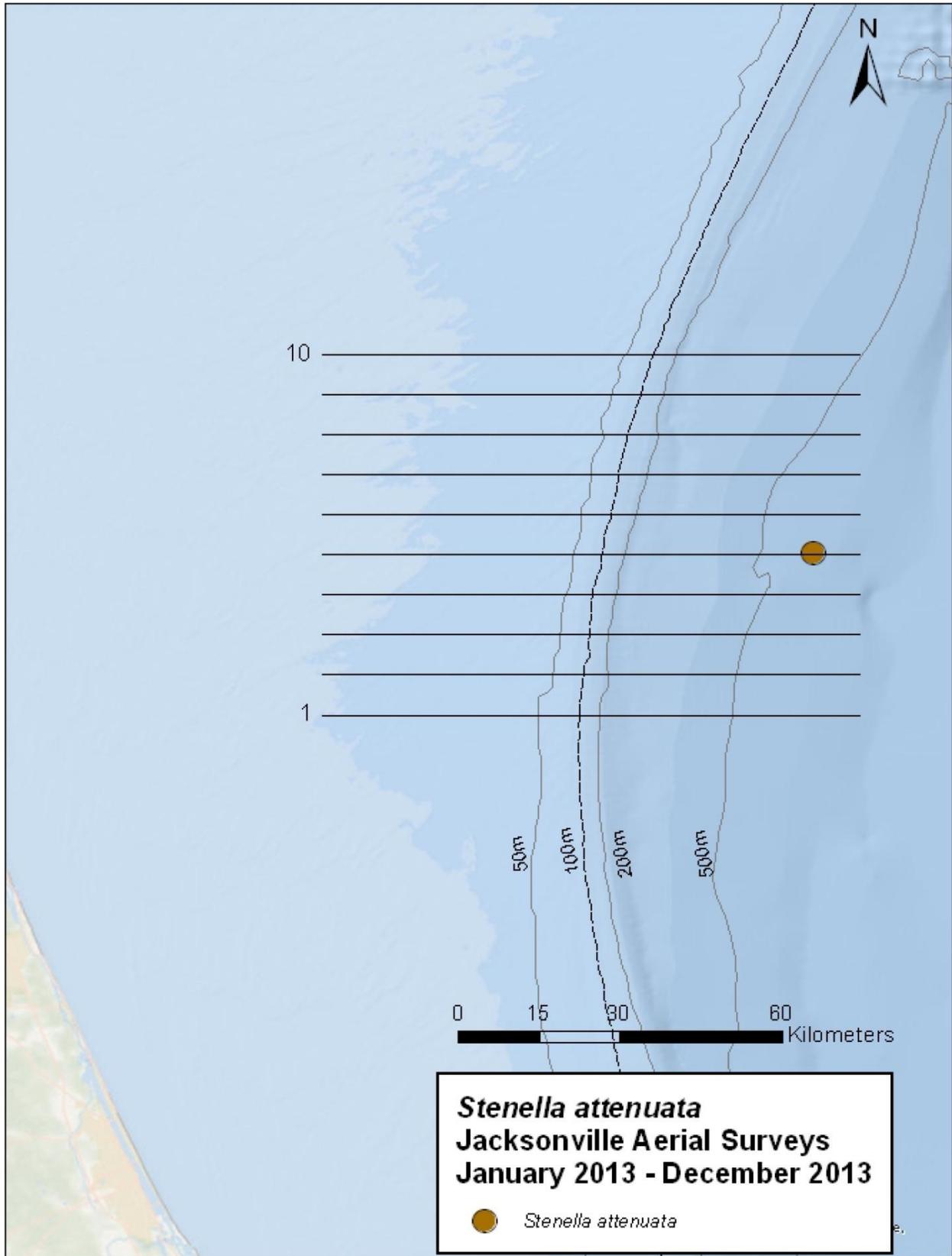


Figure 9. Pantropical spotted dolphin (*Stenella attenuata*) sighting.

Short-finned pilot whale (*Globicephala macrorhynchus*) (Table 8, Figure 10)

A single, off effort sighting of a group of ten short-finned pilot whales were encountered while transiting between tracklines one and two. Sightings of pilot whales in the western North Atlantic occur primarily near the continental shelf break (Waring *et al.* 2010) as is the case with our sightings (Figure 9). The difficulty of differentiating short-finned and long-finned pilot whales (*Globicephala melas*) at sea, NMFS reports stock numbers and status as *Globicephala* spp. (Waring *et al.* 2011). The abundance estimate of *Globicephala* spp. (24674, CV=0.45) is based upon shipboard surveys along the outer continental shelf of the U.S. Atlantic between Florida and Maryland in 2004 (Waring *et al.* 2010). These estimates were combined with spatial distribution analysis as well as genetic analyses to generate the current value of 24674. The status of short-finned pilot whales in the U.S. Atlantic is currently unknown (Waring *et al.* 2011).

Table 8. Short-finned pilot whale (*Globicephala macrorhynchus*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013. Asterisk denotes off effort sightings.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
10-May-13	15:00	77	29.999860	-79.784083	E	1	1	90°	10 *

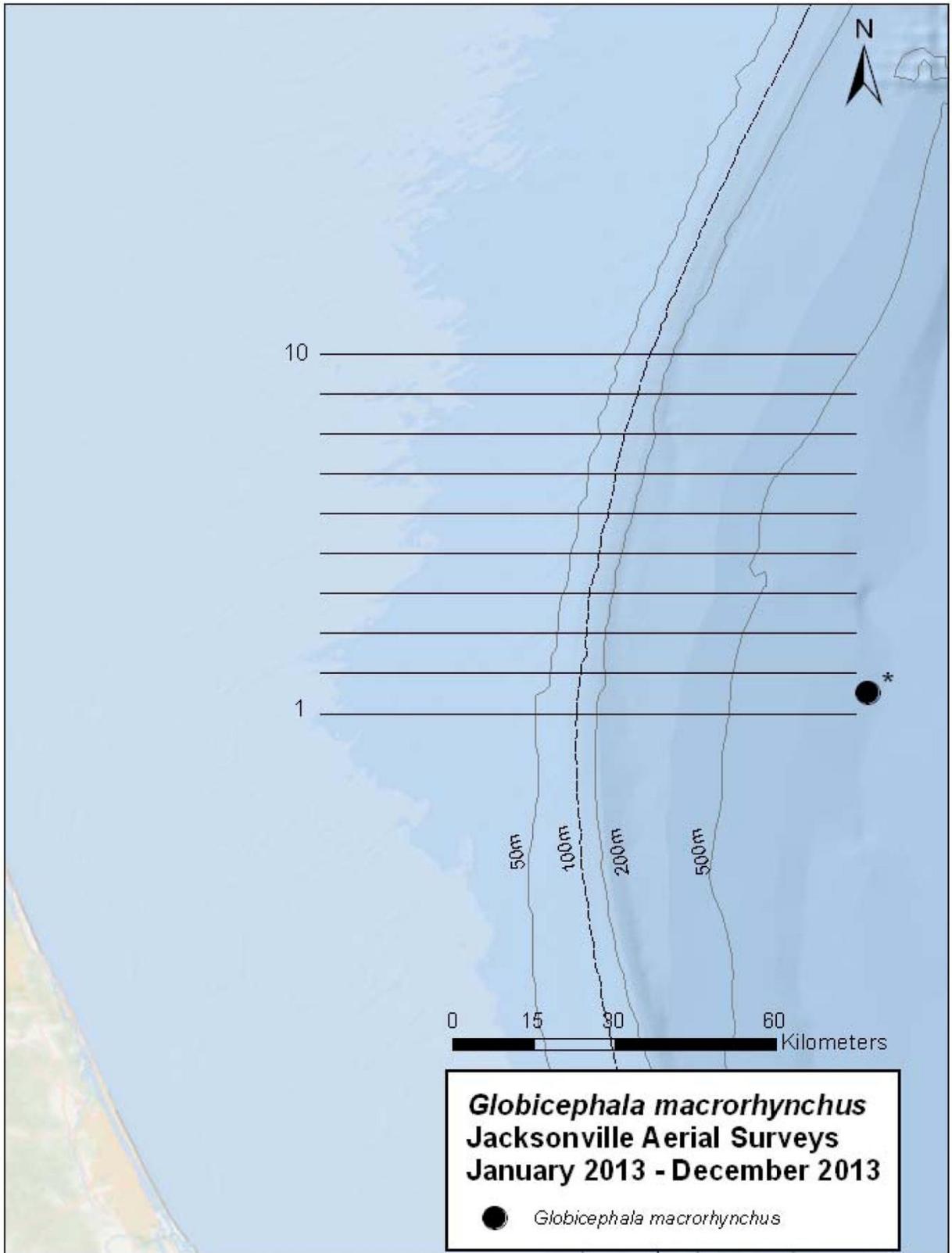


Figure 10. Short-finned pilot whale (*Globicephala macrorhynchus*) sighting. Asterisk denotes off effort sighting.

Sea Turtles (Tables 9 and 10, Figures 11a – 13)

A total of 301 sea turtles were observed during the reporting period. Sighting rates were negatively correlated with Beaufort Sea State, with rates declining at higher sea states (Figure 12b). Sea turtles were observed every day of survey effort with the highest sighting rates occurring in May and September (Figure 12c). Observation rates ranged from a low of 17.36 /1000km flown in March to 65.79 /1000km in September (Figure 12c). Loggerhead sea turtles (*Caretta caretta*) constituted the majority of sea turtle sightings (89.7%), followed by leatherback sea turtles (*Dermochelys coriacea*) (5.3%). Turtles labeled as unidentified were typically either of small size, submerged, or too far away for the observers to make an accurate identification to species (accounted for 4.9% of sightings). Sea turtle species are listed below in order of decreasing number of sightings (*i.e.* most commonly sighted species first).

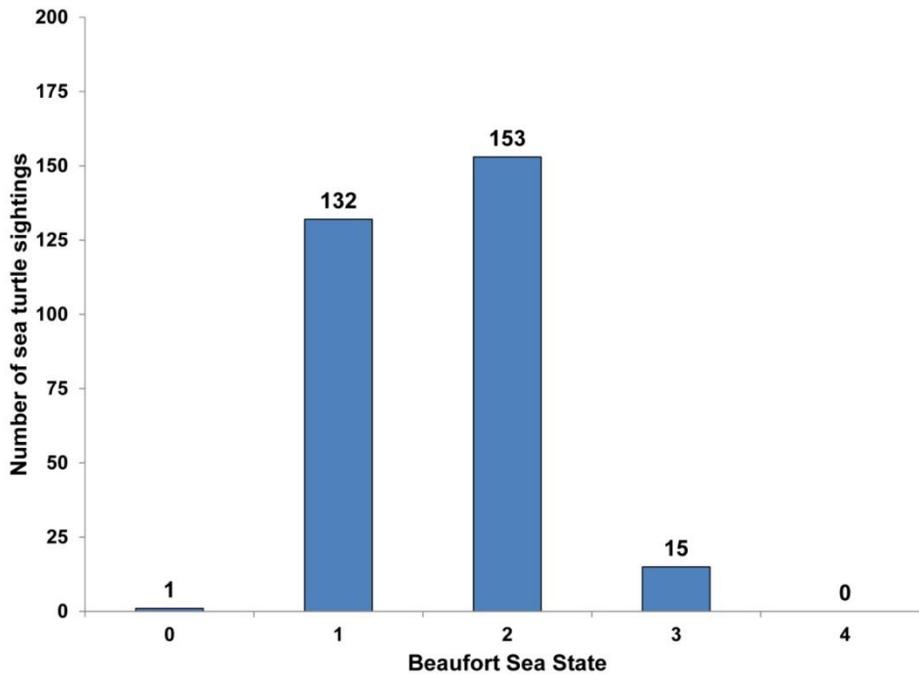


Figure 11a. Total number of sea turtle sightings by Beaufort Sea State from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

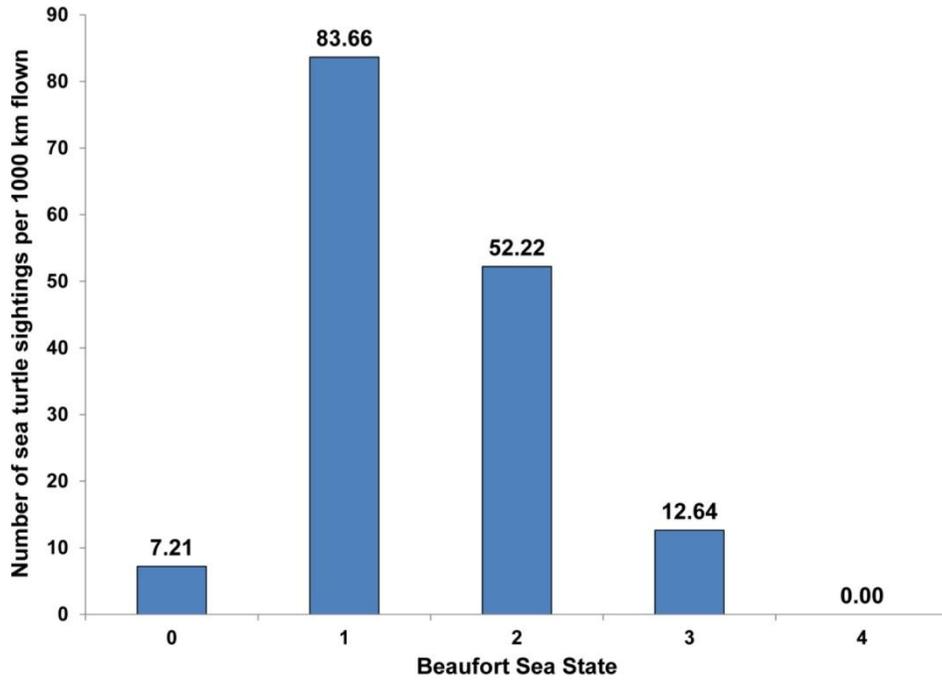


Figure 11b. Sea turtle sightings per 1000 km flown by Beaufort Sea State from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

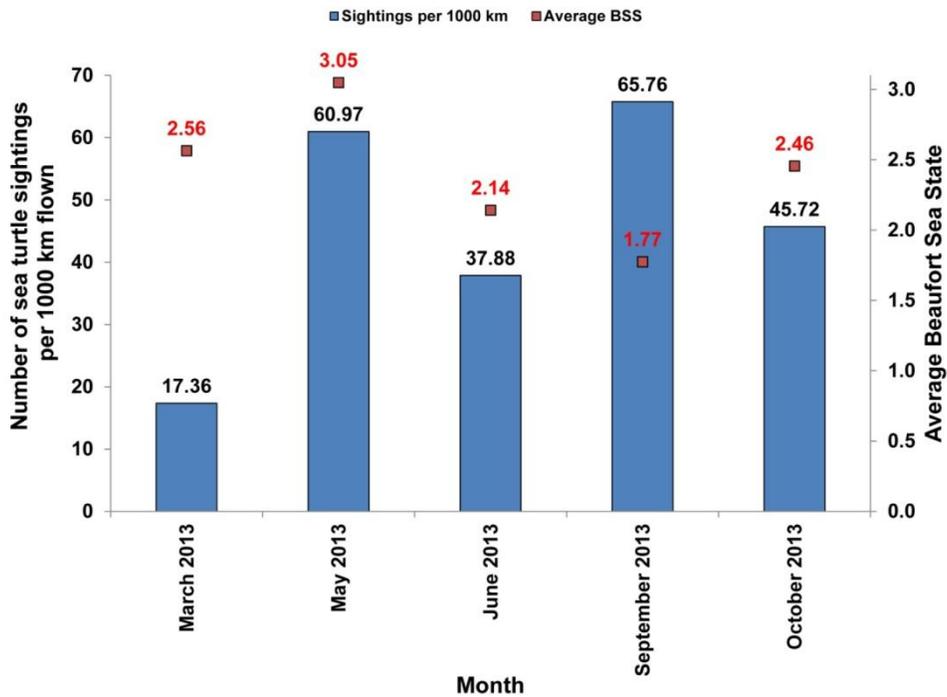


Figure 11c. Sea turtle sightings per 1000 km surveyed and the average Beaufort Sea State per month from January 2013 to December 2013 during aerial surveys in the Jacksonville, Florida survey area.

Loggerhead sea turtle (*Caretta caretta*) (Table 9, Figure 12)

A total of 270 loggerhead sea turtles were observed and this species was encountered on every day of survey effort. Loggerheads were predominantly recorded in the shallower waters over the continental shelf, although a small number of individuals occurred beyond the shelf break (Figure 12). For management purposes, loggerheads along the U.S. Atlantic east coast fall into the Northwest Atlantic Ocean distinct population segment (DPS), which is separated into five separate recovery units (NOAA 2011). The Northern Recovery Unit (defined as loggerheads originating from nests between southern VA through the FL/GA border) is currently listed as threatened under the Endangered Species Act (NMFS 2008).

Table 9. Loggerhead sea turtle (*Caretta caretta*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
22-Mar-13	9:31	2	30.567454	-80.538419	E	10	2	90°	1
22-Mar-13	10:05	11	30.500269	-80.260487	W	9	1	90°	1
22-Mar-13	10:14	12	30.498108	-80.608610	W	9	2	90°	2
22-Mar-13	11:55	29	30.232467	-80.308752	W	5	1	90°	1
22-Mar-13	11:58	30	30.233020	-80.431971	W	5	1	90°	1
22-Mar-13	12:02	31	30.232849	-80.563915	W	5	1	90°	1
22-Mar-13	13:50	37	29.964165	-80.459179	E	1	2	90°	1
22-Mar-13	14:14	42	30.032469	-79.914083	W	2	3	90°	1
22-Mar-13	14:20	43	30.030858	-80.094269	W	2	1	90°	1
22-Mar-13	14:34	30	30.029445	-80.379803	W	2	1	90°	1
22-Mar-13	15:11	52	30.100602	-80.264373	E	3	1	90°	1
22-Mar-13	15:50	59	30.158969	-80.143519	W	4	2	90°	1
22-Mar-13	15:58	52	30.166886	-80.430403	W	4	2	100°	1
22-Mar-13	15:58	60	30.167058	-80.419303	W	4	3	90°	1
9-May-13	9:37	6	30.499316	-80.265287	W	9	1	90°	1
9-May-13	10:05	13	30.433980	-80.548932	E	8	2	90°	1
9-May-13	10:50	23	30.364789	-80.323407	W	7	3	90°	1
9-May-13	11:10	33	30.363686	-80.559879	W	7	2	90°	1
9-May-13	11:11	28	30.364145	-80.615694	W	7	2	60°	1
9-May-13	11:12	29	30.363997	-80.659010	W	7	1	90°	1
9-May-13	11:19	38	30.363570	-80.682900	W	7	1	90°	1
9-May-13	12:51	36	30.301058	-80.572898	E	6	1	90°	1
9-May-13	12:54	43	30.301338	-80.440328	E	6	2	90°	1
9-May-13	12:54	37	30.301288	-80.467927	E	6	2	90°	2
9-May-13	12:57	44	30.301325	-80.339608	E	6	2	90°	1
9-May-13	13:53	51	30.231486	-80.459403	W	5	3	90°	1
9-May-13	14:01	69	30.231464	-80.533289	W	5	2	90°	1
9-May-13	14:02	54	30.231334	-80.580124	W	5	2	90°	2
9-May-13	14:16	76	30.166476	-80.589532	E	4	2	90°	1
9-May-13	14:16	59	30.167301	-80.574810	E	4	2	90°	2
9-May-13	14:20	77	30.167542	-80.412402	E	4	2	90°	1
9-May-13	15:14	76	30.099156	-80.376829	W	3	1	90°	1
9-May-13	15:19	104	30.098874	-80.575968	W	3	2	90°	2
9-May-13	15:22	78	30.098242	-80.680218	W	3	2	90°	3
9-May-13	15:27	108	30.032820	-80.598887	E	2	2	90°	2
9-May-13	15:27	81	30.032810	-80.600476	E	2	2	90°	5
9-May-13	15:54	90	30.033189	-80.209099	E	2	1	90°	1
9-May-13	15:58	91	30.033147	-80.061411	E	2	1	60°	1
9-May-13	16:26	98	29.964523	-80.143403	W	1	1	90°	2
9-May-13	16:31	132	29.964577	-80.331006	W	1	1	90°	2
9-May-13	16:38	103	29.964717	-80.478518	W	1	2	90°	2
9-May-13	16:40	138	29.964239	-80.576005	W	1	1	90°	1
9-May-13	16:40	105	29.964217	-80.556417	W	1	2	90°	3
9-May-13	16:41	139	29.964229	-80.598729	W	1	2	90°	1
10-May-13	9:01	3	30.233078	-80.520178	E	5	2	90°	1
10-May-13	9:10	8	30.233653	-80.357600	E	5	2	90°	1
10-May-13	9:49	16	30.299761	-80.383482	W	6	1	90°	1
10-May-13	9:52	18	30.299682	-80.509877	W	6	2	60°	2

Table 9 (continued). Loggerhead sea turtle (*Caretta caretta*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
10-May-13	9:53	24	30.299582	-80.550551	W	6	1	90°	2
10-May-13	10:00	29	30.299422	-80.643360	W	6	2	60°	1
10-May-13	10:06	23	30.365818	-80.639418	E	7	2	60°	2
10-May-13	10:09	32	30.366178	-80.491192	E	7	1	90°	2
10-May-13	10:09	24	30.366161	-80.491160	E	7	1	90°	1
10-May-13	10:25	42	30.366576	-80.193386	E	7	1	90°	1
10-May-13	10:27	31	30.366647	-80.133751	E	7	2	60°	2
10-May-13	10:36	34	30.366668	-79.960308	E	7	1	90°	2
10-May-13	10:52	49	30.432455	-80.182935	W	8	1	90°	1
10-May-13	11:00	54	30.432233	-80.318962	W	8	1	90°	2
10-May-13	11:11	43	30.432322	-80.520553	W	8	1	90°	1
10-May-13	11:27	67	30.500274	-80.511121	E	9	1	90°	1
10-May-13	11:54	79	30.500560	-80.119501	E	9	2	90°	2
10-May-13	14:36	110	29.966092	-80.595947	E	1	2	90°	2
10-May-13	14:37	72	29.966101	-80.551402	E	1	2	90°	1
10-May-13	14:39	112	29.966343	-80.480475	E	1	2	90°	2
10-May-13	14:47	119	29.966243	-80.281508	E	1	2	90°	2
10-May-13	14:48	120	29.966307	-80.214382	E	1	2	90°	1
10-May-13	15:13	127	30.031229	-80.090700	W	2	1	90°	1
10-May-13	15:21	132	30.031289	-80.356457	W	2	1	90°	2
10-May-13	15:21	81	30.031286	-80.371469	W	2	2	90°	1
10-May-13	15:32	84	30.030829	-80.562588	W	2	2	90°	1
10-May-13	15:41	141	30.101053	-80.630895	E	3	2	90°	4
10-May-13	15:46	145	30.101168	-80.485622	E	3	2	90°	2
10-May-13	15:47	90	30.101195	-80.440974	E	3	2	90°	1
10-May-13	15:49	91	30.101410	-80.354716	E	3	1	90°	1
10-May-13	16:26	155	30.165522	-80.472388	W	4	2	90°	1
10-May-13	16:26	101	30.165502	-80.483680	W	4	2	60°	1
20-Jun-13	11:13	18	30.433610	-80.355157	E	8	2	100°	1
20-Jun-13	11:13	20	30.433621	-80.356341	W	8	2	90°	1
20-Jun-13	12:20	30	30.300399	-80.484550	E	6	3	100°	1
20-Jun-13	13:03	39	30.232642	-80.294103	E	5	2	60°	1
20-Jun-13	13:04	36	30.232583	-80.316607	W	5	2	90°	1
20-Jun-13	13:05	40	30.232747	-80.340113	E	5	2	60°	2
20-Jun-13	13:10	42	30.232371	-80.511228	E	5	2	45°	1
20-Jun-13	13:11	37	30.232211	-80.556997	W	5	2	90°	1
21-Jun-13	8:49	2	29.966005	-80.412465	E	1	1	100°	1
21-Jun-13	8:51	3	29.966167	-80.331749	E	1	2	90°	1
21-Jun-13	9:23	11	29.965789	-79.948386	E	1	2	100°	1
21-Jun-13	10:03	16	30.031000	-80.374764	W	2	2	90°	1
21-Jun-13	10:08	18	30.030790	-80.530030	W	2	1	90°	1
21-Jun-13	10:10	20	30.030562	-80.601449	W	2	1	90°	1
21-Jun-13	10:24	35	30.101224	-80.604449	E	3	2	100°	1
21-Jun-13	10:24	25	30.101206	-80.609197	E	3	2	60°	2
21-Jun-13	10:29	26	30.101379	-80.436468	E	3	2	90°	1
21-Jun-13	11:19	51	30.165378	-80.358652	W	4	2	120°	1
21-Jun-13	11:36	56	30.164929	-80.613848	W	4	2	90°	1
21-Jun-13	11:38	57	30.164722	-80.686099	W	4	2	90°	1

Table 9 (continued). Loggerhead sea turtle (*Caretta caretta*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
21-Jun-13	11:42	60	30.233359	-80.673792	E	5	2	100°	1
21-Jun-13	11:42	40	30.233325	-80.658294	E	5	2	90°	1
21-Jun-13	11:45	61	30.233619	-80.574087	E	5	2	120°	1
21-Jun-13	11:45	62	30.233604	-80.556715	E	5	2	100°	1
21-Jun-13	11:52	64	30.233957	-80.348056	E	5	2	100°	1
21-Jun-13	12:00	67	30.299337	-80.341447	W	6	2	100°	1
21-Jun-13	12:03	68	30.299073	-80.433225	W	6	2	110°	1
21-Jun-13	12:06	45	30.298961	-80.527905	W	6	1	90°	1
4-Sep-13	9:26	3	30.567188	-80.661118	E	10	1	90°	2
4-Sep-13	9:27	4	30.567263	-80.624473	E	10	1	90°	2
4-Sep-13	9:30	3	30.567157	-80.494132	E	10	2	90°	1
4-Sep-13	9:32	6	30.567375	-80.426064	E	10	1	60°	1
4-Sep-13	9:41	11	30.565769	-80.342143	E	10	1	90°	1
4-Sep-13	9:44	7	30.567668	-80.212994	E	10	2	90°	1
4-Sep-13	10:17	12	30.499165	-80.438626	W	9	3	90°	3
4-Sep-13	10:18	15	30.499022	-80.489067	W	9	2	90°	1
4-Sep-13	10:18	13	30.499044	-80.473238	W	9	2	90°	3
4-Sep-13	10:20	14	30.498873	-80.567321	W	9	1	90°	1
4-Sep-13	10:21	17	30.498834	-80.572597	W	9	1	90°	3
4-Sep-13	10:36	25	30.433581	-80.548772	E	8	1	90°	1
4-Sep-13	10:36	20	30.433579	-80.547838	E	8	2	90°	1
4-Sep-13	10:39	27	30.433859	-80.453877	E	8	2	90°	2
4-Sep-13	10:41	28	30.433926	-80.388214	E	8	1	90°	1
4-Sep-13	10:43	22	30.433965	-80.300960	E	8	2	90°	1
4-Sep-13	10:50	23	30.433805	-80.044907	E	8	2	90°	1
4-Sep-13	11:14	26	30.365464	-80.300487	W	7	2	90°	1
4-Sep-13	11:24	38	30.365151	-80.486572	W	7	2	90°	1
4-Sep-13	11:31	43	30.364538	-80.608420	W	7	2	90°	2
4-Sep-13	11:32	44	30.364742	-80.649202	W	7	2	90°	1
4-Sep-13	13:19	53	29.966151	-80.651806	E	1	2	100°	1
4-Sep-13	13:20	54	29.966396	-80.622740	E	1	2	90°	2
4-Sep-13	13:21	55	29.966466	-80.580178	E	1	1	90°	1
4-Sep-13	14:24	49	30.031608	-80.366015	W	2	2	90°	1
4-Sep-13	14:29	51	30.031418	-80.518242	W	2	1	90°	1
4-Sep-13	14:30	78	30.031245	-80.555204	W	2	1	100°	1
4-Sep-13	14:30	52	30.031240	-80.564627	W	2	1	90°	1
4-Sep-13	14:38	83	30.031036	-80.653808	W	2	2	90°	2
4-Sep-13	14:43	57	30.100397	-80.675628	E	3	2	90°	1
4-Sep-13	14:44	86	30.100231	-80.640462	E	3	3	90°	1
4-Sep-13	14:45	87	30.100458	-80.605112	E	3	2	90°	3
4-Sep-13	14:45	58	30.100406	-80.607357	E	3	2	90°	2
4-Sep-13	14:46	59	30.100489	-80.572090	E	3	2	90°	3
4-Sep-13	15:38	64	30.165643	-80.612157	W	4	2	90°	1
4-Sep-13	15:44	97	30.232809	-80.651135	E	5	1	90°	2
4-Sep-13	15:44	67	30.232894	-80.645058	E	5	2	90°	1
4-Sep-13	15:57	102	30.233434	-80.341656	E	5	1	90°	1
4-Sep-13	15:57	71	30.233506	-80.324428	E	5	2	90°	1
4-Sep-13	16:28	104	30.299773	-80.353026	W	6	1	90°	1

Table 9 (continued). Loggerhead sea turtle (*Caretta caretta*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
4-Sep-13	16:30	74	30.299681	-80.396212	W	6	2	90°	1
4-Sep-13	16:33	75	30.299574	-80.527944	W	6	2	90°	1
4-Sep-13	16:34	106	30.299493	-80.570535	W	6	1	90°	1
5-Sep-13	8:55	3	30.233323	-80.477695	E	5	2	90°	1
5-Sep-13	8:58	4	30.233309	-80.399370	E	5	1	90°	1
5-Sep-13	9:59	11	30.299686	-80.485925	W	6	1	90°	1
5-Sep-13	10:00	17	30.299523	-80.546687	W	6	2	90°	1
5-Sep-13	10:04	14	30.299306	-80.656849	W	6	2	90°	1
5-Sep-13	10:10	18	30.365675	-80.611886	E	7	2	90°	1
5-Sep-13	10:52	23	30.433238	-80.336459	W	8	2	90°	1
5-Sep-13	11:02	26	30.433104	-80.474588	W	8	1	90°	1
5-Sep-13	11:03	27	30.432993	-80.526433	W	8	2	90°	2
5-Sep-13	11:06	28	30.432672	-80.618309	W	8	1	90°	1
5-Sep-13	11:37	45	30.499939	-80.201050	E	9	2	90°	1
5-Sep-13	12:11	42	30.566566	-80.178383	W	10	2	90°	1
5-Sep-13	12:15	43	30.566614	-80.332196	W	10	1	90°	1
5-Sep-13	12:24	46	30.566514	-80.487272	W	10	1	60°	1
5-Sep-13	12:25	47	30.566428	-80.533570	W	10	2	60°	1
5-Sep-13	12:27	48	30.566247	-80.585322	W	10	2	90°	3
5-Sep-13	14:01	65	30.165576	-80.685975	E	4	2	90°	1
5-Sep-13	14:03	66	30.166345	-80.628341	E	4	1	90°	1
5-Sep-13	14:28	59	30.165552	-80.374146	E	4	2	45°	1
5-Sep-13	15:12	66	30.099262	-80.496737	W	3	1	90°	3
5-Sep-13	16:28	81	29.965024	-80.432194	W	1	2	90°	1
5-Sep-13	16:29	82	29.964488	-80.487731	W	1	1	90°	1
5-Sep-13	16:32	83	29.964224	-80.604485	W	1	2	100°	2
5-Sep-13	16:33	84	29.964161	-80.630161	W	1	1	90°	3
5-Sep-13	16:34	109	29.964064	-80.657138	W	1	1	90°	1
5-Sep-13	16:34	85	29.963975	-80.672278	W	1	2	90°	4
6-Sep-13	9:01	111	30.567094	-80.672921	E	10	1	90°	1
6-Sep-13	9:05	80	30.567227	-80.510839	E	10	2	90°	1
6-Sep-13	9:06	112	30.567321	-80.491575	E	10	1	90°	1
6-Sep-13	10:04	93	30.498826	-80.619859	W	9	1	90°	1
6-Sep-13	10:06	131	30.498562	-80.676832	W	9	1	90°	1
6-Sep-13	10:20	138	30.434005	-80.582672	E	8	1	90°	1
17-Oct-13	9:10	4	30.567075	-80.630288	E	10	2	90°	1
17-Oct-13	9:22	9	30.567971	-80.480760	E	10	2	90°	1
17-Oct-13	9:24	5	30.568061	-80.399944	E	10	2	90°	1
17-Oct-13	9:26	11	30.568015	-80.322749	E	10	1	90°	1
17-Oct-13	9:35	18	30.567766	-80.119444	E	10	2	90°	1
17-Oct-13	9:58	13	30.498647	-80.219321	W	9	1	90°	1
17-Oct-13	10:07	24	30.498658	-80.371199	W	9	2	100°	1
17-Oct-13	10:09	16	30.498662	-80.472790	W	9	1	90°	3
17-Oct-13	10:09	25	30.498669	-80.481210	W	9	1	90°	1
17-Oct-13	10:33	36	30.433925	-80.514590	E	8	1	90°	1
17-Oct-13	10:35	37	30.434018	-80.443583	E	8	1	90°	3
17-Oct-13	11:13	26	30.364482	-80.505859	W	7	1	90°	1
17-Oct-13	13:19	54	29.966390	-80.264990	E	1	1	110°	1

Table 9 (continued). Loggerhead sea turtle (*Caretta caretta*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
17-Oct-13	13:57	41	30.031311	-80.459521	W	2	1	90°	1
17-Oct-13	14:37	83	30.100419	-80.623915	E	3	1	90°	2
17-Oct-13	14:39	54	30.100797	-80.537588	E	3	1	90°	1
17-Oct-13	14:40	84	30.100758	-80.507192	E	3	1	90°	1
17-Oct-13	15:45	71	30.165850	-80.467578	W	4	1	90°	3
17-Oct-13	15:52	74	30.166356	-80.570420	W	4	1	90°	1
17-Oct-13	15:53	75	30.165344	-80.604218	W	4	2	90°	1

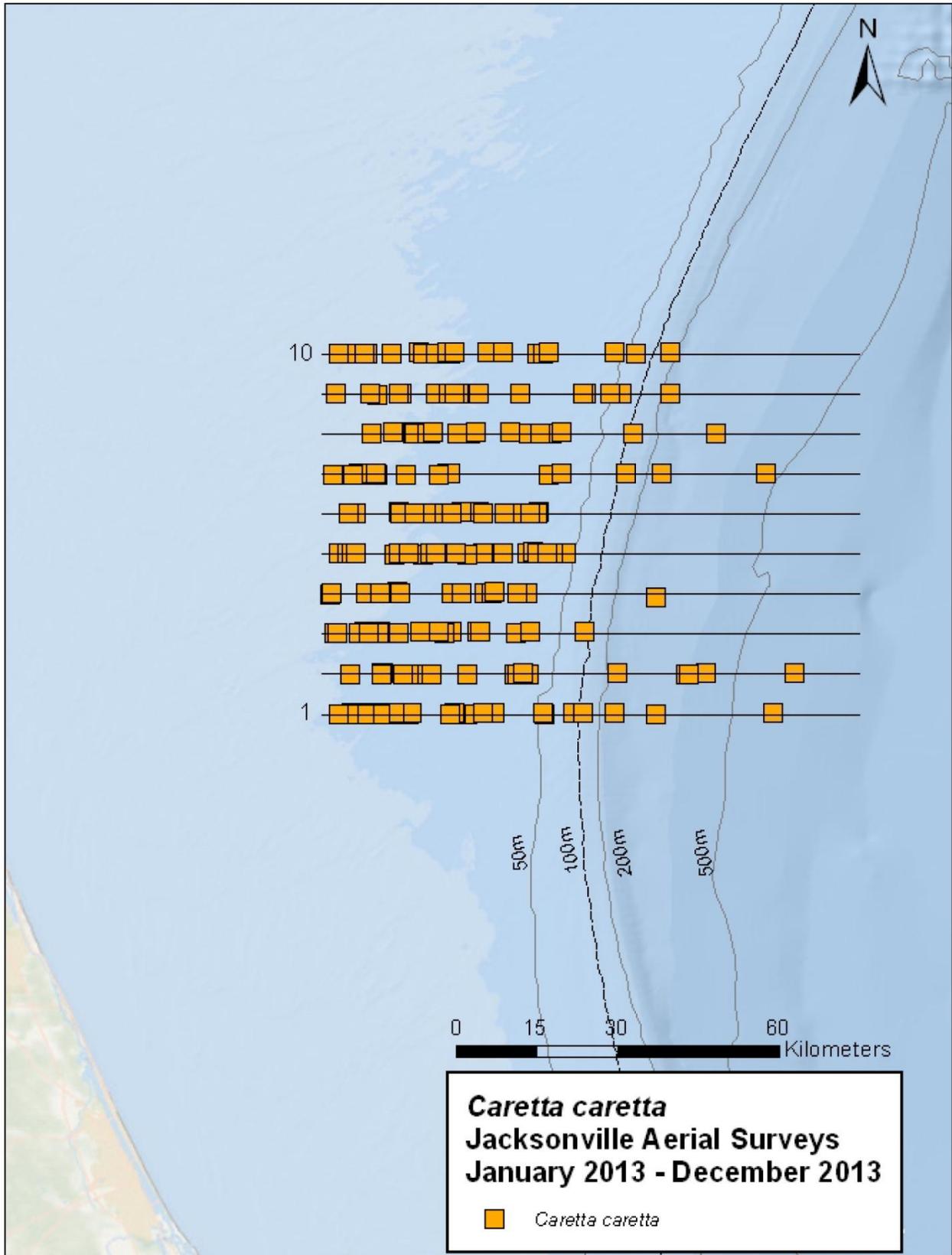


Figure 12. Loggerhead sea turtle (*Caretta caretta*) sightings.

Leatherback sea turtle (*Dermochelys coriacea*) (Table 10, Figure 13)

A total of 16 leatherback sea turtles were recorded inshore of the 50m shelf break. This species was observed in four of the five months surveyed (absent in March). The most recent population estimates for the North Atlantic is a range of 34,000 to 94,000 adult leatherbacks (Turtle Expert Working Group 2007). Leatherback nesting beaches in the Atlantic, as well as worldwide, have experienced severe to moderate declines over the past several decades and this species is listed as endangered under the Endangered Species Act (NMFS 1992).

Table 10. Leatherback sea turtle (*Dermochelys coriacea*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-May-13	9:52	10	30.498700	-80.467029	W	9	2	90°	1
9-May-13	16:43	106	29.963869	-80.692764	W	1	1	60°	1
20-Jun-13	12:12	27	30.364728	-80.690127	W	7	2	90°	1
20-Jun-13	10:52	15	30.498625	-80.648203	E	9	2	90°	1
4-Sep-13	15:34	94	30.166010	-80.466395	W	4	1	90°	2
4-Sep-13	15:48	98	30.233114	-80.527860	E	5	2	90°	1
4-Sep-13	16:31	105	30.299707	-80.445775	W	6	1	90°	1
4-Sep-13	10:21	15	30.498837	-80.585909	W	9	2	90°	1
4-Sep-13	14:27	50	30.031527	-80.456816	W	2	1	90°	1
5-Sep-13	14:06	67	30.166647	-80.534017	E	4	2	90°	1
5-Sep-13	16:32	108	29.964237	-80.603328	W	1	2	90°	2
17-Oct-13	13:08	51	29.965337	-80.668460	E	1	1	90°	1
17-Oct-13	14:17	72	30.030698	-80.651910	W	2	1	90°	1
17-Oct-13	14:31	51	30.099887	-80.683980	E	3	1	90°	1

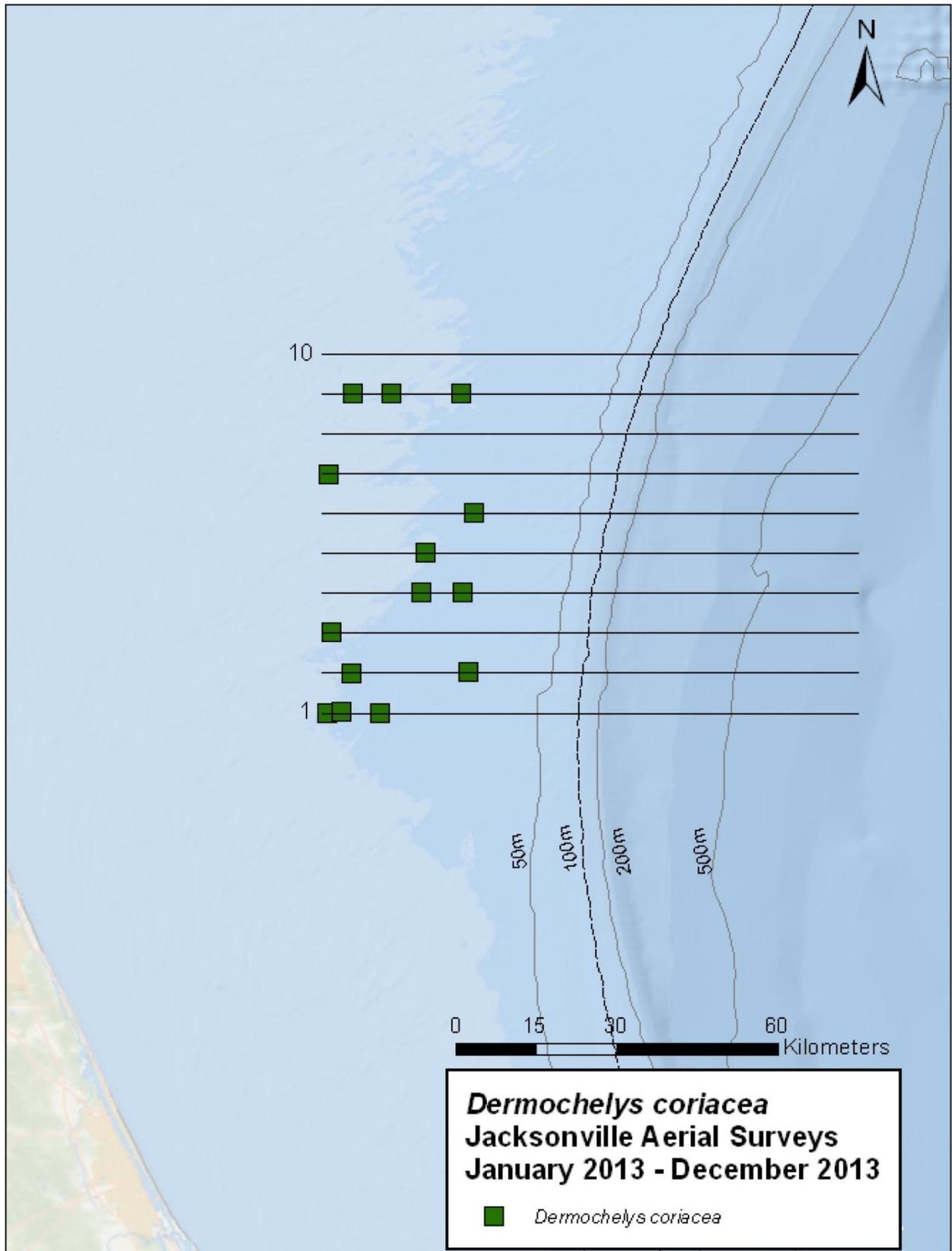


Figure 13. Leatherback sea turtle (*Dermochelys coriacea*) sightings.

Pelagic bony fishes *Osteichthyes* (Table 11, Figure 14).

Three ocean sunfish (*Mola mola*) were recorded over the continental shelf in May and June.

Table 11. Ocean sunfish (*Mola mola*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-May-13	13:12	50	30.301376	-80.125243	E	6	2	90°	1
21-Jun-13	10:11	28	30.030317	-80.659515	W	2	2	100°	1
21-Jun-13	10:25	36	30.101178	-80.571039	E	3	2	90°	1

Cartilaginous Fishes *Chondrichthyes* (Tables 12-14, Figure 14).

Nine manta rays (*Manta birostris*) occurred throughout the survey site with 55% of sightings occurring in May (Table 12). A single great white shark (*Carcharodon carcharias*) was recorded in March over the continental shelf break (Table 13). A total of 29 unidentified sharks were recorded during the reporting period (Table 14). Sharks were seen throughout the study period with no discernable spatial or temporal trends.

Table 12. Manta ray (*Manta birostris*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-May-13	16:39	137	29.964310	-80.537293	W	1	1	90°	1
9-May-13	15:30	82	30.032961	-80.508107	E	2	2	90°	1
9-May-13	16:39	104	29.964343	-80.522563	W	1	1	90°	1
10-May-13	14:35	109	29.966227	-80.625693	E	1	2	90°	1
10-May-13	15:32	138	30.030946	-80.547569	W	2	1	90°	1
20-Jun-13	10:06	6	30.567585	-80.120211	W	10	2	90°	1
21-Jun-13	8:47	3	29.965959	-80.499738	E	1	1	90°	1
4-Sep-13	10:37	26	30.433809	-80.524473	E	8	2	90°	1
5-Sep-13	15:24	69	30.098694	-80.666238	W	3	2	100°	1

Table 13. Great white shark (*Carcharodon carcharias*) sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
22-Mar-13	14:26	28	30.034610	-80.168774	W	2	1	90°	1

Table 14. Unidentified shark sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
22-Mar-13	14:31	46	30.031556	-80.302537	W	2	1	90°	1
9-May-13	14:22	78	30.167715	-80.357911	E	4	3	90°	1
9-May-13	14:29	83	30.167886	-80.233013	E	4	1	90°	1
9-May-13	14:59	94	30.099246	-80.185997	W	3	2	90°	3
9-May-13	15:53	121	30.033168	-80.220804	E	2	2	90°	2
9-May-13	13:34	46	30.223601	-80.205338	W	5	2	90°	1
9-May-13	14:30	63	30.167769	-80.207901	E	4	1	90°	1
9-May-13	16:29	99	29.964567	-80.226181	W	1	2	90°	1
9-May-13	15:01	96	30.101863	-80.235979	W	3	1	90°	1
10-May-13	9:02	3	30.233186	-80.495063	E	5	2	100°	1
10-May-13	9:12	9	30.233712	-80.298160	E	5	1	90°	1
10-May-13	9:13	10	30.233885	-80.255024	E	5	1	60°	1
10-May-13	9:42	19	30.299755	-80.193418	W	6	1	90°	1
10-May-13	11:13	60	30.432205	-80.617724	W	8	1	90°	2
10-May-13	11:33	69	30.505301	-80.391333	E	9	2	90°	1
10-May-13	9:24	7	30.232909	-79.825222	E	5	2	90°	1
10-May-13	10:51	37	30.432506	-80.128085	W	8	2	90°	1
10-May-13	15:13	79	30.031450	-80.106970	W	2	4	90°	1
10-May-13	16:07	97	30.164762	-79.844225	W	4	3	60°	1
20-Jun-13	10:30	8	30.504797	-80.100013	W	9	2	90°	18
21-Jun-13	8:52	4	29.966162	-80.298607	E	1	2	110°	2
21-Jun-13	8:56	6	29.966060	-80.150693	E	1	2	100°	1
21-Jun-13	10:06	26	30.030835	-80.467428	W	2	3	100°	1
21-Jun-13	10:30	37	30.101461	-80.402485	E	3	2	100°	2
21-Jun-13	10:09	19	30.030712	-80.565987	W	2	2	90°	1
5-Sep-13	11:50	50	30.499519	-79.872744	E	9	1	90°	1
5-Sep-13	15:01	64	30.099328	-80.113331	W	3	1	90°	1
17-Oct-13	9:33	16	30.568351	-80.189631	E	10	1	90°	1
17-Oct-13	9:34	8	30.568050	-80.141055	E	10	1	90°	1

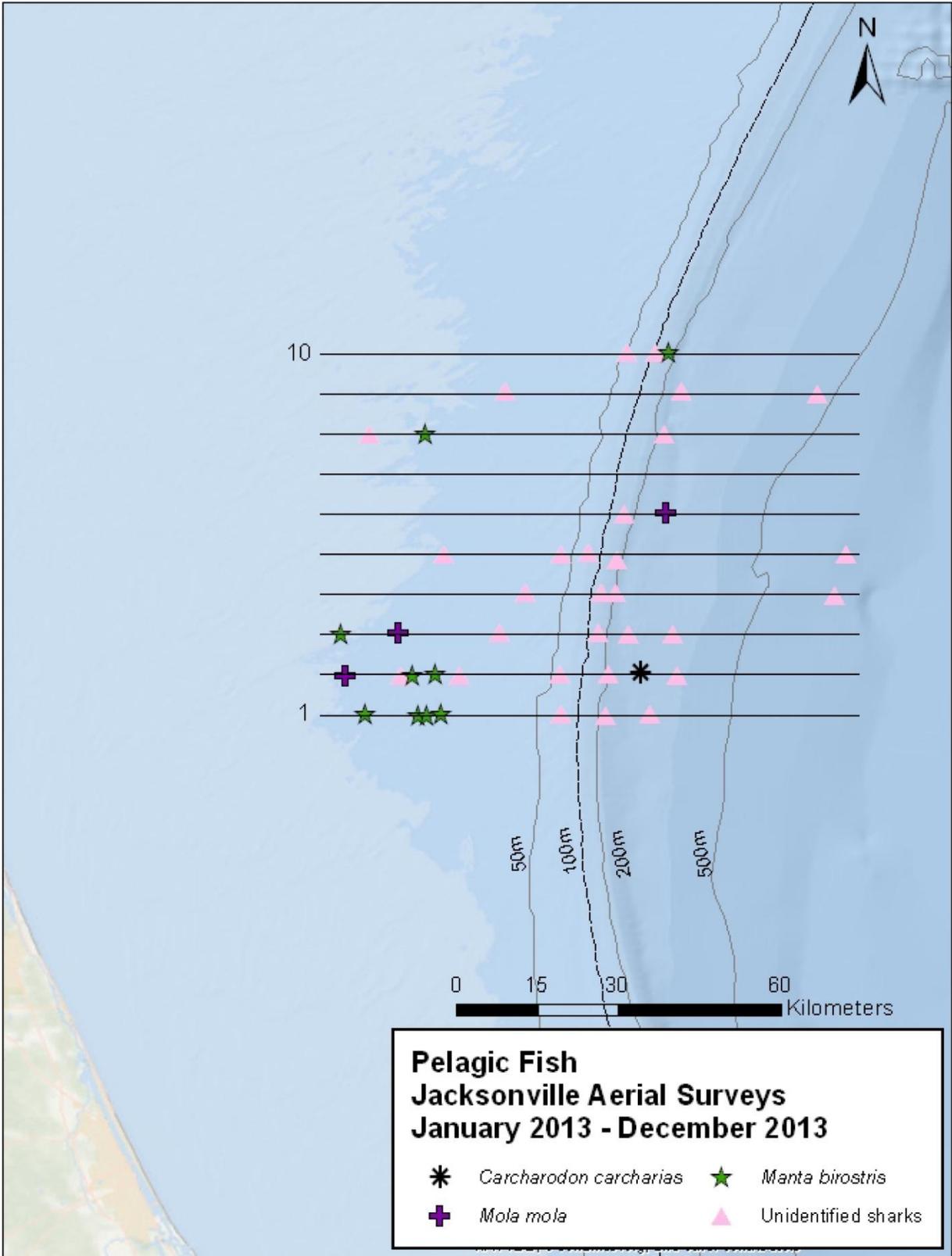


Figure 14. Ocean sunfish (*Mola mola*), Manta ray (*Manta birostris*), great white shark (*Carcharodon carcharias*), and shark sightings.

Vessel Sightings

Commercial (Table 15, Figure 15)

A total of seven commercial vessels (*e.g.* tankers, car carriers, and container vessels) were observed in the study site.

Table 15. Commercial vessel sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
9-May-13	9:30	5	30.498822	-80.034096	W	9	3	45°	1	Cargo vessel
10-May-13	14:33	108	29.965752	-80.678741	E	1	3	45°	1	Car carrier
20-Jun-13	9:55	3	30.567753	-80.519313	W	10	1	90°	1	Tanker
20-Jun-13	11:29	24	30.433534	-79.953940	W	8	2	60°	1	Cargo vessel
4-Sep-13	10:39	21	30.433828	-80.450476	E	8	2	45°	1	Cargo vessel
5-Sep-13	8:56	4	30.233214	-80.451326	E	5	2	60°	1	Flat decked boat
17-Oct-13	13:16	52	29.966238	-80.376275	E	1	2	90°	1	Cargo vessel

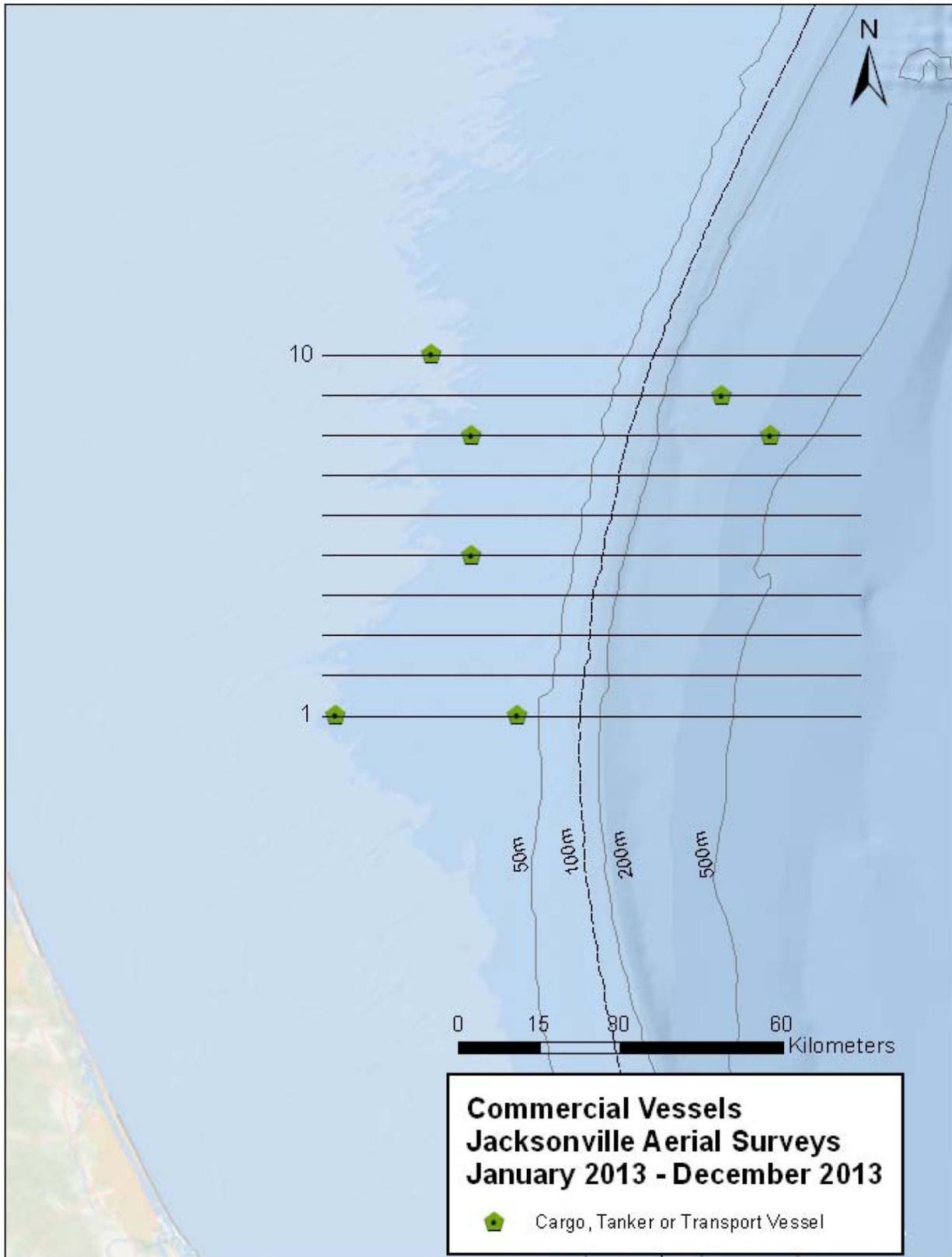


Figure 15. Large commercial shipping vessel sightings.

Military (Table 16, Figure 16)

A total of four U.S. military vessels were seen during the reporting period.

Table 16. Military vessel sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
22-Mar-13	16:01	53	30.165624	-80.552963	W	4	4	90°	1	Submarine
20-Jun-13	10:19	9	30.498138	-79.858890	E	9	1	60°	1	Navy Frigate circling
21-Jun-13	9:46	18	30.030854	-80.055606	W	2	2	130°	1	Submarine
5-Sep-13	10:09	17	30.365606	-80.641892	E	7	1	90°	1	USCG

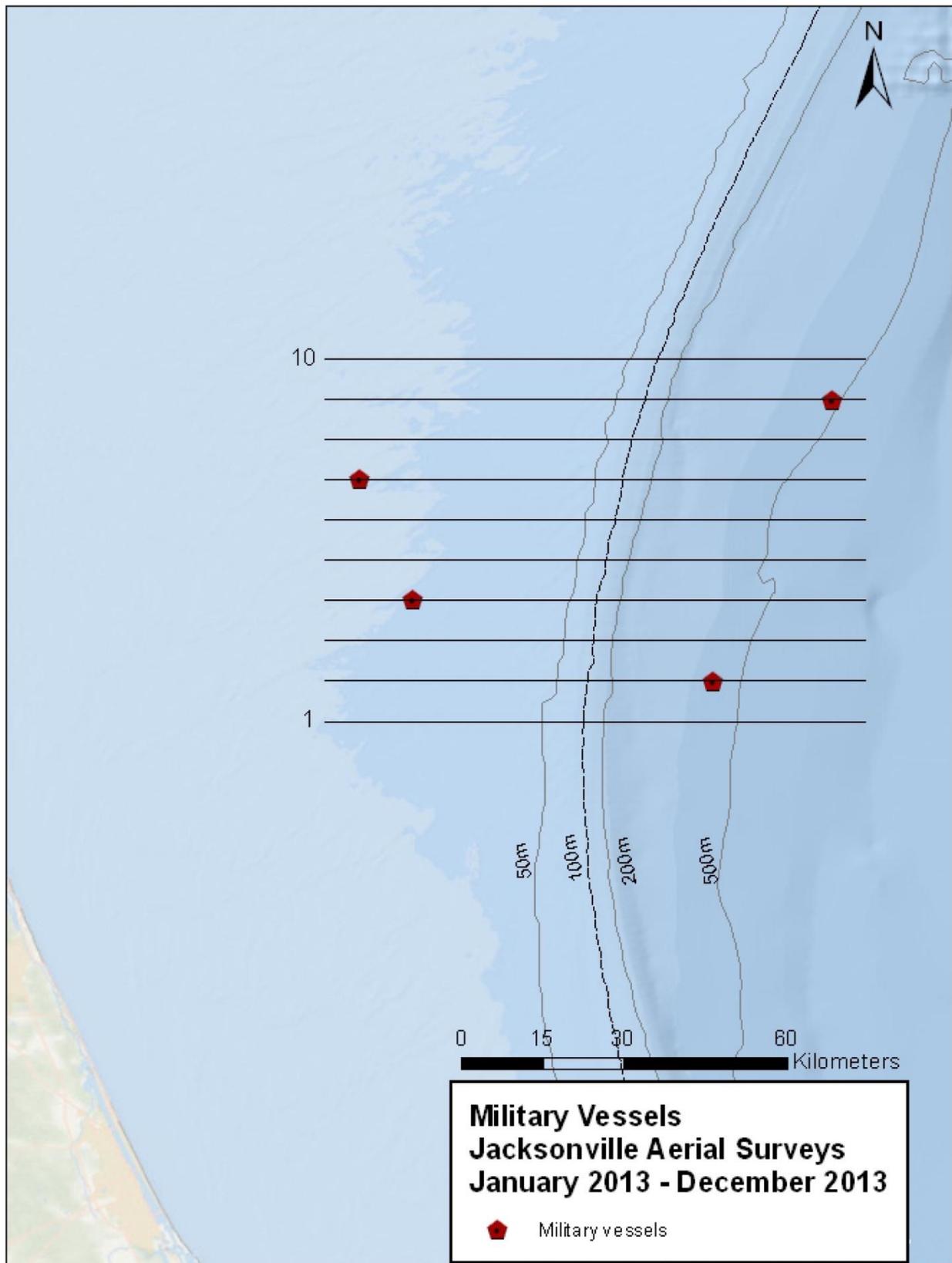


Figure 16. Military vessel sightings.

Other Vessels (Table 17, Figure 17)

A total of 94 other vessels were recorded in the survey area with all classified as recreational fishing vessels.

Table 17. Other vessel sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
5-Sep-13	15:36	72	30.033033	-80.425800	E	2	2	45°	1	Recreational fishing vessel
22-Mar-13	10:03	5	30.499314	-80.201540	W	9	3	90°	1	Recreational fishing vessel
22-Mar-13	10:30	9	30.433705	-80.292942	E	8	2	90°	1	Recreational fishing vessel
22-Mar-13	10:59	12	30.363471	-80.251655	W	7	3	90°	1	Recreational fishing vessel
22-Mar-13	11:54	19	30.232878	-80.259618	W	5	4	90°	1	Recreational fishing vessel
22-Mar-13	11:55	20	30.232785	-80.284650	W	5	2	90°	2	Recreational fishing vessel
22-Mar-13	11:58	22	30.233124	-80.413333	W	5	4	90°	1	Recreational fishing vessel
22-Mar-13	13:54	25	29.967852	-80.306237	E	1	4	90°	8	Recreational fishing vessel
22-Mar-13	15:10	39	30.100098	-80.279186	E	3	1	90°	1	Recreational fishing vessel
22-Mar-13	15:56	50	30.167509	-80.355793	W	4	1	90°	1	Recreational fishing vessel
22-Mar-13	9:41	4	30.568138	-80.166791	E	10	3	90°	2	Recreational fishing vessel
22-Mar-13	10:03	10	30.498998	-80.169610	W	9	1	60°	1	Recreational fishing vessel
22-Mar-13	11:26	21	30.300853	-80.260753	E	6	1	45°	2	Recreational fishing vessel
22-Mar-13	11:54	27	30.232880	-80.247636	W	5	2	60°	2	Recreational fishing vessel
22-Mar-13	13:54	39	29.967901	-80.311182	E	1	3	60°	1	Recreational fishing vessel
22-Mar-13	14:52	49	30.103087	-80.510285	E	3	2	60°	1	Recreational fishing vessel
9-May-13	9:09	3	30.567579	-80.247292	E	10	1	90°	1	Recreational fishing vessel
9-May-13	10:47	24	30.364816	-80.222657	W	7	1	90°	1	Recreational fishing vessel
9-May-13	13:09	49	30.301004	-80.228949	E	6	2	60°	1	Recreational fishing vessel
9-May-13	13:34	56	30.222559	-80.198677	W	5	3	90°	1	Recreational fishing vessel
9-May-13	14:56	93	30.099128	-80.064953	W	3	3	45°	1	Recreational fishing vessel
9-May-13	15:20	105	30.098691	-80.627502	W	3	2	45°	1	Recreational fishing vessel
9-May-13	10:20	16	30.432917	-80.214979	E	8	2	60°	3	Recreational fishing vessel
9-May-13	13:09	41	30.301591	-80.202231	E	6	1	60°	1	Recreational fishing vessel
9-May-13	15:05	73	30.099920	-80.284595	W	3	2	90°	2	Recreational fishing vessel
10-May-13	9:18	11	30.233432	-80.080274	E	5	2	90°	1	Recreational fishing vessel
10-May-13	9:40	18	30.299830	-80.137711	W	6	3	45°	2	Recreational fishing vessel
10-May-13	10:24	41	30.366533	-80.239368	E	7	2	45°	1	Recreational fishing vessel
10-May-13	11:11	59	30.432311	-80.521432	W	8	1	90°	1	Recreational fishing vessel
10-May-13	14:37	111	29.966285	-80.525746	E	1	1	45°	1	Recreational fishing vessel
10-May-13	14:44	117	29.966440	-80.380396	E	1	3	90°	3	Recreational fishing vessel
10-May-13	14:46	118	29.966236	-80.300657	E	1	3	90°	3	Recreational fishing vessel
10-May-13	15:19	131	30.031358	-80.273136	W	2	2	90°	2	Recreational fishing vessel
10-May-13	15:42	142	30.101057	-80.585977	E	3	3	45°	3	Recreational fishing vessel
10-May-13	9:11	6	30.233706	-80.328902	E	5	3	45°	5	Recreational fishing vessel
10-May-13	9:44	12	30.299847	-80.302820	W	6	2	90°	1	Recreational fishing vessel
10-May-13	9:48	15	30.299868	-80.362524	W	6	2	90°	1	Recreational fishing vessel
10-May-13	9:50	17	30.299666	-80.421623	W	6	2	60°	1	Recreational fishing vessel
10-May-13	10:22	29	30.366252	-80.290417	E	7	2	60°	2	Recreational fishing vessel
10-May-13	10:59	40	30.434642	-80.277617	W	8	3	60°	2	Recreational fishing vessel
10-May-13	11:53	54	30.500595	-80.152755	E	9	1	90°	1	Recreational fishing vessel
10-May-13	15:46	89	30.101028	-80.499330	E	3	1	90°	1	Recreational fishing vessel
10-May-13	15:50	92	30.101450	-80.344038	E	3	3	90°	1	Recreational fishing vessel
10-May-13	15:51	93	30.101493	-80.306002	E	3	3	90°	3	Recreational fishing vessel
10-May-13	16:19	98	30.165790	-80.294285	W	4	3	60°	1	Recreational fishing vessel
20-Jun-13	9:56	4	30.567573	-80.500739	W	10	1	90°	1	Recreational fishing vessel
20-Jun-13	10:37	12	30.499118	-80.159371	E	9	2	60°	1	Recreational fishing vessel
20-Jun-13	11:14	21	30.433610	-80.316954	W	8	2	60°	1	Recreational fishing vessel

Table 17 (continued). Other vessel sightings in the Jacksonville, Florida survey area from January 2013 to December 2013.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
21-Jun-13	8:53	5	29.966245	-80.279808	E	1	1	80°	1	Recreational fishing vessel
21-Jun-13	10:10	27	30.030544	-80.603713	W	2	4	90°	3	Recreational fishing vessel
4-Sep-13	10:20	16	30.498950	-80.543352	W	9	1	60°	1	Recreational fishing vessel
4-Sep-13	11:23	37	30.366552	-80.436867	W	7	3	100°	1	Recreational fishing vessel
4-Sep-13	9:33	4	30.567588	-80.401749	E	10	3	60°	1	Recreational fishing vessel
5-Sep-13	10:53	27	30.433115	-80.372695	W	8	1	90°	1	Recreational fishing vessel
5-Sep-13	11:13	34	30.499523	-80.616123	E	9	2	60°	1	Recreational fishing vessel
5-Sep-13	15:08	85	30.099378	-80.334723	W	3	3	60°	1	Recreational fishing vessel
5-Sep-13	15:06	65	30.099440	-80.268162	W	3	1	45°	1	Recreational fishing vessel
6-Sep-13	9:58	90	30.499476	-80.515094	W	9	2	69°	1	Recreational fishing vessel
17-Oct-13	9:33	17	30.568344	-80.174193	E	10	2	90°	1	Recreational fishing vessel
17-Oct-13	9:57	12	30.498614	-80.206812	W	9	2	45°	1	Recreational fishing vessel
17-Oct-13	11:14	27	30.364838	-80.528840	W	7	2	45°	1	Recreational fishing vessel
17-Oct-13	13:15	32	29.966154	-80.385257	E	1	3	45°	1	Recreational fishing vessel

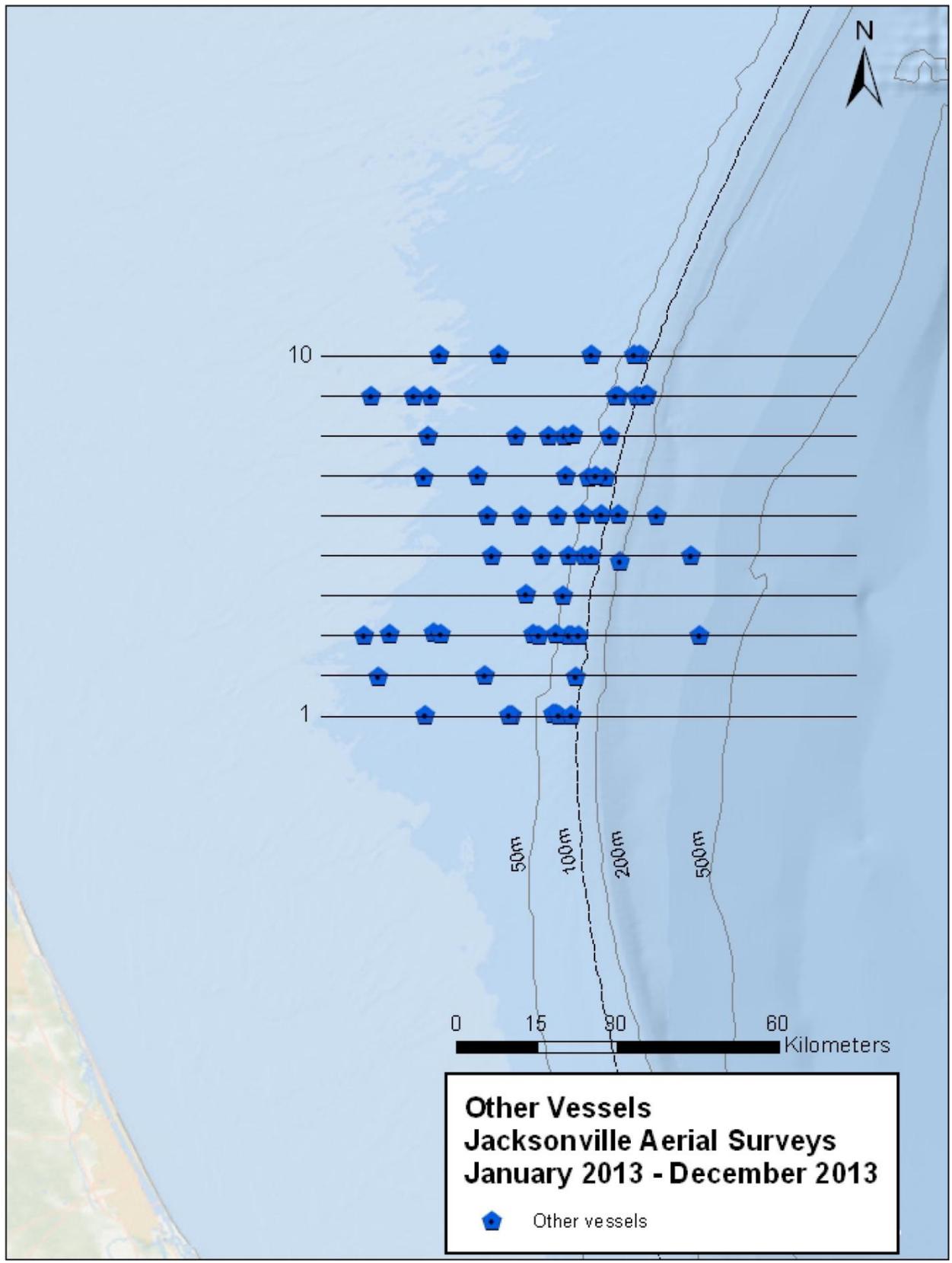


Figure 17. Other vessel sightings.

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