Aerial Survey Baseline Monitoring in the Continental Shelf Region of the VACAPES OPAREA: 2016 Annual Progress Report

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Humpback whale (*Megaptera novaeangliae*). Photo by Sarah Mallette, Virginia Aquarium & Marine Science Museum collected under NOAA Scientific Permit # 16473 issued to University of North Carolina Wilmington.

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Table of Contents

Appendices

Figures

Tables

Acronyms and Abbreviations

BSS	Beaufort Sea State
CREEM	Centre for Research into Ecological and Environmental Modeling
GPS	Global Positioning System
km	kilometer(s)
m	meter(s)
NARW	North Atlantic right whale
NAVFAC	Naval Facilities Engineering Command
OPAREA	Operating Area
SD	standard deviation
UNCW	University of North Carolina Wilmington
U.S.	United States
UTC	Coordinated Universal Time
VACAPES	Virginia Capes
VAQF	Virginia Aquarium & Marine Science Center Foundation, Inc.
VA WEA	Virginia Wind Energy Area

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1. Introduction

The Virginia Aquarium & Marine Science Center Foundation, Inc. (VAQF) is tasked to conduct aerial surveys for the continental shelf region off the mouth of the Chesapeake Bay within the Virginia Capes Operating Area (VACAPES OPAREA) to provide marine species monitoring services. In 2007, a multi-institutional project utilizing multiple platforms (i.e., aerial, vessel, and passive acoustic monitoring) aimed at protected species monitoring off the East Coast of the United States commenced. The current survey will complement existing United States (U.S.) Navy marine species monitoring efforts (Aerial Survey Baseline Monitoring- Atlantic Fleet Training and Testing) and will support environmental planning and regulatory compliance along the East Coast of the United States.

This project represents the first year of Navy-funded aerial survey efforts over the continental shelf off the coast of Virginia Beach, Virginia. These surveys build upon previous survey efforts funded by Virginia Coastal Zone Management (CZM) Program to document large whale occurrence in the vicinity of the Virginia Wind Energy Area (VA WEA) and contribute to regional mid-Atlantic ocean planning efforts. VAQF in collaboration with University of North Carolina Wilmington (UNCW) conducted line-transect aerial surveys in this location from 2012 through 2016, although surveys were not flown every month or with consistent effort between years (Mallette et al. 2014, 2016). The goal of the current surveys is to complement existing monitoring projects and contribute baseline protected species occurrence data, including species distribution; abundance; density estimates; and seasonal habitat usage.

The survey site includes an approximately 6,500-square-kilometer area off the coast of Virginia extending from the southern portion of the eastern shore of Virginia to the North Carolina/Virginia state border. The aerial survey design was established based upon advisements from the Centre for Research into Ecological and Environmental Modelling (CREEM) at the University of St. Andrews and objectives identified by the U.S. Navy. VAQF conducted fixed-wing aerial line-transect surveys, using previously established distance-sampling protocols, to document the occurrence of marine mammals and sea turtles. VAQF worked closely with the UNCW to maintain consistency among the safety, flight, and data-reporting protocols for Hatteras/Onslow/JAX baseline monitoring projects (McAlarney et al. 2013, 2015). The current report describes monitoring activities that occurred between January 2016 and December 2016.

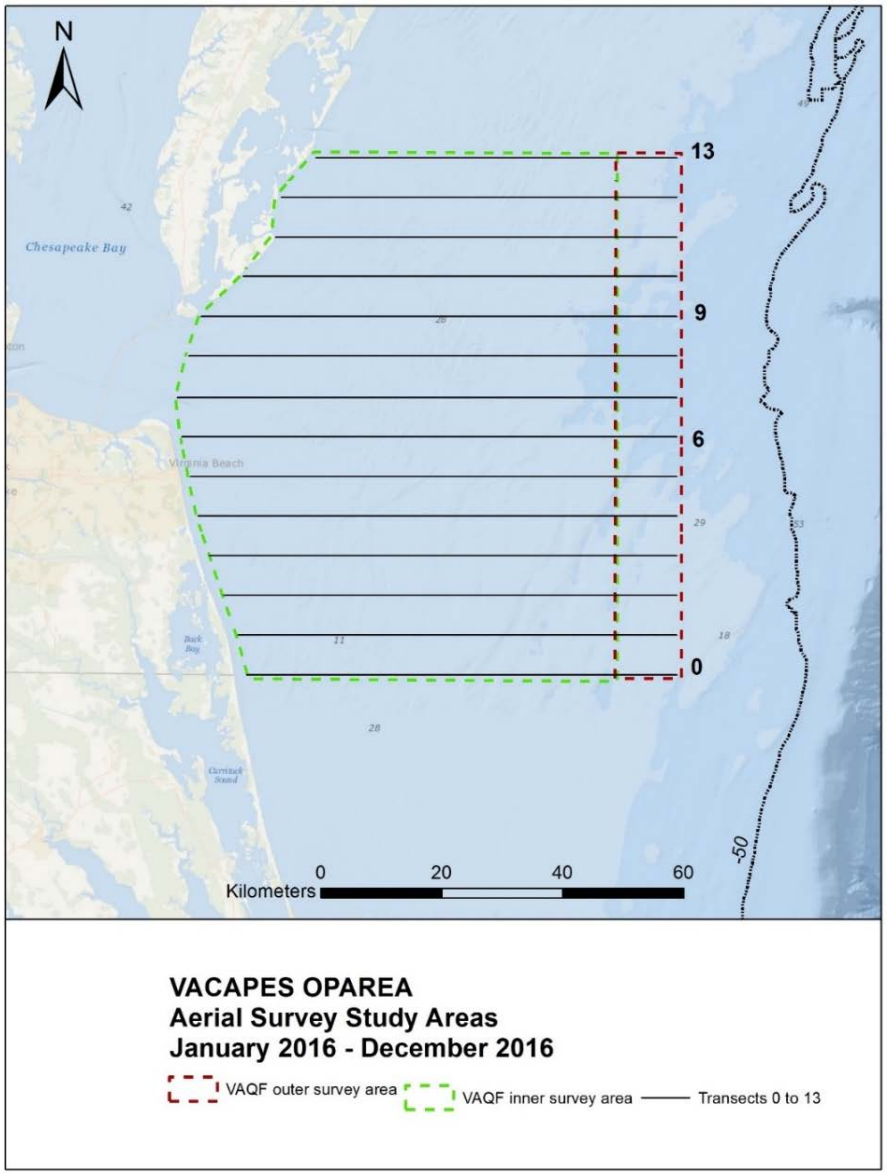
2. Summary of Coastal Virginia Aerial Surveys

This document is an annual progress report to the U.S. Department of the Navy on aerial surveys conducted along the continental shelf off the coast of Virginia Beach, Virginia, from January to December 2016. To build upon the existing dataset in the proximity of the VA WEA, previously established transect lines were modified based upon recommendations from CREEM and discussions with UNCW and the Navy to manage overlap between the coastal (VAQF) and Survey Area offshore (UNCW) survey areas. Eighteen survey days were allotted to VAQF to continue surveys of the continental shelf region off the mouth of the Chesapeake Bay within the VACAPES OPAREA during 2016.

Two survey designs were established relative to the existing Norfolk Canyon offshore survey area to calibrate for survey origin difference and integrate data between sites. These were (1) *Overlap*: the eastern ends of all transect lines overlapped 10 kilometers (km) with the western ends of the offshore lines (**Table 1, Figure 1**), and (2) *No Overlap (truncated)*: transect lines did not overlap with the offshore transect lines (**Table 1, Figure 1**; i.e., the eastern end of the coastal lines terminated at the longitude of the western end of the UNCW lines).

Table 1. Trackline end points for the VACAPES survey area for both the *Overlap* and *No-overlap* survey designs.

Transect	West End		East End (no overlap)		East End (overlap)	
	Latitude (°N)	Longitude (°W)	Latitude (°N)	Longitude (°W)	Latitude (°N)	Longitude (°W)
0	36.55054	-75.84462	36.55343	-75.15952	36.55352	-75.05009
1	36.60995	-75.86152	36.61296	-75.15965	36.61305	-75.05013
2	36.66928	-75.88874	36.67249	-75.15977	36.67258	-75.05017
3	36.72761	-75.91646	36.73103	-75.15989	36.73113	-75.05021
4	36.78727	-75.93766	36.79086	-75.16002	36.79095	-75.05024
5	36.84616	-75.95269	36.84987	-75.16014	36.84997	-75.05028
6	36.90554	-75.96906	36.90938	-75.16026	36.90948	-75.05032
7	36.96382	-75.97857	36.96774	-75.16038	36.96784	-75.05036
8	37.02638	-75.95745	37.03013	-75.16052	37.03023	-75.05040
9	37.08526	-75.93570	37.08885	-75.16064	37.08894	-75.05044
10	37.14611	-75.85745	37.14911	-75.16077	37.14920	-75.05048
11	37.20508	-75.79796	37.20766	-75.16089	37.20776	-75.05052
12	37.26437	-75.78844	37.26688	-75.16102	37.26698	-75.05056
13	37.32400	-75.72454	37.32611	-75.16066	37.32621	-75.05060



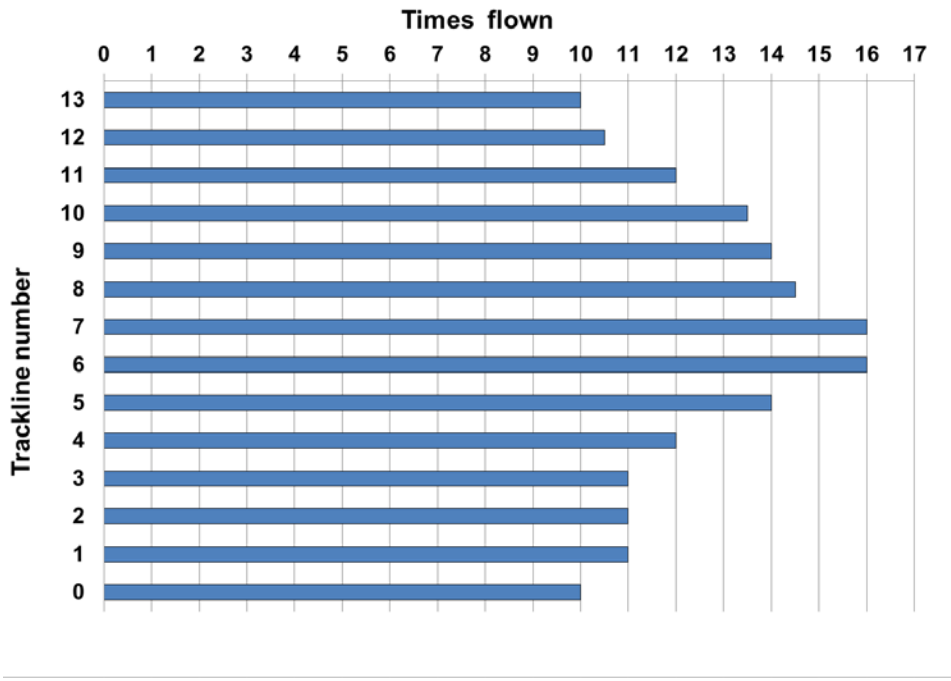


Figure 1. Survey tracklines and realized effort in the VACAPES survey area for 2016.

Survey effort occurred in each month of 2016. One and a half to two survey days were achieved in 5 of the 12 months, single days of effort occurred during May through November. A total of 177 transect lines (11,923 km) over 18 days was covered during the reporting period. Ninety-three percent of survey effort was conducted in Beaufort Sea State [BSS] 1–3.

A total of 109 sightings of 1,848 cetaceans was detected while on-effort during the 18 days of aerial surveys. Six species of cetaceans were photo-documented, including bottlenose dolphin (*Tursiops truncatus*; 99 sightings of 1,673 individuals), Atlantic spotted dolphin (*Stenella frontalis*; 2 sightings of 155 individuals), short-beaked common dolphin (*Delphinus delphis*; 3 sightings of 14 individuals), North Atlantic right whale (*Eubalaena glacialis;* 2 sightings of 2 individuals), humpback whale (*Megaptera novaeangliae*, 2 sightings of 2 individuals), and fin whale (*Balaenoptera physalus,* 1 sighting of 2 individuals).

Thirty-one off-effort cetacean sightings were also recorded, including 5 sightings of humpback whales (6 individuals), one sighting of Atlantic spotted dolphins (125 individuals), and 24 sightings of bottlenose dolphins (124 individuals). There was one sighting (1 individual) where the baleen whale species identity could not be established with 100 percent certainty, and this sighting was recorded as an “unidentified balaenopterid.” These off-effort sightings were included in species sighting maps and tables, but were excluded from all other analyses.

Three hundred and thirty-one sightings of 362 sea turtles were recorded during the survey period, of which 283 were identified as loggerhead (*Caretta caretta;* 313 individuals) and 10 sightings as leatherback (*Dermochelys coriacea;* 11 individuals) sea turtles. Species identification could not be established for 38 detections of single turtles, and these were listed as “unidentified sea turtle.” Sea turtles were detected during 6 of the 12 months surveyed, with the highest numbers of sightings in June.

In addition to cetaceans and sea turtles, other species observed included a variety of fishes, including manta rays (*Manta birostris*), cownose rays (*Rhinoptera bonasus*), ocean sunfish (*Mola mola*), unidentified sharks, and cobia (*Rachycentron canadum*). Commercial, military, and recreational vessels also were encountered in the survey area.

3. Methods

3.1 Survey Design and Logistics

Aerial survey effort was initiated in the continental shelf region off the mouth of the Chesapeake Bay within the VACAPES OPAREA in January 2016. As this is controlled airspace, pilots coordinate airspace the morning of planned survey flights to avoid interacting with any active areas and activities.

To achieve the allocated 18 survey days, two surveys per month were planned for November–April when large whale presence was expected to be highest in the area. The other six months included one planned survey day. One and a half to two survey days were achieved in five of the 12 months, with single days of effort occurring in May through November. A total of 177 transect lines (11,923.2 km) over 18 days was covered during the 2016 reporting period. The central portion of the survey area was generally given preference. In some instances, coverage

off the mouth of the Chesapeake Bay was provided to support vessel surveys being conducted by HDR, Inc., while other times the central portion of the survey area was covered due to restricted airspaces to the north and south.

VAQF coordinated with UNCW's flight team as necessary to avoid airspace conflicts and to pair VAQS and UNCW flights when possible. Flights maintained consistency for general flight and safety guidelines. Survey flights typically originated from the Fixed-base Operator in Norfolk, Virginia. Aerial survey, data collection and management protocols were consistent with ongoing surveys being conducted under the Navy's marine species monitoring program in the offshore VACAPEs and Jacksonville areas. Aerial surveys were conducted in high-wing, twin-engine, Cessna 337 aircraft, which were maintained under Title 14 of the Code of Federal Regulations § 135. Each plane was equipped with electronic positioning equipment and safety gear required for carrying out aerial surveys. Two pilots were used for each flight. Both pilots met requirements specified in 14 Code of Federal Regulations § 135, and met or exceeded all NOAA offshore flight safety requirements. The survey team included two observers and a coordinator. Surveys were flown only in safe operating conditions according to NOAA Aircraft Operations Center standards and under visual flight rules. Aerial surveys for endangered species were conducted under National Marine Fisheries Service Scientific Research Permit 16473, held by Dr. D. Ann Pabst at UNCW, and for non-listed marine mammal species under Scientific Research General Authorization 17325 issued to VAQF.

Surveys were flown at an altitude of 305 meters (1,000 feet) and operational airspeeds of approximately 185 kilometers per hour (100 knots). Two observers, one positioned on each side of the aircraft, conducted the surveys. The plane was equipped with a Global Positioning System (GPS) receiver to permit precise track-line fidelity. Each observer had an independent GPS unit to record precise times and geographic positions of all marine mammal and sea turtle sightings. All times were recorded in local time, either Eastern Standard or Eastern Daylight as appropriate for the date of the survey.

Environmental parameters including visibility, BSS, cloud cover, and glare were collected at regular intervals throughout the survey period and at each time an event was recorded. When a cetacean sighting occurred, the initial location on the track-line was recorded and the plane broke from the track-line. The sighting cue(s) and the vertical and horizontal angles of the initial sighting relative to the observer's vantage point in the plane were recorded at the time of the sighting. When the plane was directly over the animals' location, species identification, reliability of species identification, and group size (minimum, maximum, and best estimate) were recorded. Observers also recorded perpendicular angle from the transect line of all sea turtles, other marine vertebrates, and vessels, although the survey did not break track for these sightings.

Additionally, track was not broken when bottlenose dolphins were observed in the nearshore waters within 20 nautical miles (37 km) of shore, although standard sighting data were documented. This approach was established to maximize efficiency of survey effort in areas where the spatial distribution and relative abundance of coastal bottlenose dolphins has previously been established (Engelhaupt et al. 2016, Barco et al. 1999; Torres et al. 2003; Torres et al. 2005).

If a sighting occurred while transiting to or from the survey area or between transect lines it was recorded as an “off effort” sighting. Any cetaceans the survey team encountered while investigating a separate sighting cue also were considered off effort. If two species were seen associated with the same sighting cue, both were considered on effort.

4. Results

One hundred and seventy-five transect lines totaling 11,923.2 km were surveyed from January 2016 to December 2016 (**Table 2**). Conditions during the 18 survey days ranged from BSS 1 to 4 with approximately 93 percent of effort in BSS 3 or lower [BSS 1: 1,896.1 km (15.90 percent), BSS 2: 4,819.5 km (40.4 percent), BSS 3: 4,308.5 km (36.1 percent), BSS 4: 899.1 km (7.5 percent)] (**Figures 2a and b**). An average BSS value, weighted by distance flown, was calculated for each month as a way to compare conditions across time (**Figure 2c**).

Table 2. Tracklines, km flown, and Hobbs hours (engine-on time) during aerial surveys of the Coastal VACAPES survey area in 2016. Trackline numbers are listed in the order in which they were flown.

Date	Transect lines Flown AM	Transect lines Flown PM	Total km Flown	Hobbs Hours
29 Jan 2016	6 to 11	1 to 3	245.0	5.5
30 Jan 2016	10 to 7	5 to 4	535.1	
2 Feb 2016	0 to 5	6 to 11	786.5	10.6
22 Feb 2016	12, 9	11, 10, 8 to 1	744.3	
17 Mar 2016	13 to 12	11 to 4	772.0	13.6
18 Mar 2016	6 to 9	10 to 11, 3 to 0	744.2	
20 Apr 2016	0 to 5	6 to 13	893.1	9.9
21 Apr 2016		5 to 10	414.0	
10 May 2016	6 to 9	10 to 13	575.0	5.0
27 Jun 2016	0 to 3	4 to 7,half of 8 &12, 13	748.2	6.0
14 Jul 2016	13 to 8	7 to 0	881.6	7.1
8 Aug 2016	12 to 13, 11 to 6	5 to 0	891.6	6.5
13 Sep 2016	0 to 5	6, 7, half of 10 & 11, 12, 13	688.6	5.2
21 Oct 2016	0 to 5	6, 7, 13, 12	740.2	5.6
7 Nov 2016	10 to 5		460.8	3.0
10 Dec 2016	13 to 8	7 to 4	632.7	
21 Dec 2016	0 to 5	6 to 9	774.7	14.8
22 Dec 2016	13 to 8		411.0	
18 Days	**175.5 Transect lines**		**11,923.2**	**92.8**

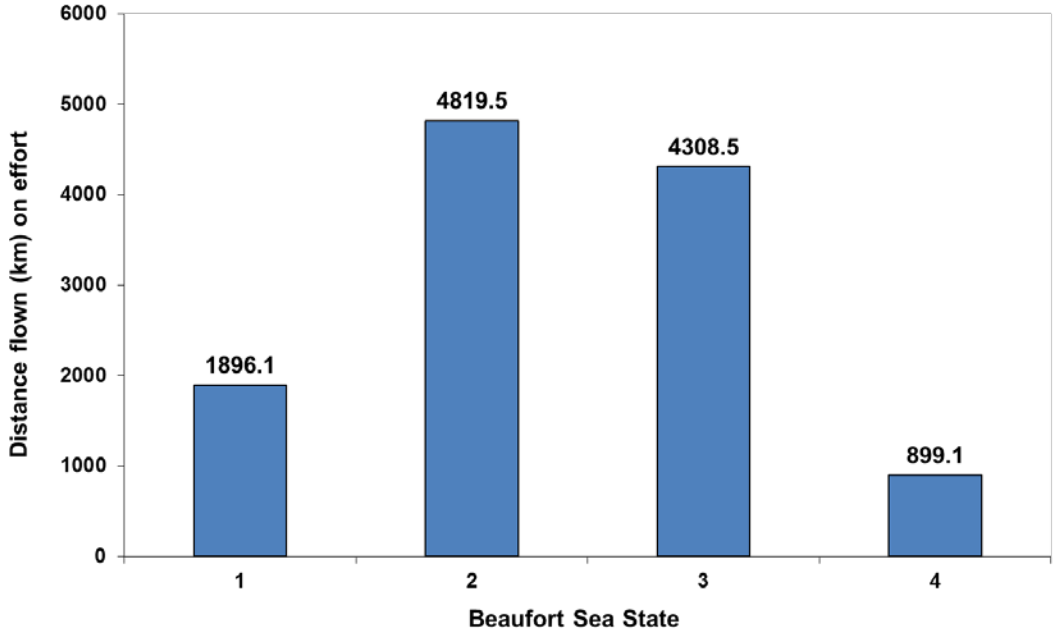


Figure 2a. Total on-effort distance surveyed per Beaufort Sea State during aerial surveys in the Coastal VACAPES survey area in 2016.

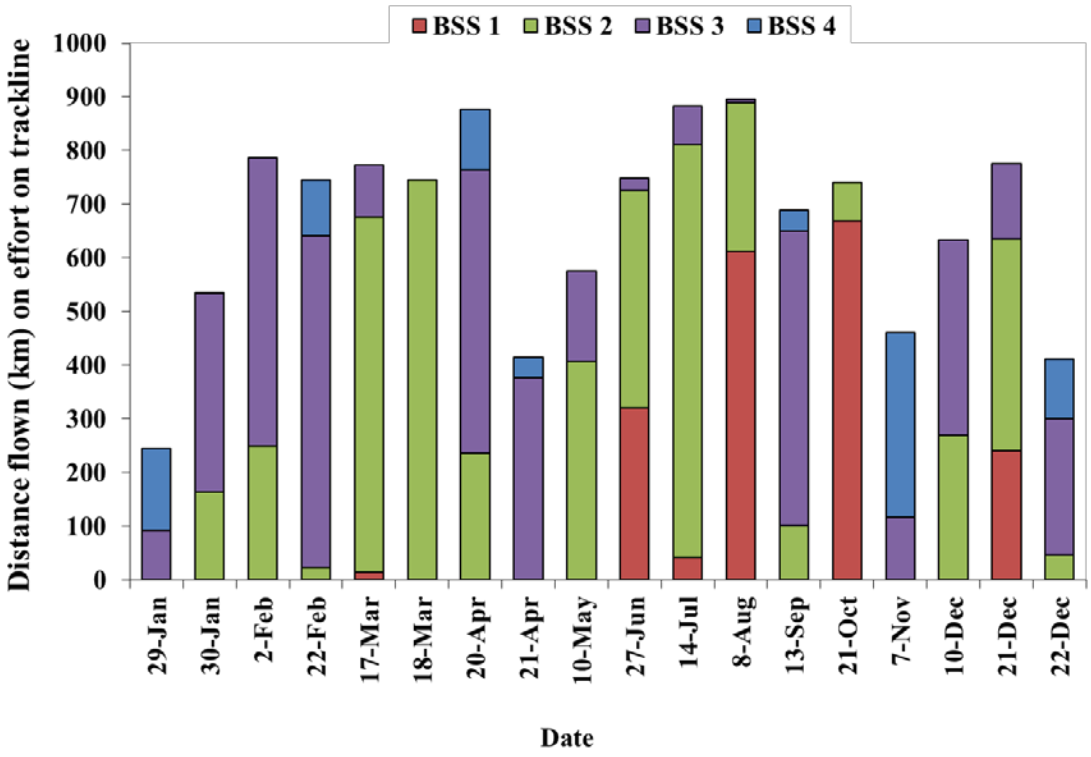


Figure 2b. Effort by Beaufort Sea State for each day during aerial surveys in the Coastal VACAPES survey area in 2016.

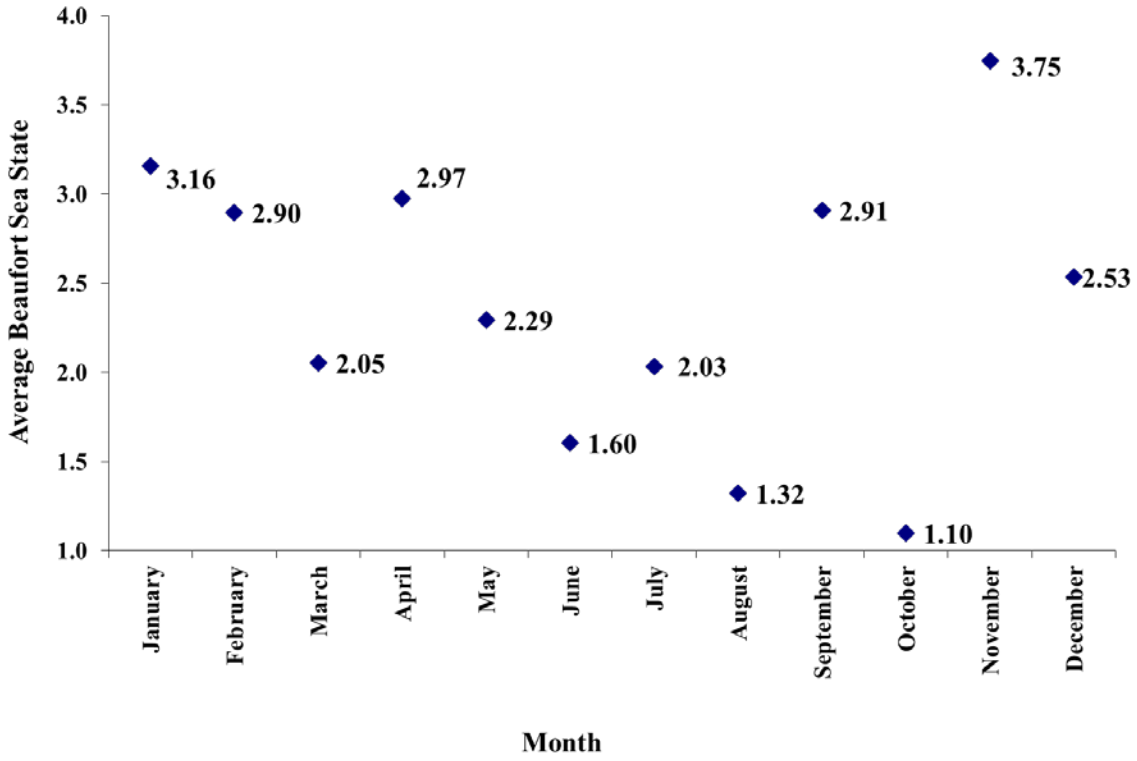


Figure 2c. Distance-weighted mean BSS for each month f during aerial surveys in the Coastal VACAPES survey area in 2016.

All cetacean sightings occurred in BSS of 3 or lower (**Figure 3a**). Cetacean sighting rates decreased in BSS higher than 2, with 8.97 sightings/1,000 km in BSS 1, 15.35 sightings/1,000 km in BSS 2, 4.18 sightings/1,000 km in BSS 3, and 0.00 sightings/1,000 km in BSS 4 (**Figure 3b**). Other aerial surveys demonstrated that the rate of cetacean sightings is negatively affected by an increase in the BSS (e.g., Buckland et al. 2001; DeMaster et al. 2001; Gómez de Segura et al. 2006; McAlarney *et al*. 2014; Cummings *et al.* 2016; Mallette *et al.* 2016,). Sighting rates per month ranged from 1.74 sightings to 31.00. Sighting rate was highest in March (43 percent of sightings) with 47 sightings recorded over 1,515.1 km and twenty transect lines (**Figure 3c**).

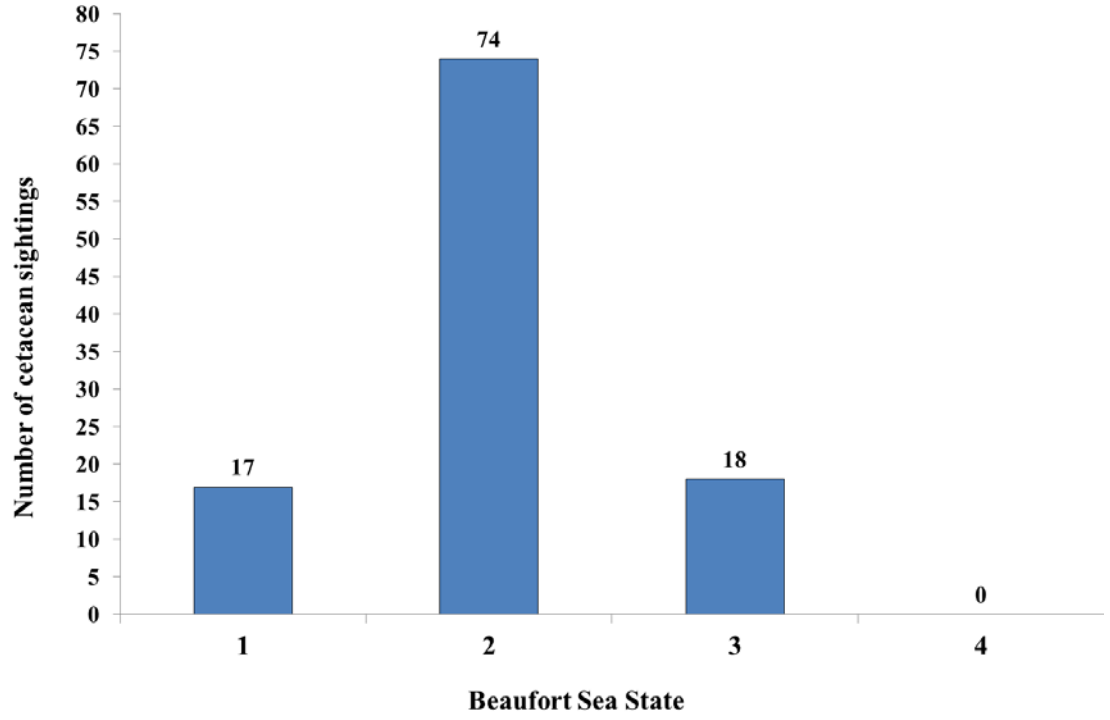


Figure 3a. Number of cetacean sightings per BSS during aerial surveys in the Coastal VACAPES survey area in 2016.

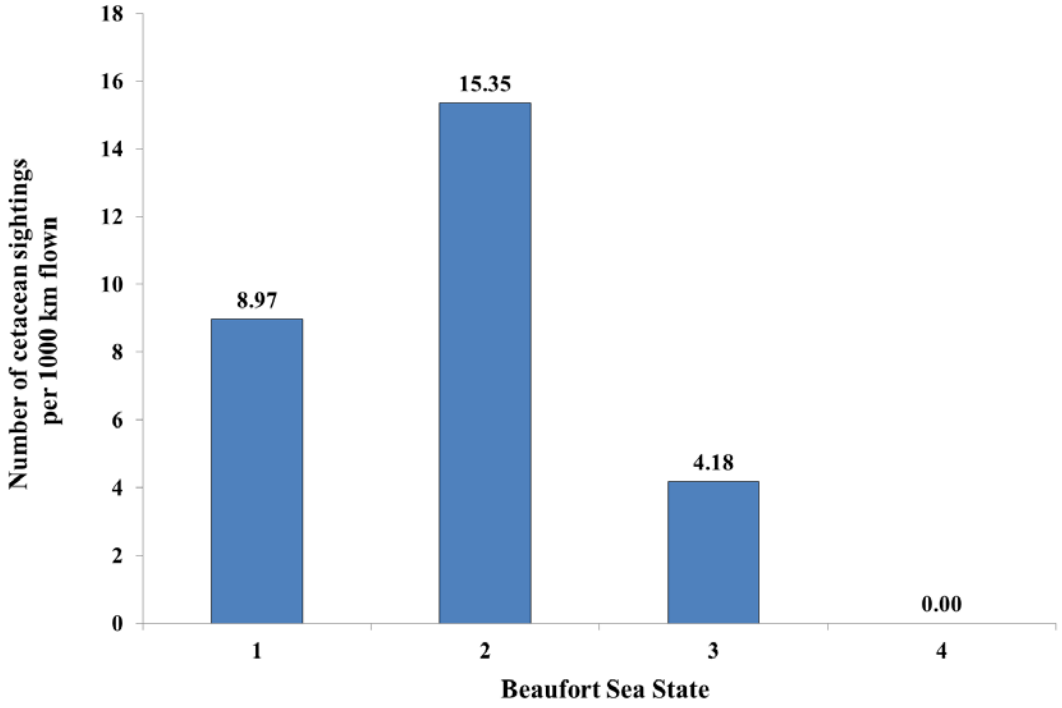


Figure 3b. Cetacean sightings per 1,000 km flown by BSS during aerial surveys in the Coastal VACAPES survey area in 2016.

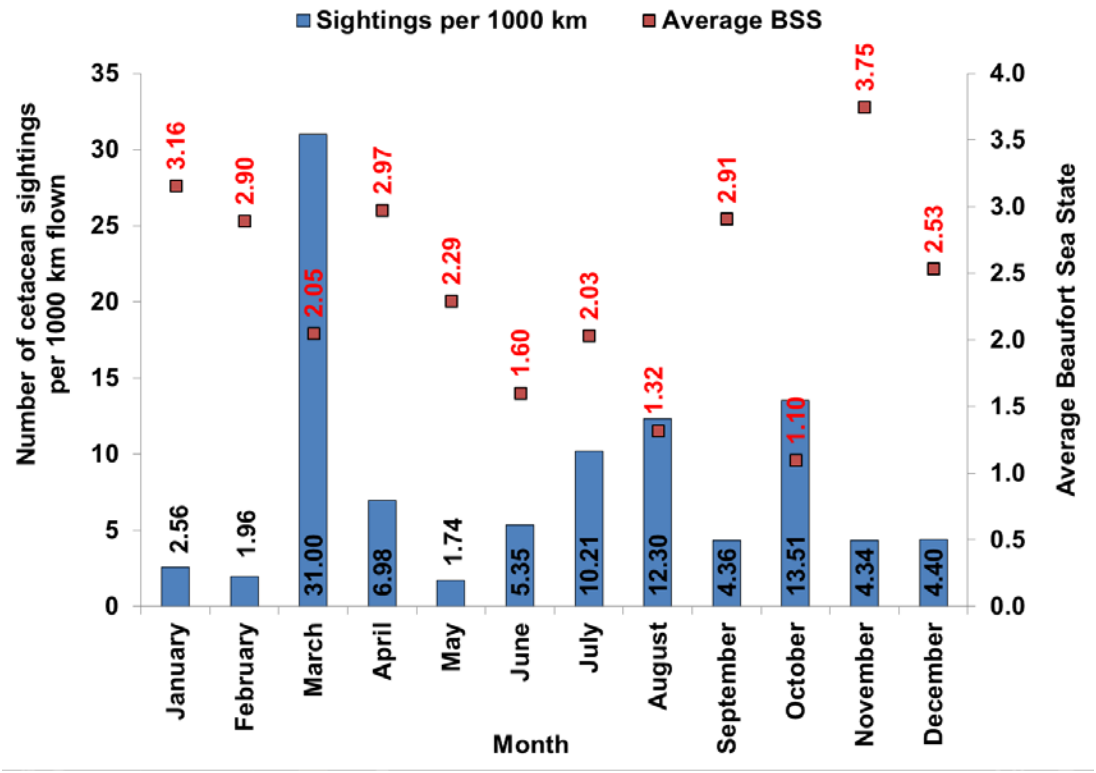


Figure 3c. Cetacean sightings per 1,000 km surveyed and the average BSS per month during aerial surveys in the Coastal VACAPES survey area in 2016.

Of the 109 marine mammal sightings, 76 percent of these were bottlenose dolphins that were sighted within 20 nm of the coast, for which we did not break track. On 26 occasions, the survey team broke track for an on-effort marine mammal sighting, collected the actual time and position of the sighting, and completed a sighting summary of that event. Ninety-one percent of sightings for which "actual position" [*e.g.* coordinates above the animal(s)] of sighting was collected occurred within 1.5 km of the transect line (**Figure 4a**), and mean sighting distance from the transect line for all cetacean sightings was 0.84 km (standard deviation [SD]=0.45). The difference in mean sighting distances between BSS 1 and 2 were 2.8 km, and 2.2 km between BSS 2 and 3 (**Figure 4b**). Average sighting distances are normally calculated after removing outliers, defined as any value in excess of three SD from the mean (mean=0.84 km, SD=0.45, 0.84+[3x0.45]=2.18 km, Outlier > 2.18 km). There were no sighting distances that were identified as outliers during this reporting period. **Figures 4a and b** represent the 26 on-effort cetacean sightings where distance from transect line was able to be calculated.

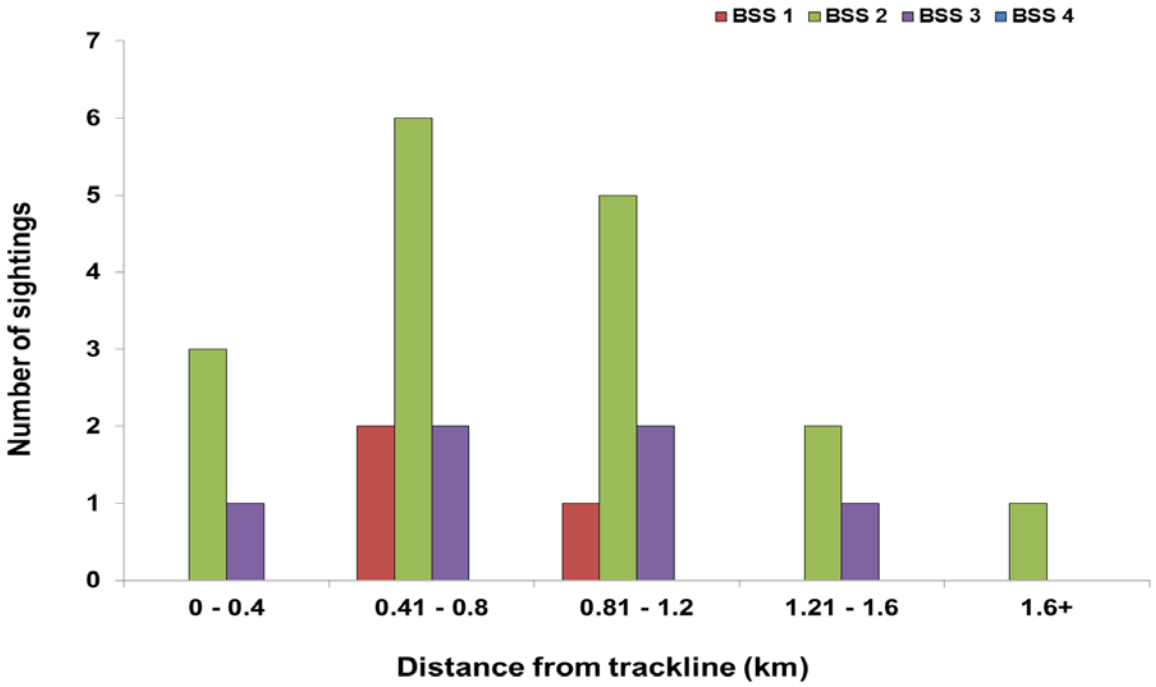


Figure 4a. Sighting distances by BSS for 26 of 109 on-effort cetacean sightings during aerial surveys in the Coastal VACAPES survey area in 2016. Sighting distances are only included for sightings where the survey platform broke from the trackline and was able to collect GPS coordinates at the actual location of the animal(s) sighted.

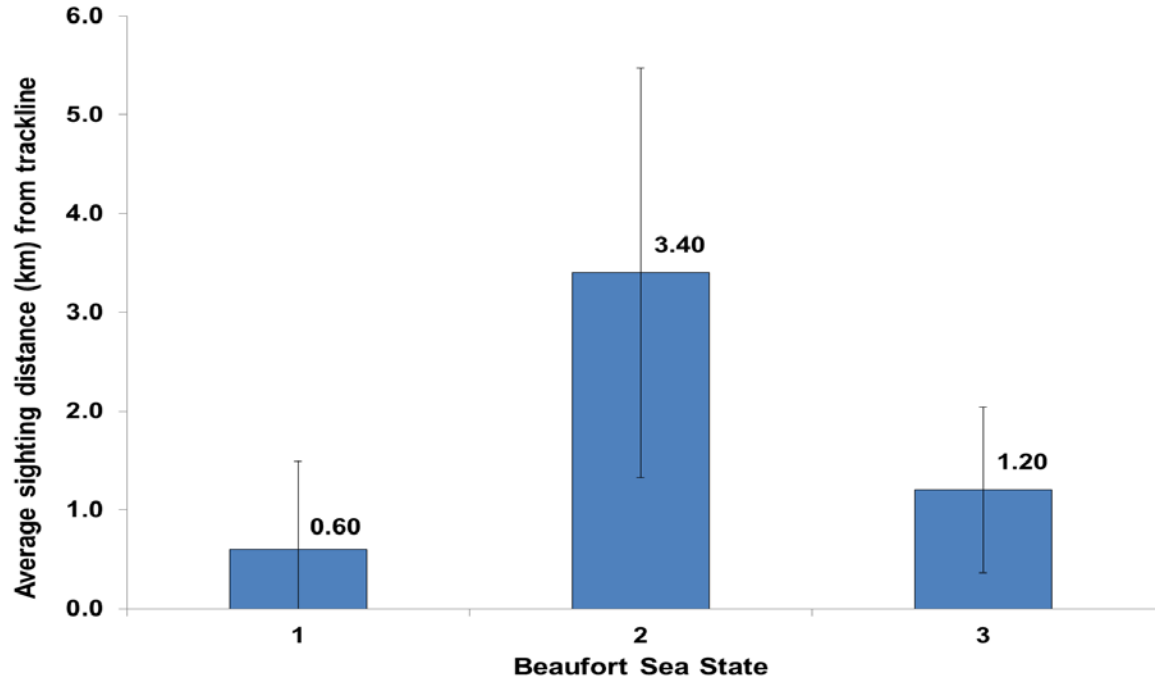


Figure 4b. Average sighting distances by BSS for 26 of 109 on-effort cetacean sightings during aerial surveys in the Coastal VACAPES survey area in 2016. Error bars denote standard deviation for each category. Sighting distances are only included for sightings where the survey platform broke from the trackline and was able to collect GPS coordinates at the actual location of the animal(s) sighted.

4.1 Marine Mammal Sightings

A total of 109 sightings of 1,848 individual cetaceans representing six species was observed while on effort in 2016 (**Table 3, Figure 5**). Summary information by species is below. Two endangered species, North Atlantic right whale and fin whale, were encountered in the Coastal VACAPES survey area. While off effort, there were sightings of four cetacean species and one unidentified baleen whale whose species identification could not be confirmed with 100% certainty (unidentified balaenopterid). The total number of individuals listed represents the best estimate of group size. Summary information on individual sightings can be reviewed in **Appendices A, B, and C**. Individual sightings are summarized in **Appendix D.**

Table 3. Total numbers of on-effort sightings and individuals for each species by month f during aerial surveys in the Coastal VACAPES survey area in 2016.

Species		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Tursiops truncatus	Sightings		1	44	9		3	9	11	3	10	2	7	99
	# of individuals		6	467	101		16	111	91	608	207	20	46	1,673
Stenella frontalis	Sightings					1	1							2
	# of individuals					125	30							155
Delphinus delphis	Sightings	1		2										3
	# of individuals	5		9										14
Balaenoptera physalus	Sightings		1											1
	# of individuals		2											2
Megaptera novaeangliae	Sightings			1									1	2
	# of individuals			1									1	2
Eubalaena glacialis	Sightings	1	1											2
	# of individuals	1	1											2
Total	**Sightings**	**2**	**3**	**47**	**9**	**1**	**4**	**9**	**11**	**3**	**10**	**2**	**8**	**109**
	Total individuals	**6**	**9**	**477**	**101**	**125**	**46**	**111**	**91**	**608**	**207**	**20**	**47**	**1,848**

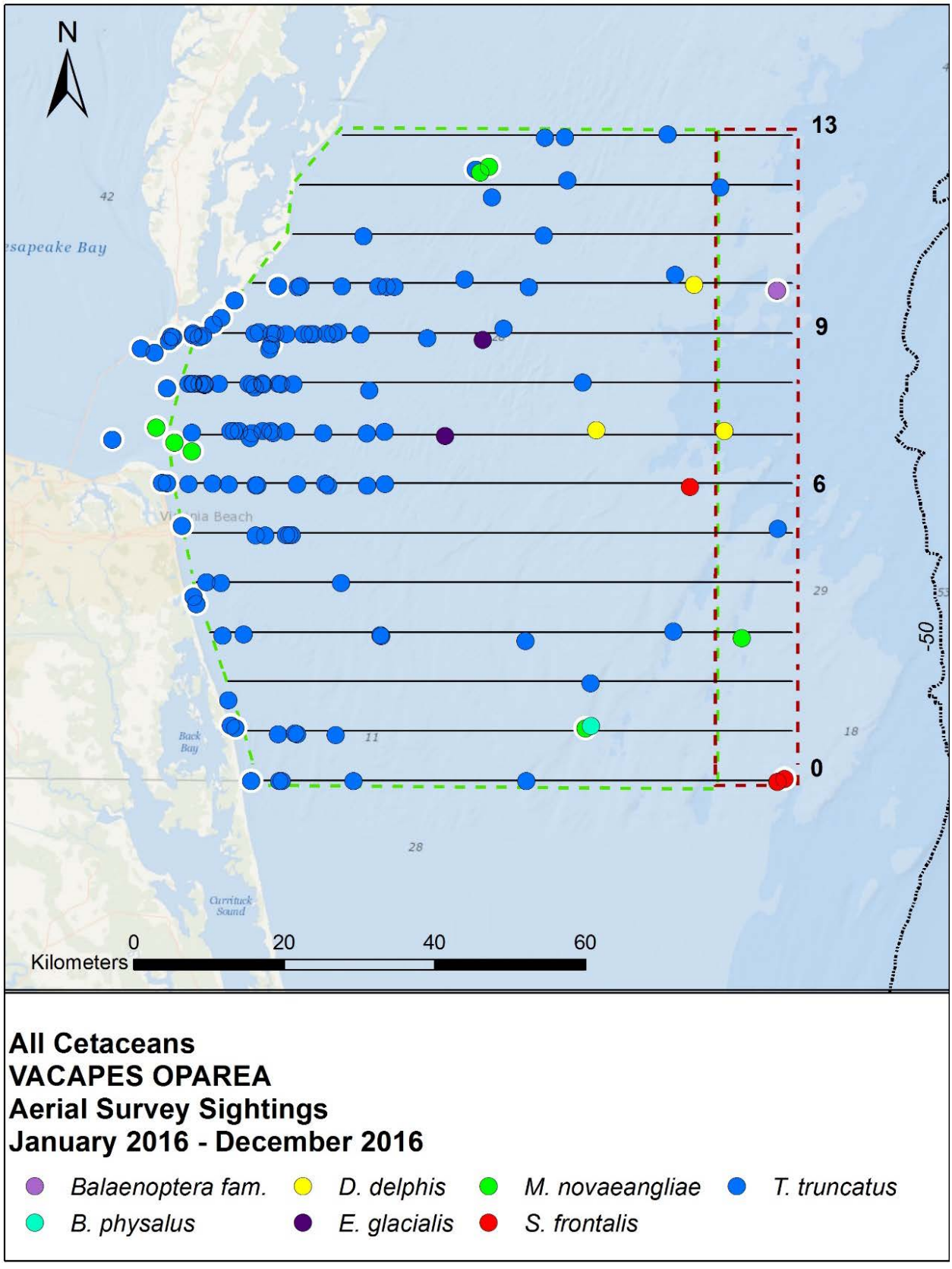


Figure 5. All cetacean sightings during aerial surveys during aerial surveys in the Coastal VACAPES survey area in 2016.

4.2 Dolphins

4.2.1 Bottlenose dolphin (*Tursiops truncatus*)

Bottlenose dolphins were the most commonly observed cetacean species, with 99 on-effort sightings totaling 1,673 individuals (**Appendix D, Figure 6**). Bottlenose dolphins were observed in 11 of the 12 months in 2016. January was the only month during which this species was not observed. Group size ranged from 1 to 600 individuals (mean=167.3, SD=206.7). The group of 600 individual dolphins was observed in September, and the size of this group is uncommon (Mallette et al. 2016). Excluding that sightings, the largest group size was 125 individuals and the mean was 10.9 (SD=18.3). In addition, on 24 occasions (124 individuals), bottlenose dolphins were observed while transiting between transect lines or between the airport and survey area and thus were considered off-effort (also included in **Appendix D, Figure 6**).

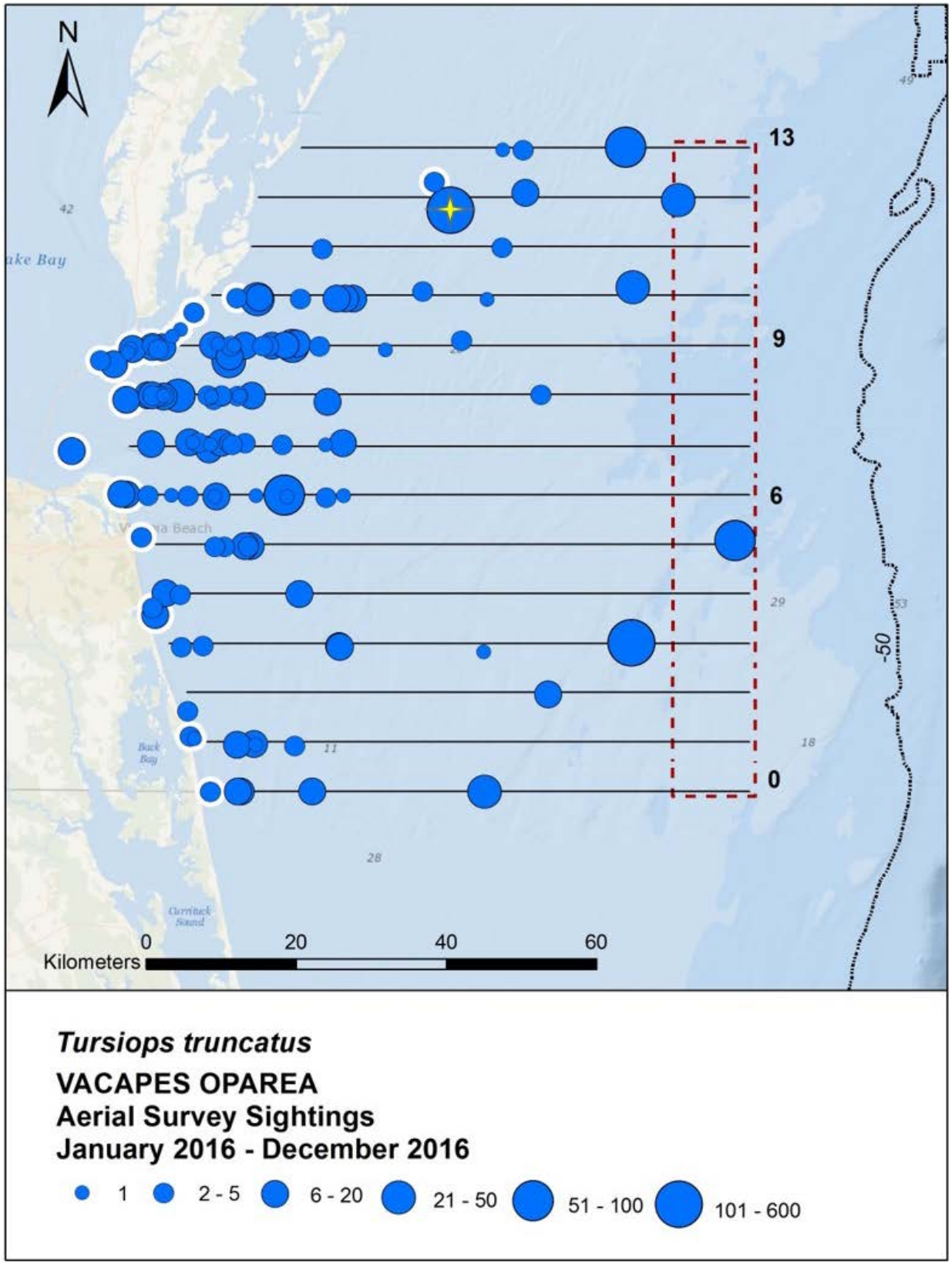


Figure 6. Bottlenose dolphin (*Tursiops truncatus*) sightings in the Coastal VACAPES survey area in 2016 (N=123). Symbol size indicates group size. White outlines denote off-effort sightings. Group of 600 individuals denoted by a yellow star.

4.2.2 Atlantic spotted dolphin (*Stenella frontalis*)

Two sightings totaling 155 Atlantic spotted dolphins were recorded while on effort in the VACAPES survey area. Group sizes were 30 and 125 (mean=77.5, SD=67.2) (**Appendix D, Figure 7**). One additional off-effort sighting of 125 dolphins was documented inside the survey area. All sightings occurred in May and June. Two distinct ecotypes of the Atlantic spotted dolphin occur in the western North Atlantic: a heavily spotted, larger form that typically occurs on the continental shelf and is most often encountered around the 200-m isobath or in shallower water, and a less spotted and smaller form that occurs farther offshore and around islands (Perrin et al. 1987, 1994). Young spotted dolphins are typically less spotted and become more spotted with maturity, therefore it was difficult to discern from the images collected during each sighting which ecotype was present within the survey area.

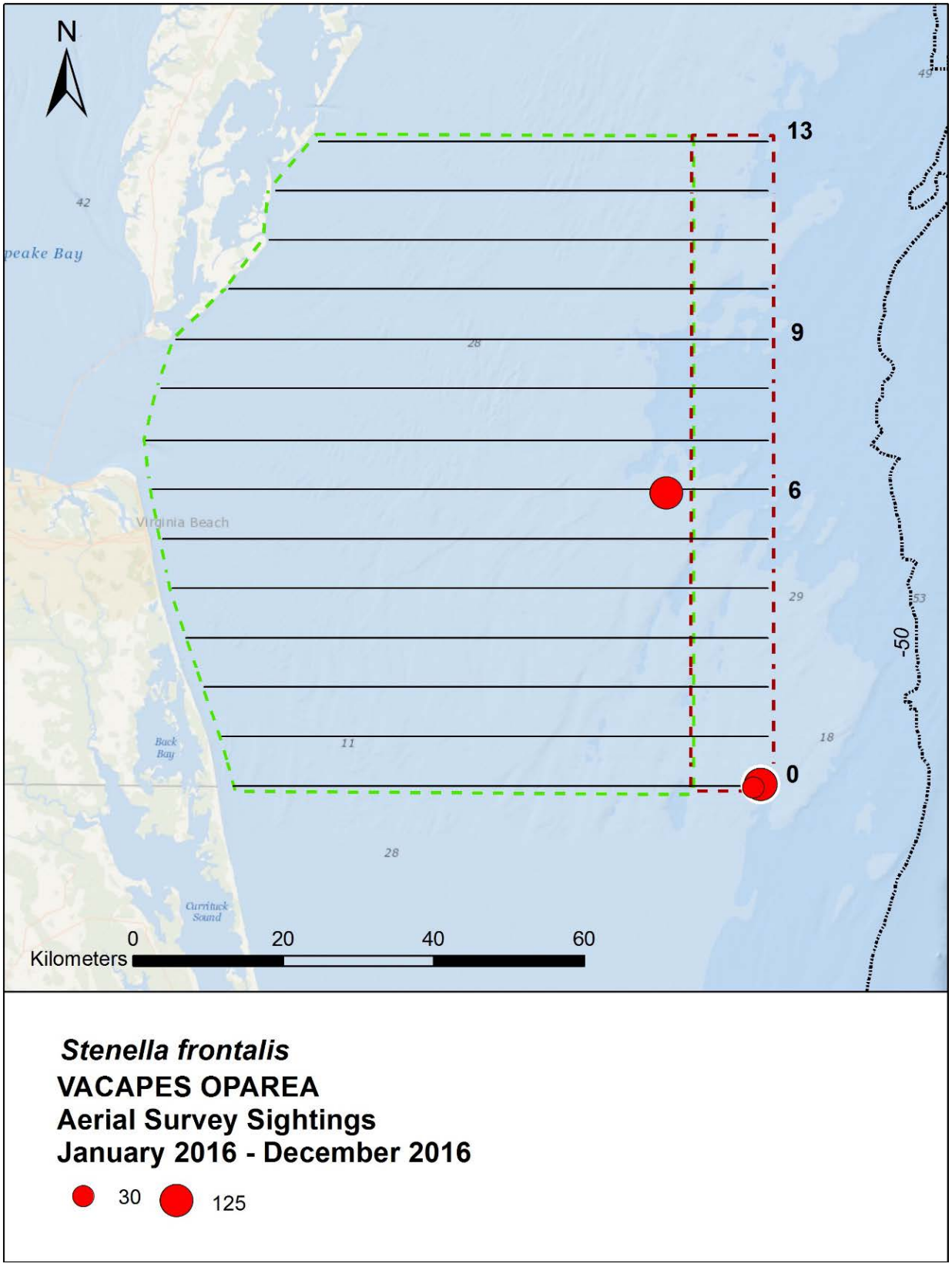


Figure 7. Atlantic spotted dolphin (*Stenella frontalis*) sightings in the coastal VACAPES survey area in 2016 (N=3). Symbol size indicates group size. White outline denotes an off-effort sighting.

4.2.3 Short-beaked common dolphin (*Delphinus delphis*)

Three sightings totaling 14 individuals (mean=9, SD=2.82) of short-beaked common dolphins were recorded. Short-beaked common dolphins were documented in 2 months, January and March, during surveys in 2016 (**Appendix D, Figure 8**). Best estimate of group size ranged from four to five individuals.

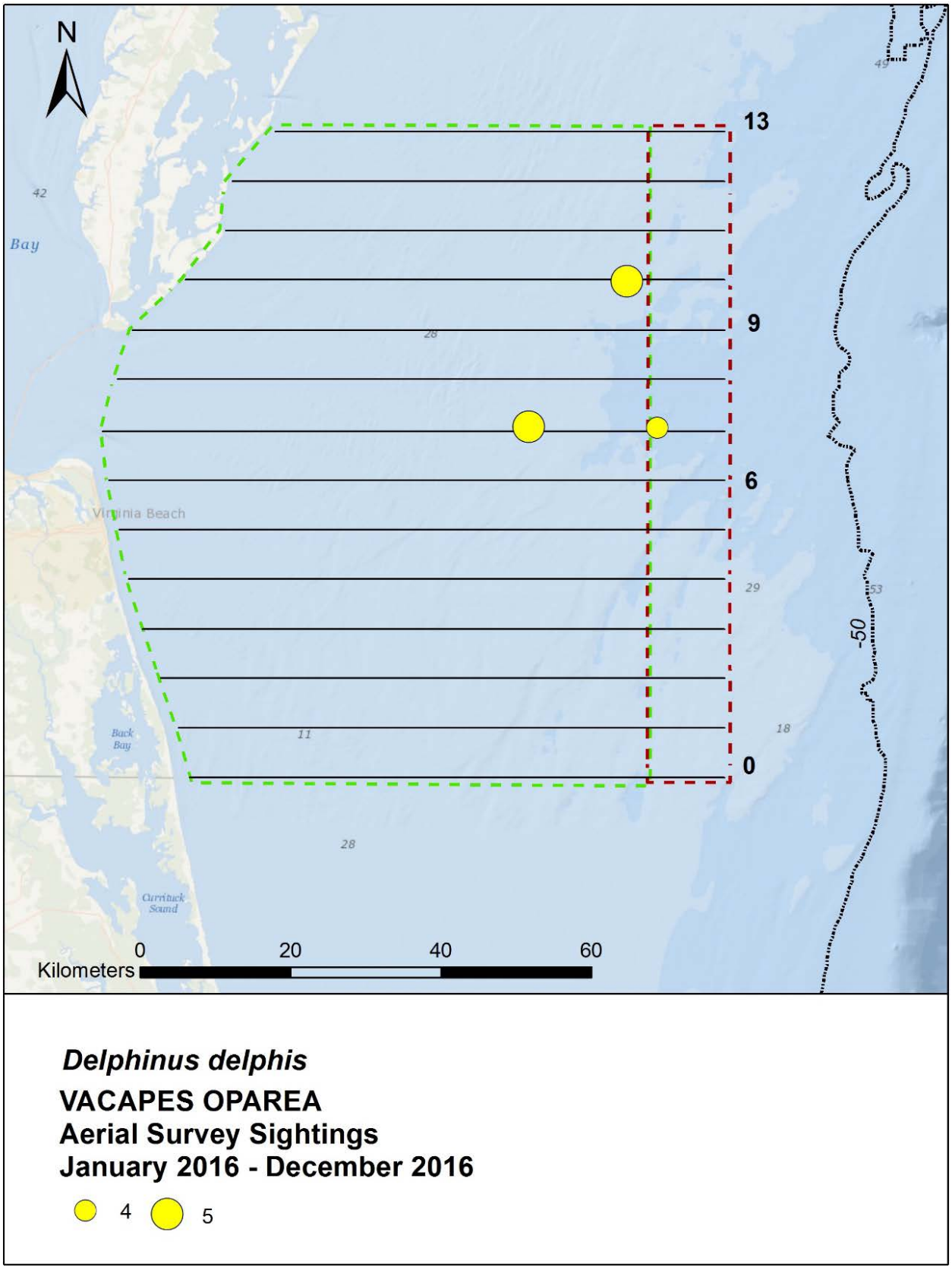


Figure 8. Short-beaked common dolphin (*Delphinus delphis*) sightings in the coastal VACAPES survey area in December 2016 (N=3). Symbol size indicates group size.

4.3 Baleen whales

4.3.1 North Atlantic right whale (*Eubalaena glacialis*)

Two sightings of individual North Atlantic right whales (NARW) were recorded during January and February surveys (**Appendix D, Figure 9**). The survey team photo documented each NARW to assess for signs of active injury or entanglement and to collect images for individual identification. Images were contributed to the New England Aquarium for the purpose of stock assessment, and to gain additional information on individuals, seasonal use, and behavior of NARWs utilizing ocean waters off the coast of Virginia. On 30 January 2016, a single animal was observed swimming east along a consistent heading with its mouth open and exhibiting behavior consistent with feeding. There were no signs of active entanglement and the whale appeared to be in good body condition. On 2 February 2016, another single animal was observed with its mouth open swimming subsurface exhibiting behavior consistent with feeding. The whale appeared to be in good body condition.

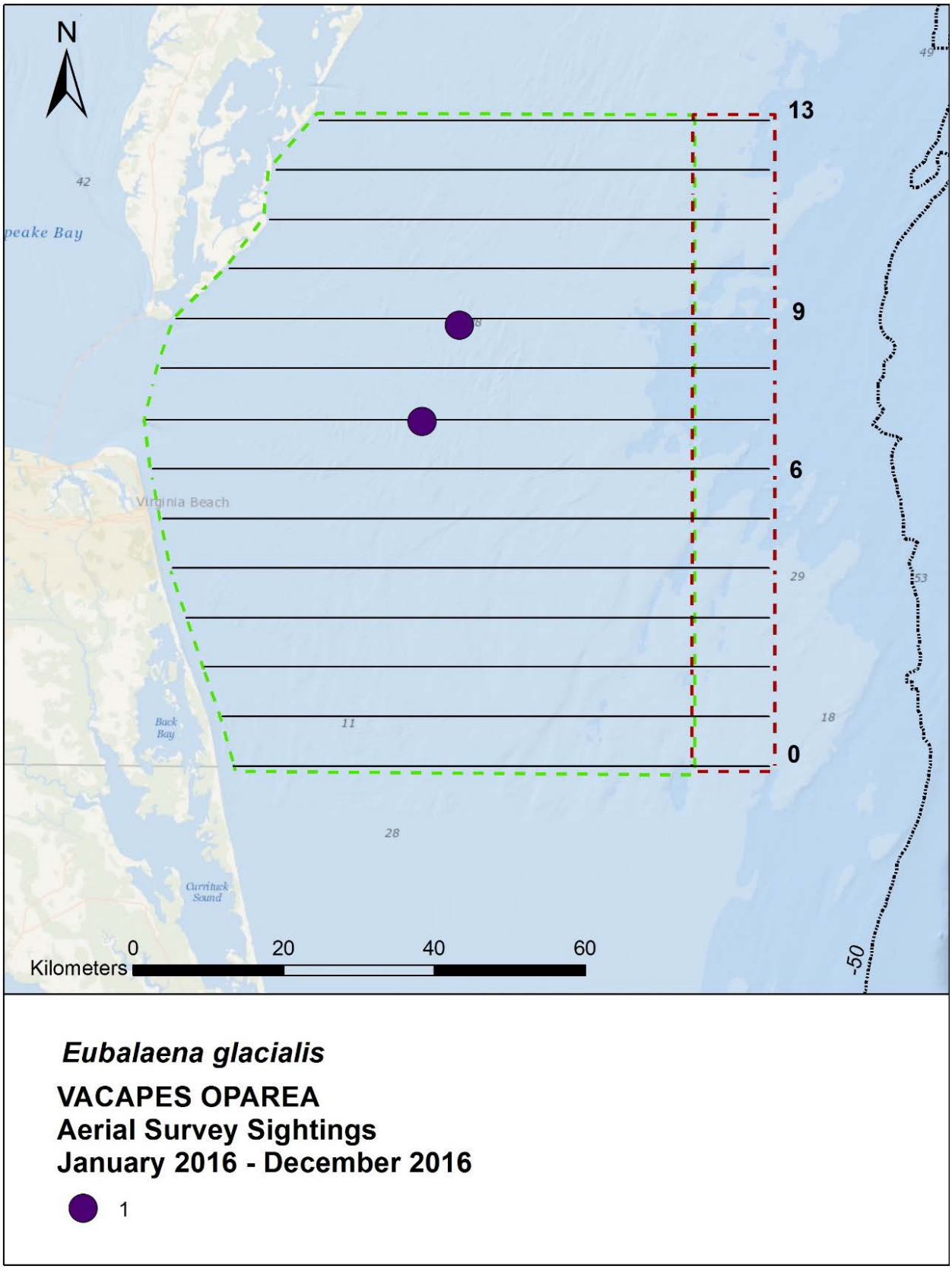


Figure 9. North Atlantic right whale (*Eubalaena glacialis)* sightings in the coastal VACAPES survey area in 2016 (N=2).

4.3.2 Humpback whale (Megaptera novaeangliae)

Individual humpback whales were observed on-effort in the coastal VACAPES survey area on two occasions **(Appendix D, Figure 10)**, while five additional sightings totaling six individuals were observed while off effort; most of these sightings occurred at the mouth of the Chesapeake Bay near Cape Henry. Sightings occurred in February, March, and December. Since the humpback whale has been the focus of ongoing photo-identification work in the region, all efforts were made to document features on the animals that could aid in identifying individuals, although identifying individual whales was not possible on each occasion. On 18 March 2016, a single animal was observed swimming subsurface, surfacing frequently and remaining close to the initial point of sighting. On 10 December 2016, a single whale was observed off effort near Cape Henry on the way to the transect line. That same day, along transect line 12, a single animal was observed traveling and diving frequently. While the survey team waited for the animal to resurface, a pair of humpback whales was observed and was recorded as an off effort sighting. After multiple surfacings, a bubble net formed and two whales emerged in the proximity of the bubble net (**Figure 11**). Three unique individuals were photo-documented during this sighting. On 21 December 2016, two humpback whales were recorded. The pilot observed a whale breaching off Cape Henry and the survey team documented the whale breaching approximately 30 times during the sighting. On transit back to the airport at the end of the survey day, another humpback whale was observed off Cape Henry and photo-documented. This whale appeared to make relatively deep dives and was fluking occasionally, although no fluke images were captured due to glare.

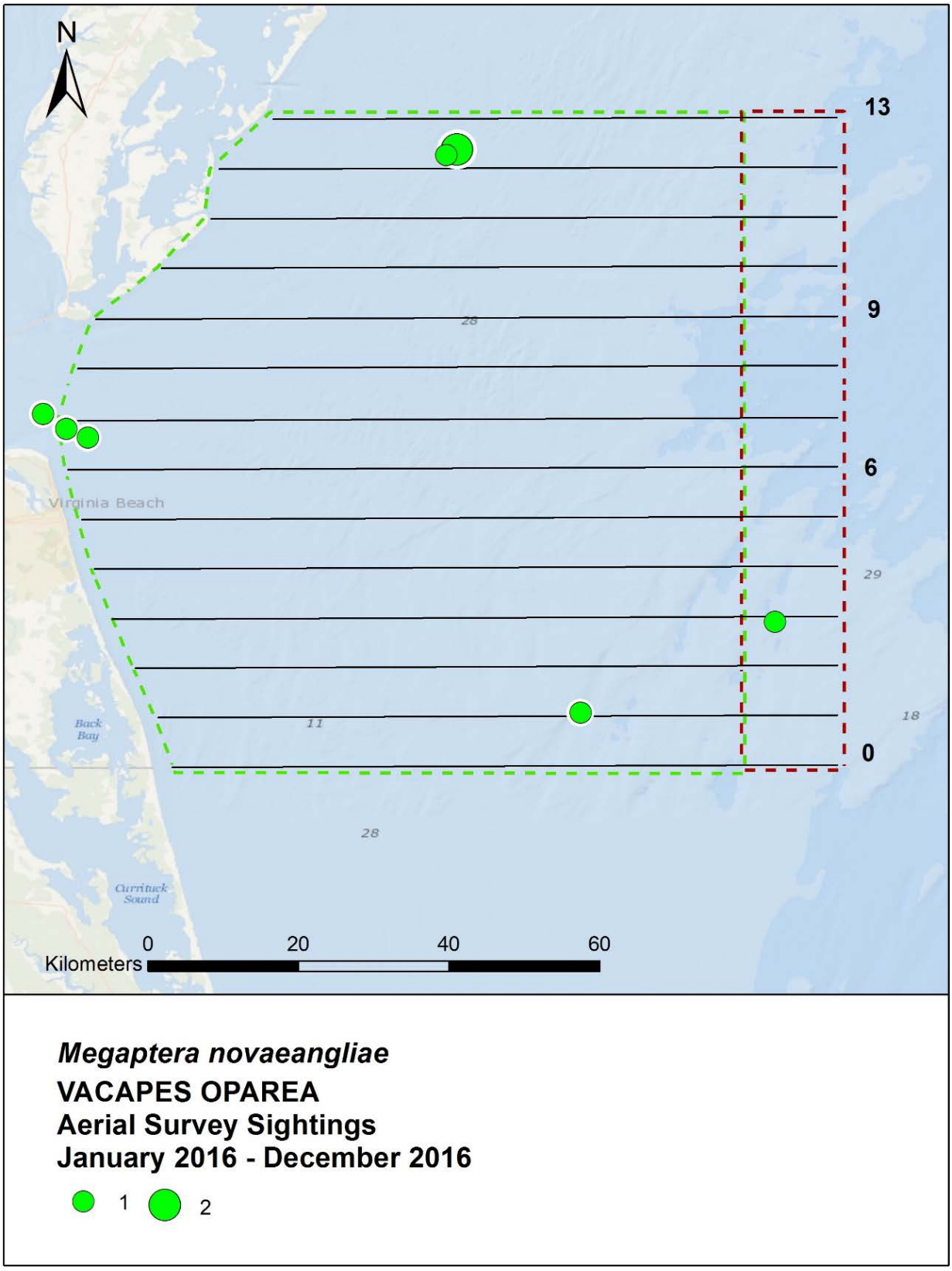


Figure 10. Humpback whale (*Megaptera novaeangliae*) sightings in the coastal VACAPES survey area fin 2016 (N=7). Symbol size indicates group size. White outlines denote off-effort sightings.

Figure 11. Images of a pair of humpback whales (*Megaptera novaeangliae*) on 10 December 2016 bubble net feeding in the coastal VACAPES survey area. Fin whale (*Balaenoptera physalus*)

4.3.3 Fin whale (*Balaenoptera physalus*)

On 2 February 2016, one sighting of two fin whales was recorded (**Appendix D, Figure 12**). One of the individuals was remarkably smaller (approximately 2/3 the length of the large whale), and the pair traveled in close proximity to each other when at the surface. One of the individuals was documented defecating, and the other rolled on the surface before diving out of sight.

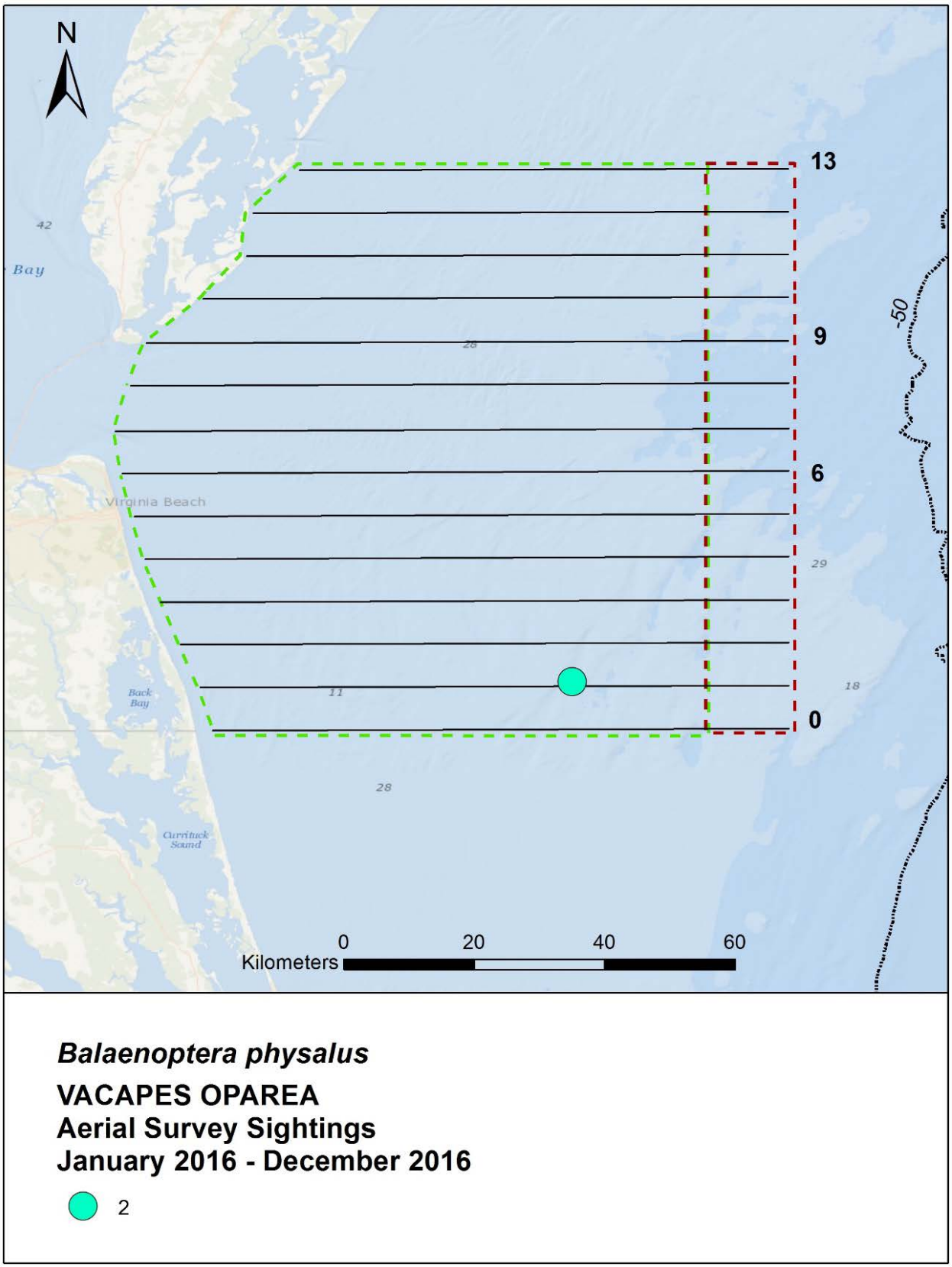


Figure 12. Fin whale (*Balaenoptera physalus*) sighting in the coastal VACAPES survey area during February 2016.

4.3.4 Unidentified balaenopterid

On 18 March 2016, an unidentified balaenopterid whale was observed off effort while transiting between the eastern ends of the transect lines **(Appendix D, Figure 13**). This whale was small and fast moving. The whale could not be relocated to confirm species identity, and no images were captured.

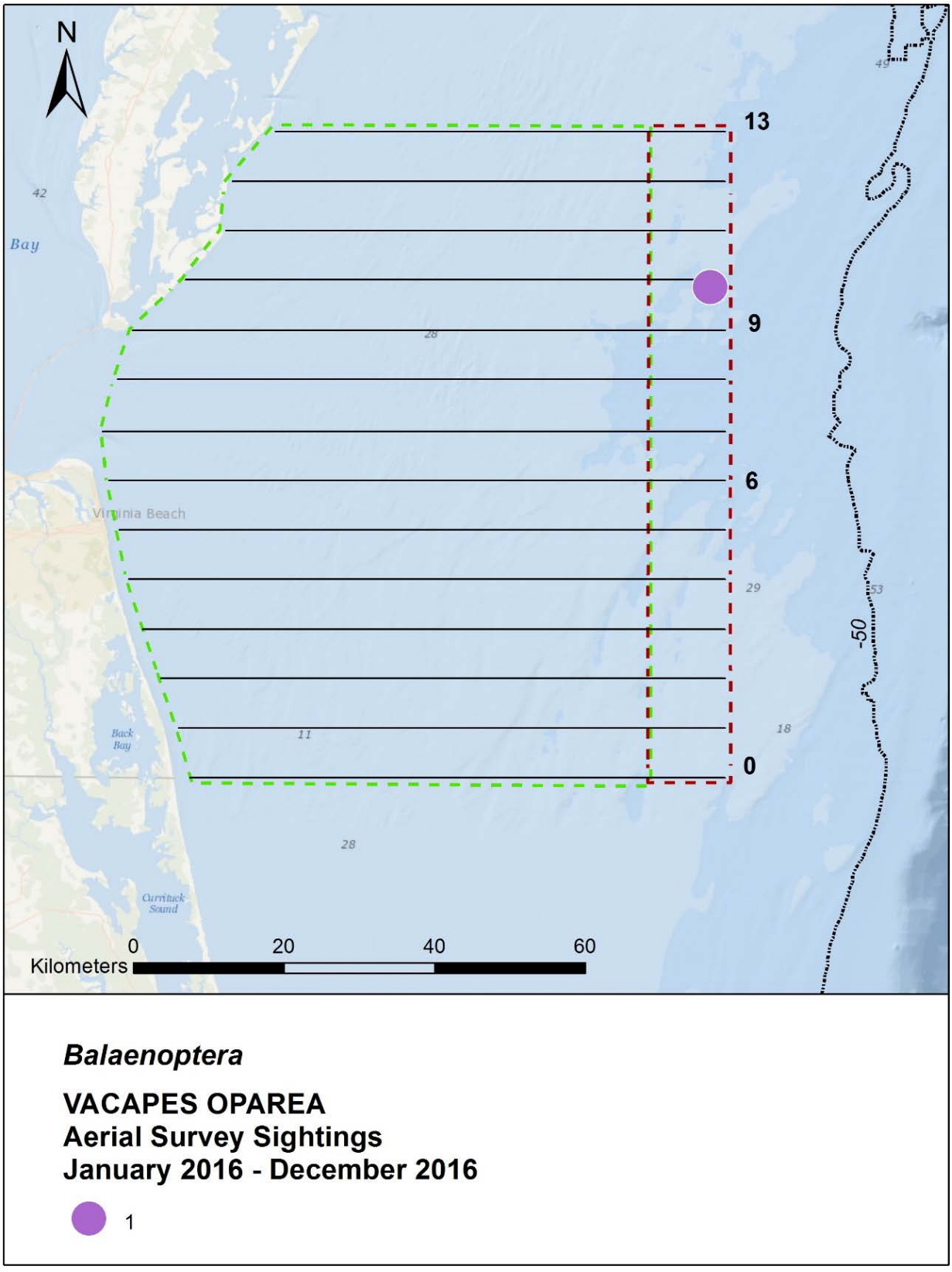


Figure 13. Unidentified balaenopterid whale sighting in the coastal VACAPES survey area during March 2016. White outline denotes an off-effort sighting.

4.4 Sea Turtles

Three hundred and thirty-one sightings of 362 sea turtles were recorded on-effort during the survey period, of which 282 sightings were of loggerheads (*Caretta caretta;* 313 individuals), 10 sightings of leatherbacks (*Dermochelys coriacea;* 11 individuals), and the remainder unidentified hard shell turtles (**Tables 4, Appendix D and Figures 14 and 15**). Sighting rates were inversely related to BSS; sightings declined rapidly as BSS increased (**Figures 16a-b**). Sea turtles were recorded in 6 months of 2016, May through October. The highest number of sightings occurred in June (**Figure 16c**). Loggerhead sea turtles represented the majority (86 percent) of total sightings and total numbers of individual sea turtles. The other sea turtle species identified in 2016 was the leatherback sea turtle (3.0 percent of total sea turtles sighted). For the remaining 10 percent of sightings, species identification could not be made with 100 percent certainty, when turtles were swimming subsurface, small, or diving, and therefore were recorded as "unidentified sea turtles."

4.4.1 Loggerhead sea turtle (*Caretta caretta*)

Two hundred and eighty-three sightings of loggerhead sea turtles occurred while on-effort from May through October in 2016, for a total of 313 animals (**Appendix D, Figure 14**). There were also three off-effort sightings for a total of 3 individuals. Sightings were recorded throughout the coastal VACAPES survey area. Sixty-three percent of loggerhead sea turtle sightings occurred in June. On 22 occasions during June surveys, two to three turtles were observed in close proximity to another and the total number of individuals in that sighting are reported in **Appendix D.**

4.4.2 Leatherback sea turtle (*Dermochelys coriacea*)

Ten sightings totaling 11 leatherback sea turtles were recorded on-effort and two sightings of two individuals were recorded off-effort within the study area in 2016. All sightings occurred east of the central portion of the survey area (**Appendix D, Figure 15**).

Table 4. Total numbers of on-effort sightings and individuals for each sea turtle species during aerial surveys in the Coastal VACAPES survey area in 2016.

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Caretta caretta	Sightings					2	148	27	61	7	38			**283**
	# of individuals					2	176	27	61	8	39			**313**
Dermochelys coriacea	Sightings						3	1	2		4			**10**
	# of individuals						4	1	2		4			**11**
Unidentified sea turtle	Sightings								32		6			**38**
	# of individuals								32		6			**38**
Total	**Sightings**					**2**	**151**	**28**	**95**	**7**	**48**			**331**
	Total individuals					**2**	**181**	**28**	**95**	**8**	**48**			**362**

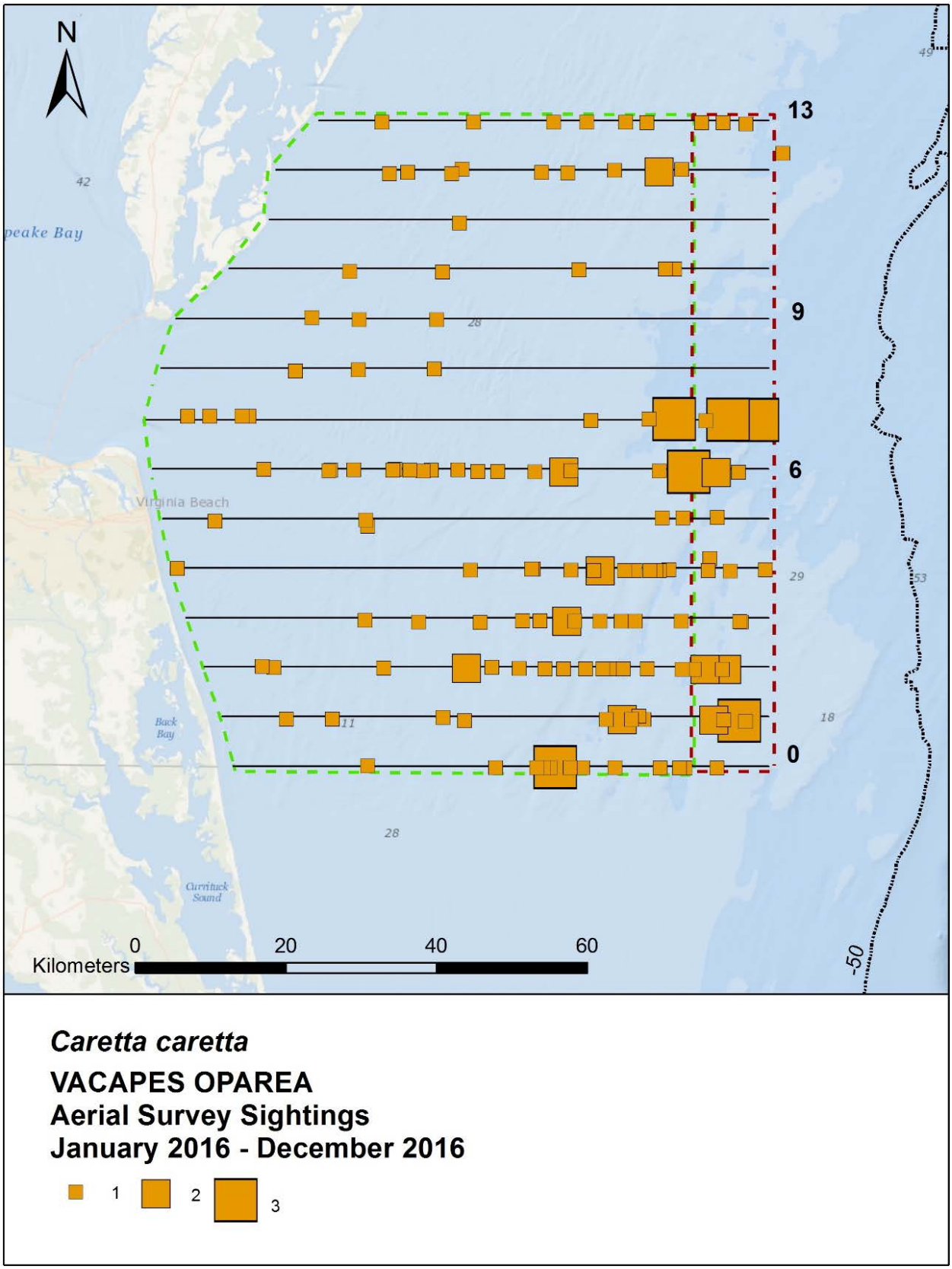


Figure 14. Loggerhead sea turtle (*Caretta caretta*) sightings in the coastal VACAPES survey area in 2016 (N=286).

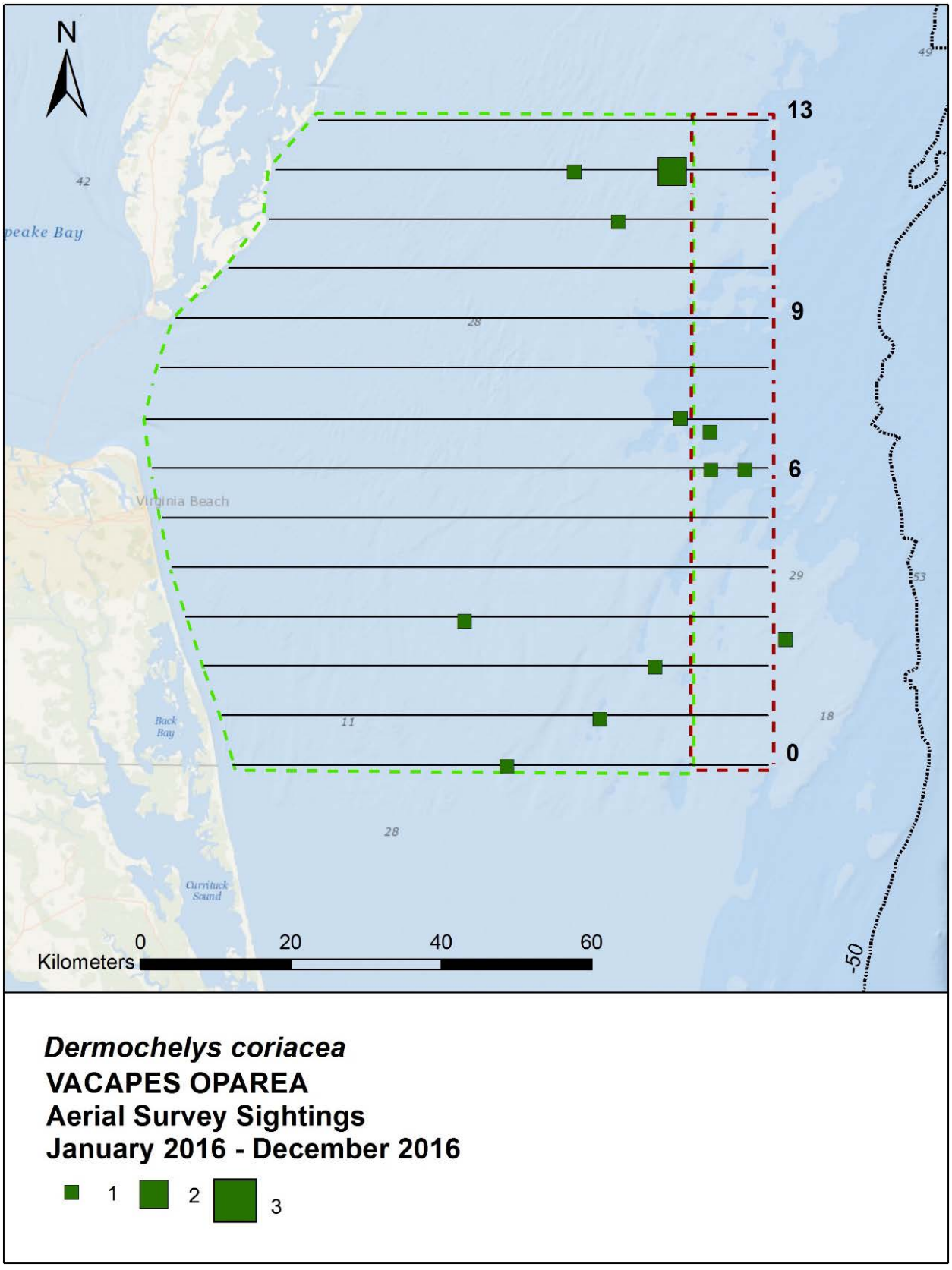


Figure 15. Leatherback sea turtle (*Dermochelys coriacea)* sightings in the coastal VACAPES survey area in 2016 (N=12).

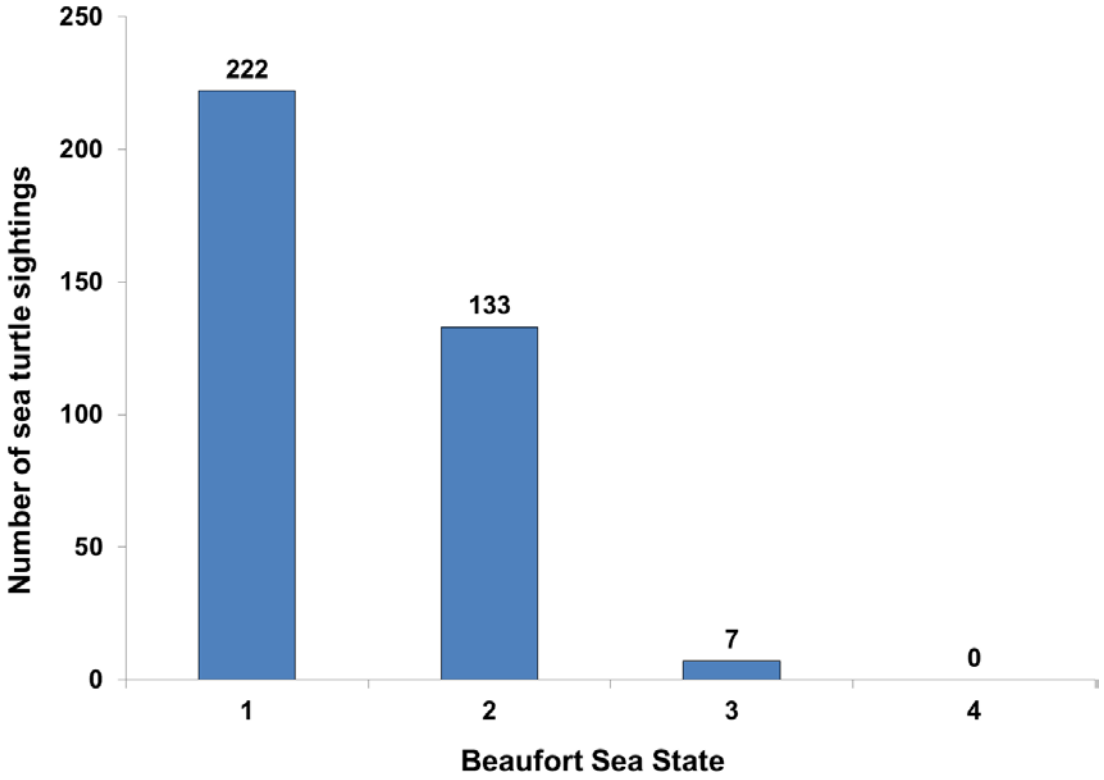


Figure 16a. Total numbers of sea turtles sightings by BSS in the coastal VACAPES survey area in 2016.

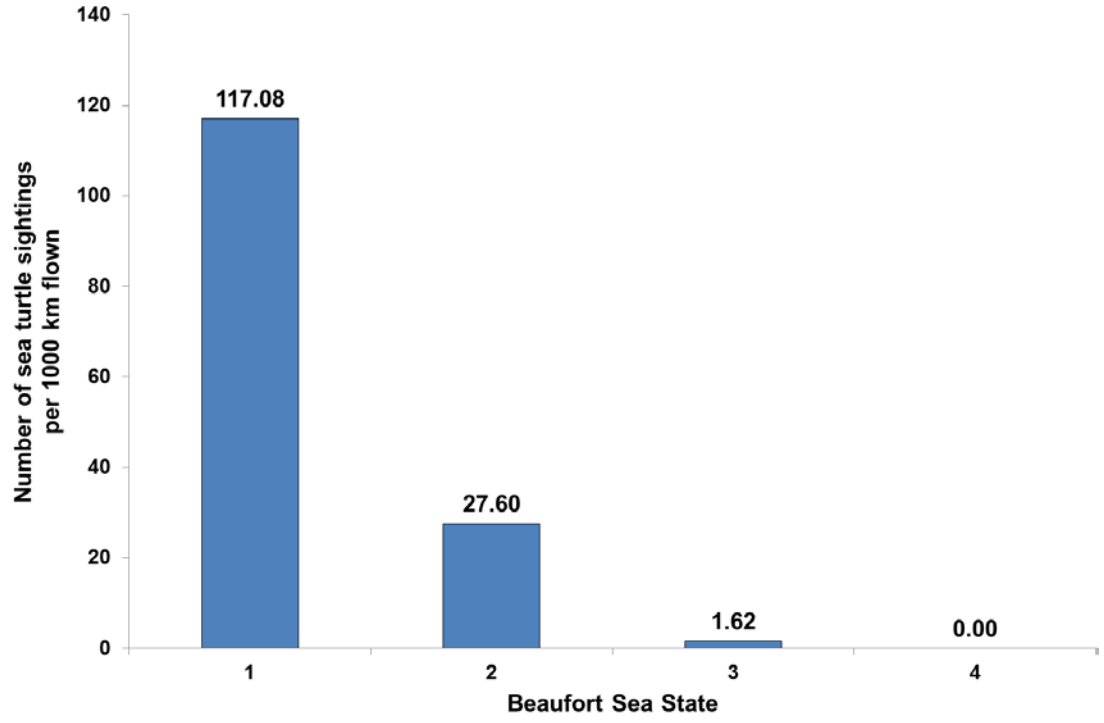


Figure 16b. Sea turtle sightings per 1,000 km flown by BSS in the coastal VACAPES survey area in 2016.

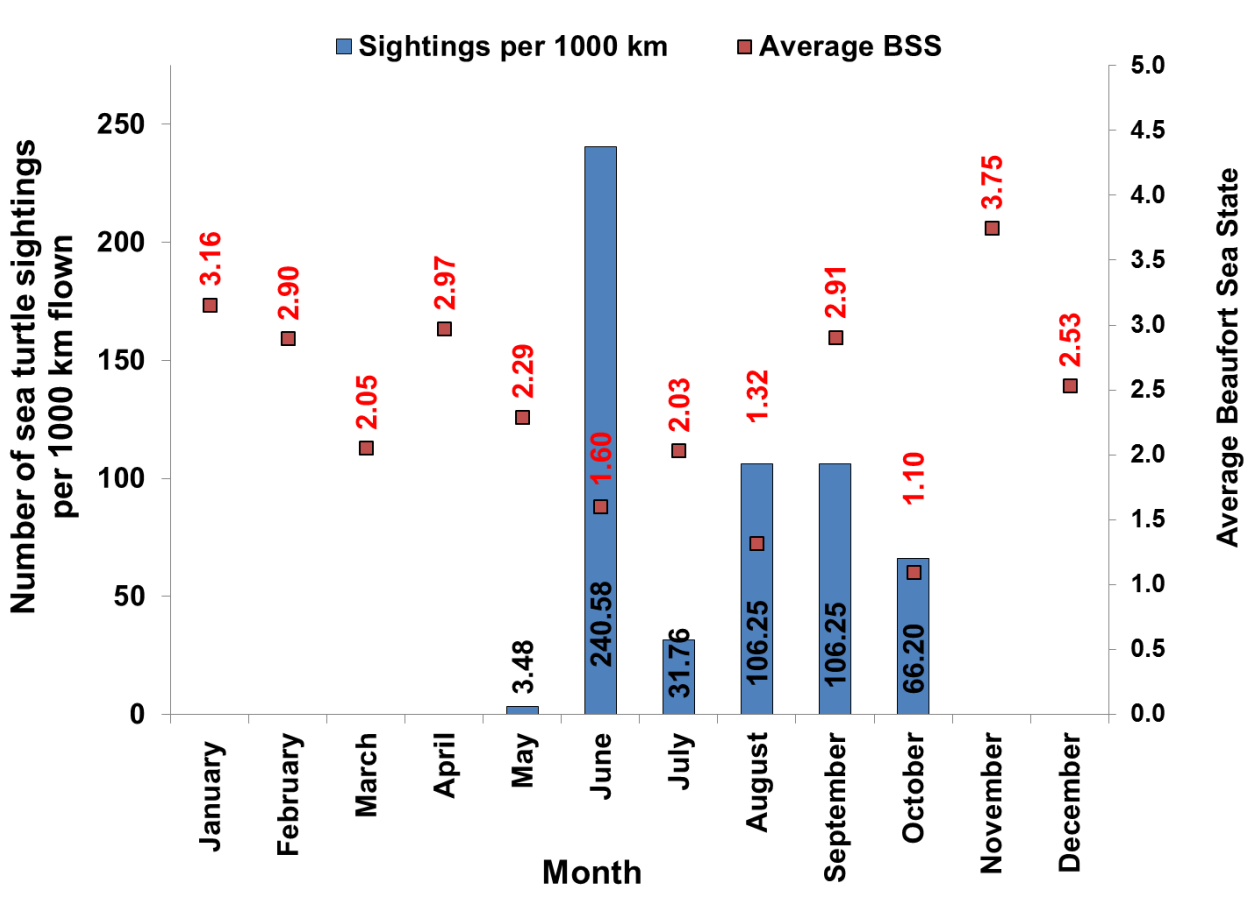


Figure 16c. Sea turtle sightings per 1,000 km surveyed and the average BSS per month in the coastal VACAPES survey area in 2016.

4.5 Other Marine Vertebrate Sightings

4.5.1 Cartilaginous fish sightings (Chondrichthyes)

Thirty-six sightings of unidentified sharks, totaling 78 individuals, were recorded during the reporting period (**Appendix D**). Seven of the 78 sharks recorded as unidentified could be identified as hammerhead sharks (*Spyhrna* sp.) based on head shape, but since none of these sightings could be identified to species they were recorded as unidentified sharks. Two species of rays were identified, including two sightings of single manta rays (**Appendix D**) and 57 sightings totaling over 3,500 cownose rays (**Appendix D**). All sightings are represented in **Figure 17**.

4.5.2 Other fishes

Three ocean sunfish and two cobia were recorded (**Appendix D, Figure 16**). Two cobia were observed underneath a loggerhead sea turtle. The survey team circled to determine species of sea turtle and confirm species of animal beneath the turtle. Virginia Aquarium fisheries staff confirmed the fish species as cobia from the images collected during the sighting.

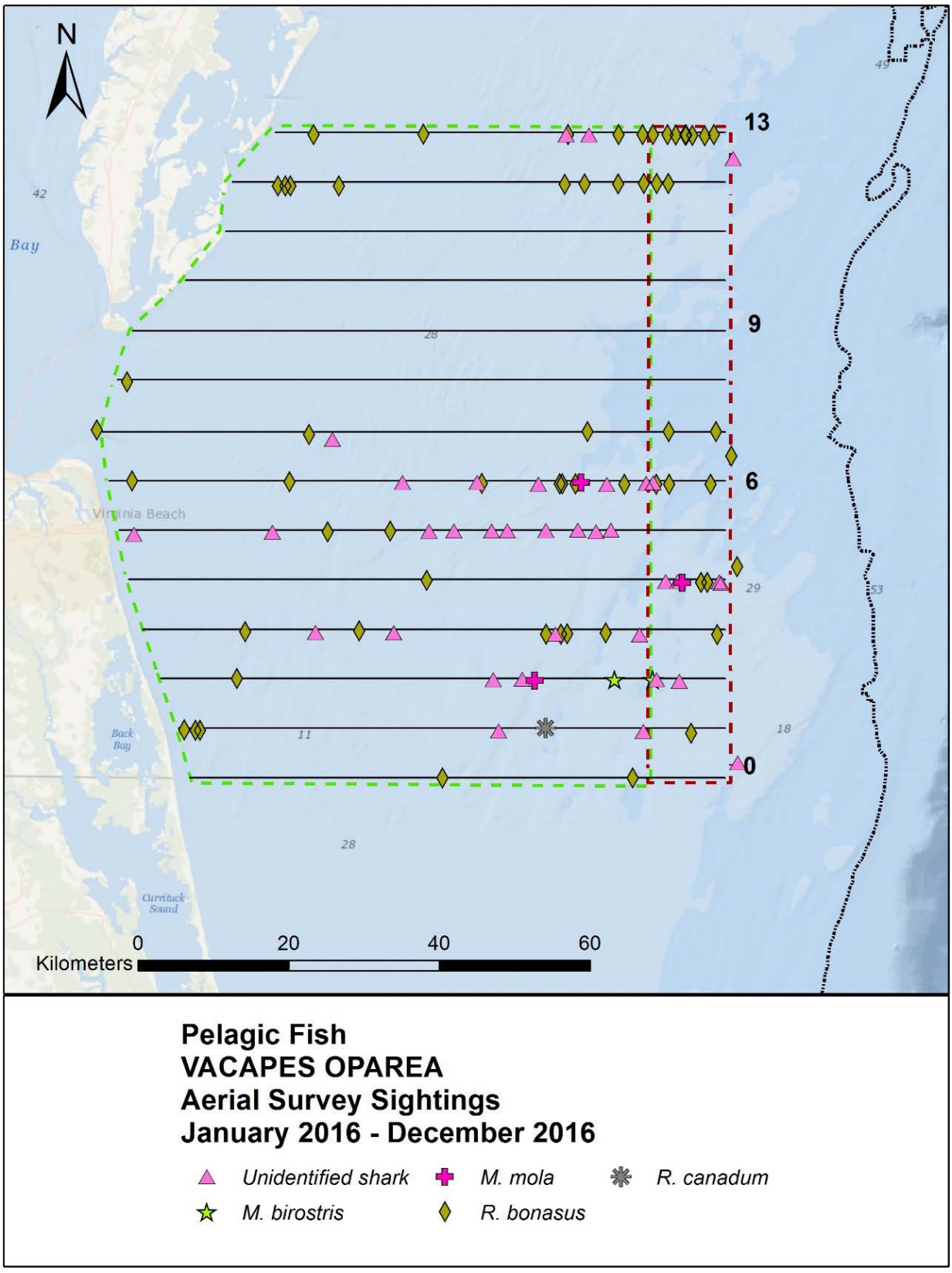


Figure 17. (Manta ray (*Manta birostris*), cownose ray (*Rhinoptera bonasus),* ocean sunfish (*Mola mola*), cobia (*Rachycentron canadum*), and shark sightings in the coastal VACAPES survey area in 2016 (N=99).

4.6 Vessel Sightings

4.6.1 Commercial

A total of 350 sightings of 367 commercial vessels (e.g., tug and barge, cargo vessel, car carrier vessels) was observed in the survey area in 2016 (**Appendix D, Figure 18**).

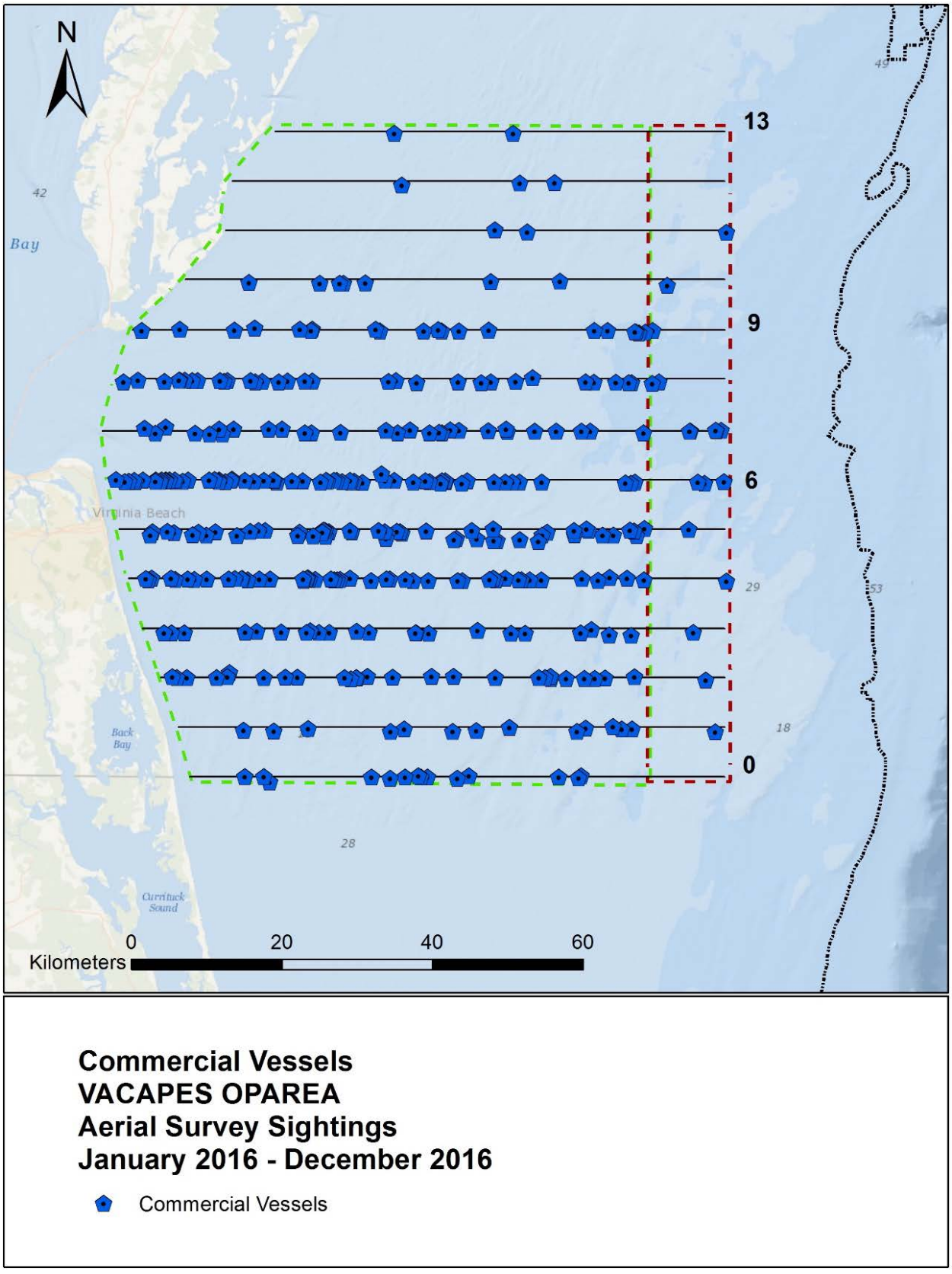


Figure 18. Commercial vessel sightings in the coastal VACAPES survey area in 2016 (N=350).

4.6.2 Military Vessels

Ninety-four sightings of one hundred and two military vessels, including warships, air-cushion vehicles (e.g. hovercraft), rigid inflatable, and US Coast Guard vessels were observed within the survey area in 2016 (**Appendix D, Figure 19**).

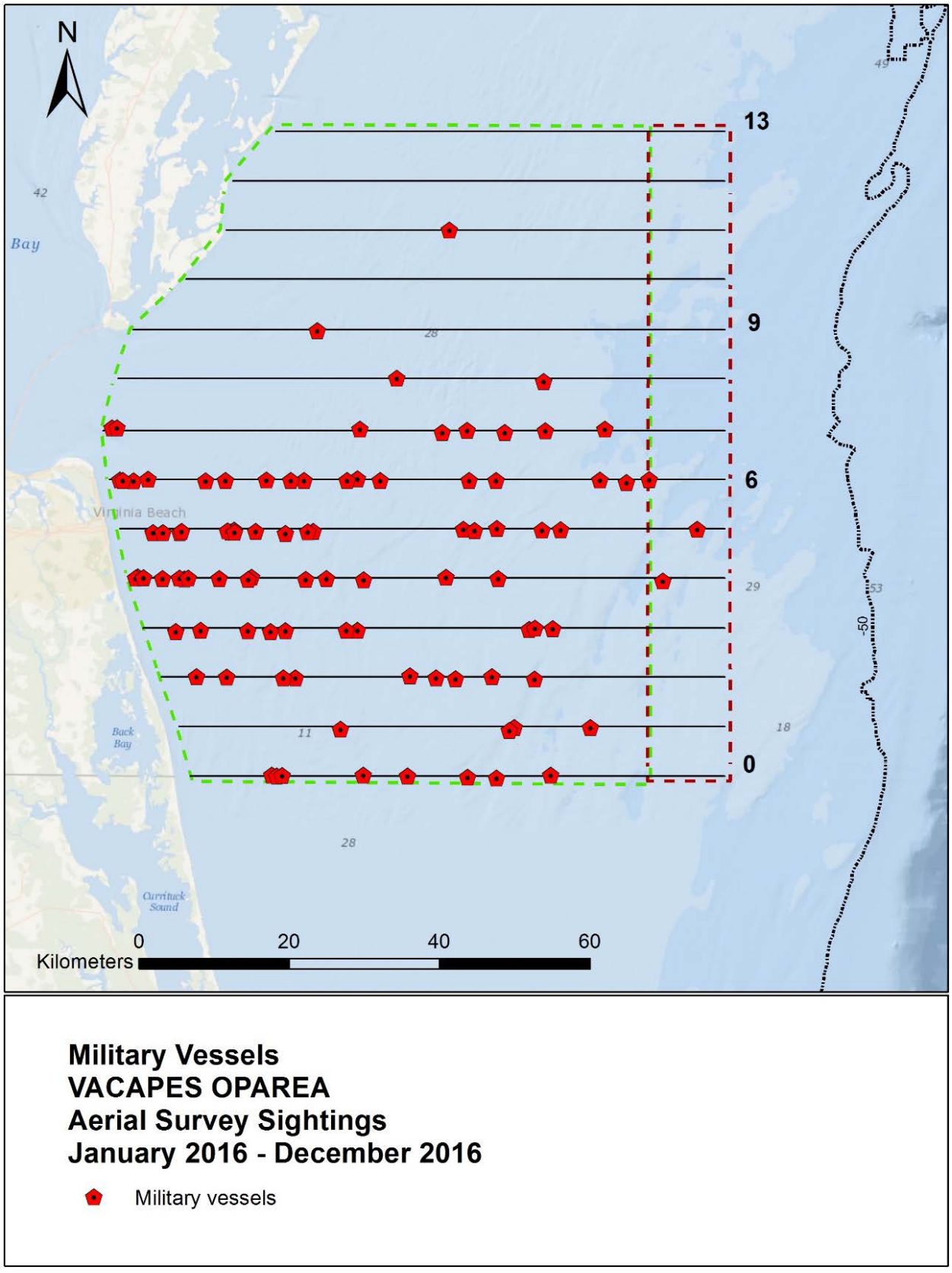


Figure 19. Military vessel sightings in the coastal VACAPES survey area in 2016 (N=94).

4.6.3 Other Vessels

One hundred and seventy-six sightings of a total of 201 other vessel types was recorded in the survey area (**Appendix D, Figure 20**). Other boats included pilot boats, sailboats, charter boats, head boats, trawl vessels, yacht and unknown vessels, all other small vessel sightings were categorized as recreational-fishing vessels.

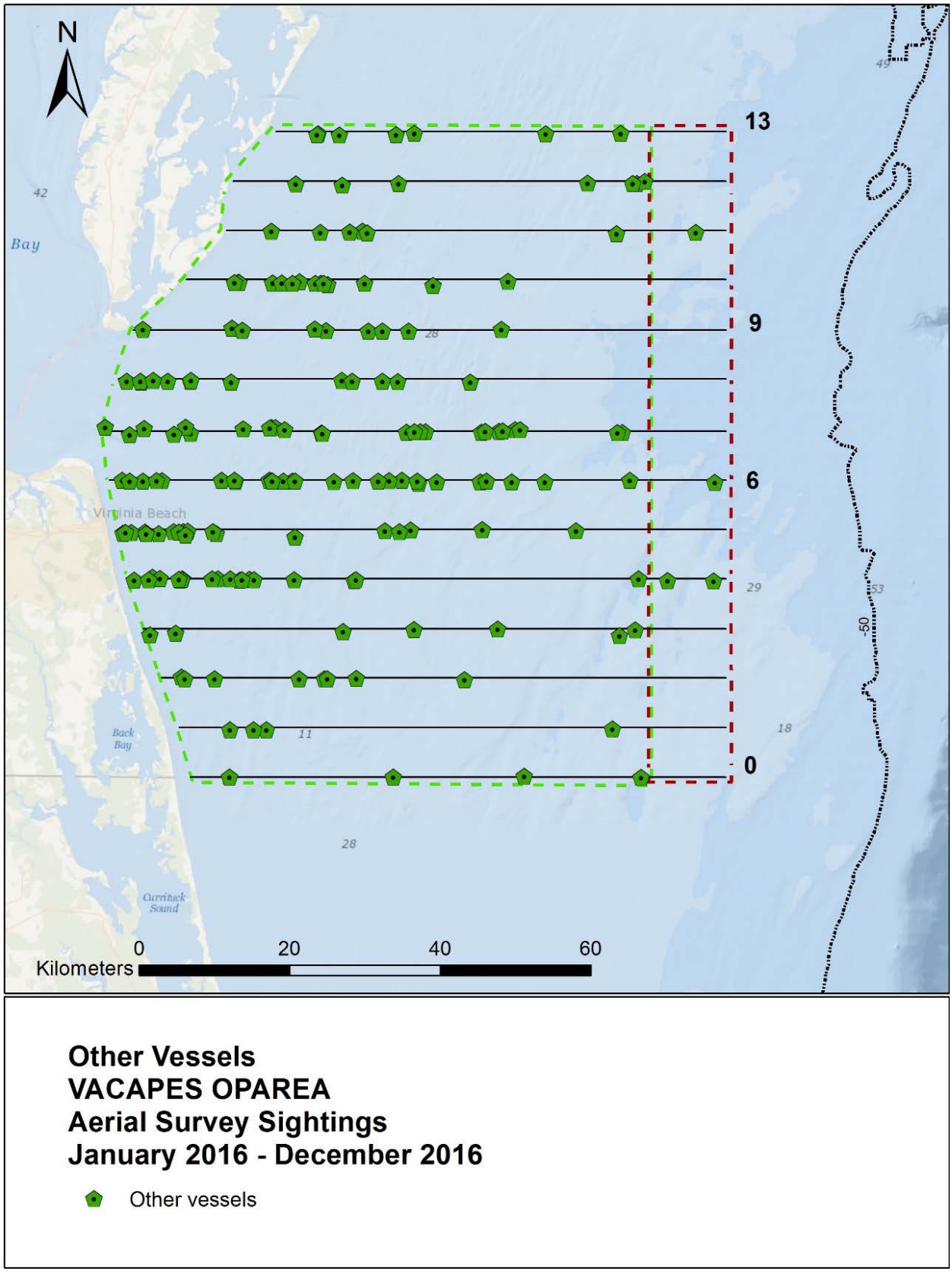


Figure 20. Other vessel sightings in the coastal VACAPES survey area in 2016 (N=176).

5. Acknowledgements

We thank U.S. Fleet Forces Command and Joel Bell (NAVFAC Atlantic) for support of this work. We thank our VAQF aerial survey observers Kristy Phillips, Sara Rose, and Erin Bates and VAQF fellow Noelle Mathies. We thank our colleagues at St. Andrews University (Charles Paxton) for guidance on survey design. We thank Ed Coffman, owner and operator of Orion Aviation, and his highly skilled pilots: Rocky Walker, John Estes, Richard Waterman, Stan Huddle, Dave Huddle, and Bob Stickle, for excellent flying and a high level of professionalism. Surveys were conducted under National Marine Fisheries Service Scientific Permit No. 16473 held by the University of North Carolina Wilmington, and National Marine Fisheries Service Scientific General Authorization permit 17325 issued to VAQF.

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A

Aerial Survey Data Sheet

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AERIAL SURVEY DATA SHEET

Appendix A

Date:_____ **Observer Side:**_____ **GPS#:**_____ **Page__ of___**

Pilot/Co-Pilot_____ **Observers Left/Right:**_____ **Hobbs:**_____

Time	Waypoint #	Event	Heading	Track #	Observer R / L	Visibility	BSS	Cloud	Glare L	Glare R	Vertical Angle	Horizontal degree	Sighting Cue	Species	Reliability	Min #	Max #	Best Est	Comments

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B

Event Codes and Species List

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Codes for Variables on USWTR Aerial Survey Data Sheet

Date: Month, Day, Year

Track#: opportunistic track line=99

Event:

1.1 = On effort/on track
1.2 = Off effort

3.1 = Change in environmental conditions

10.0 = Opportunistic sighting(s)
PF = Preflight
XB = Cross Beach
WU = Wheels Up
WD = Wheels Down
TE = Transit Leg on Effort

2.0 = Sighting-breaking track/off effort (real time)
2.3 = Vessel sighting

2.4 = Sighting of marine mammal (real location)
2.41 = Location of Sighting Cue, No Animals sighted
2.42 = Break from sighting

2.7 = Sighting of sea turtle (real location)
2.8 = Sighting of large vessel (Military, commercial, etc.)
2.9 = Unidentified sighting, requires comments

Confidence of cue
1 = definite
2 = probable
3 = possible/unsure

Beaufort Sea State:
0 = slick, calm, mirror-like
1 = small waves
2 = whitecaps 0-33%, waves 1-2 feet
3 = whitecaps 33-50%, waves 2-3 feet
4 = whitecaps 50-65%, waves 3-5 feet
5 = whitecaps >65%, waves >5 feet
6 = too rough too survey

Cloud Cover:
01 = clear
02 = partly cloudy
03 = continuous layer of clouds
04 = rain
05 = haze
99 = other, requires comments

Glare
0 = No glare
1 = 0-25 %
2 = 25 -50 %
3 = >50%

Visibility:
1 = clear to horizon
2 = half the distance to the horizon
3 = less than half the distance to the horizon

Sighting Cues:
1 = Blow
2 = Splash
3 = Body Part
4 = Breach
5 = Other (needs comments)

Vertical Angle is given in rough increments of 20 degrees with 1 being directly on the trackline and 4 being anything outside of survey wide to horizon

Horizontal Angle is given assuming the nose of the plane is 0 degrees and directly off the wing is 90 degrees – measurements are taken from 1-180 on each side of the plane.

Species List for Aerial Surveys		
Common Name	**Scientific Name**	**Species Code**
Cetaceans		
North Atlantic right whale	*Eubalaena glacialis*	Egl
Minke whale	*Balaenoptera acutorostrata*	Bac
sei whale	*Balaenoptera borealis*	Bbo
fin whale	*Balaenoptera physalus*	Bph
Brydes whale	*Balaenoptera edeni*	Bed
humpback whale	*Megaptera novaeangliae*	Mno
unidentified balaenopterid	Family *Balaenopteridae*	BALA
sperm whale	*Physeter macrocephalus*	Pma
pygmy sperm whale	*Kogia breviceps*	Kbr
dwarf sperm whale	*Kogia sima*	Ksi
unidentified Kogia	*Kogia* spp.	KOGI
Northern bottlenose whale	*Hyperoodon ampullatus*	Ham
Cuvier's beaked whale	*Ziphius cavirostris*	Zca
Mesoplodon beaked whale	Genus *Mesoplodon*	MESO
unidentified beaked whale	Family *Ziphiidae*	ZIPH
harbor porpoise	*Phocoena phocoena*	Pph
killer whale	*Orcinus orca*	Oor
melon-headed whale	*Peponocephala electra*	Pel
pygmy killer whale	*Feresa attenuata*	Fat
false killer whale	*Pseudorca crassidens*	Per
Risso's dolphin	*Grampus griseus*	Ggr
long-finned pilot whale	*Globicephala melas*	Gme
short-finned pilot whale	*Globicephala macrorhynchus*	Gma
unidentified pilot whale	Genus *Globicephala*	GLOB
rough-toothed dolphin	*Steno bredanensis*	Sbr
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	Lac
Fraser's dolphin	*Lagenodelphis hosei*	Lho
common dolphin	*Delphinus delphis*	Dde
bottlenose dolphin	*Tursiops truncatus*	Ttr
spotted dolphin	*Stenella frontalis*	Sfr
striped dolphin	*Stenella coeruleoalba*	Sco
spinner dolphin	*Stenella longirostris*	Scl
unidentified *Stenella*	Genus *Stenella*	STEN
unidentified delphinid	Family *Delphinidae*	DELP
unidentified cetacean		CETA
Pinnipeds		
gray seal	*Halichoerus grypus*	Hgr
harbor seal	*Phoca vitulina*	Pvi
harp seal	*Phoca groenlandica*	Pgr
hooded seal	*Cystophora cristata*	Ccr
unidentified phocid	Family *Phocidae*	PHOC
Sea Turtles		
loggerhead	*Caretta caretta*	Cca
leatherback	*Dermochelys coriacea*	Dco
green	*Chelonia mydas*	Cmy
Kemp's ridley	*Lepidochelys kempii*	Lke
hawksbill	*Eretmochelys imbricata*	Eim
unidentified sea turtle		TURT
Other interesting sightings		
ocean sunfish	*Mola mola*	Mmo
basking shark	*Cetorhinus maximus*	Cma
whale shark	*Rhincodon typus*	Rty
manta ray	*Manta birostris*	Mbi
cownose rays	*Rhinoptera bonasus*	Rbo

C

Notes on Sighting Summary Sheets

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The Sighting Summary Sheet

The Sighting Summary, adapted from the Sighting Data Sheet used in the field, integrates data gathered in the field with results from lab analyses to provide a full summary of each marine mammal sighting (note – this sheet only deals with marine mammal sightings). A Sighting Summary is to be completed for all sightings, including sightings made while off-effort during transits between survey legs, as well as sighting cues that never led to a sighting that was relocated.

The Sighting Summary sheet is broken into four sections; "Initial Sighting on Track", "Time and Position of Sighting", "Final Time and Position of Sighting", and "Behavior and Additional Comments". Each section and sub-heading will be detailed below.

Initial Sighting on Track

Time: The time the "break track" GPS way-point was taken.
WP#: GPS way-point number of the break track.
Lat/Long: The latitude and longitude associated with the break track way-point.
Track Line: The track line surveyed when the sighting was made.
On/Off Effort: Whether the sighting was made during an active survey track line (*i.e.* on effort) or during transit BETWEEN track lines (*i.e.* off effort). Sightings made during off effort transit to and from the range are NOT included in the sighting summaries.
Sighting Cue: Whether the initial sighting was a splash, a breach or body part.
Vertical Angle: Vertical "angle" between 1 and 4, the lower edge of view ("1") to the horizon ("4"). A subjective and relative measure of how far away from the track line the initial sighting occurred.
Horizontal Bearing in Degrees: The horizontal degrees from front to back (0 to 180) at which the sighting occurred.
Observer: Three lettered initial of the observer who made the sighting.
Observer Side: On which side of the plane in the direction of travel the sighting occurred.

Time and Position of Sighting

Time: The time the GPS way-point was taken while relocating animals and circling above.
WP#: GPS way-point number of the sighting.
Lat/Long: The latitude and longitude associated with the way point obtained while circling over animals.
Beaufort Sea State: The sea state observed during the sighting.
Species: Scientific binomial name of the marine mammal species involved in the sighting. When species identity could not be established unequivocally, the next higher taxonomic level to which identity could be established was used. If a cetacean was identified as a dolphin but images obtained during the encounter were not sufficient to establish species ID, the designation "unidentified delphinid" or "*T. truncatus*/*S. frontalis*" is used. If the animal could be ID'd as a cetacean only, then "unidentified cetacean" is used. If a large body was observed but it could not be established whether a cetacean, fish/shark or turtle was involved in the sighting, the designation "unidentified marine vertebrate" is used.
Criteria used to identify species: Which species specific diagnostic features were used in classifying a sighting to species (see information on diagnosis of species).
Best images used for species ID: The images obtained during the sighting that best displayed the features used to establish species.
Numbers (Low/ High/ Best): Low, high, and best estimate of number of animals involved in the sighting.
Calves observed? Whether any calves were observed during the encounter. A conservative measure is used, in that only animals roughly half the size of the associated larger animal (the presumed mother) are designated as calves.
Calculated Distance from Track Line: The distances between the break track waypoint (2.0) and the initial position of each sighting (2.4) is calculated using the online software Scripts Movable

Type (http://www.movable-type.co.uk/scripts/latlong.html). Since there is a bias in estimating the location of a group of mobile marine mammals from a fast moving airplane, the distances calculated between break track and sighting are rounded to 0.1 km.
Photographer: Three lettered initials of observer seated in the right camera seat.
Card #: Memory card on which the photos from the particular sighting was made.
Frame Numbers: Starting and ending frame number.
Spacer: Image used to separate sighting to clarify when one sighting ends and the next begins. Image typically of interior of plane or a 45 degree angle shot of the horizon. If taking a shot of the interior of the plane, put the camera focus setting on "manual", take the picture, then immediately set it back to "automatic".

Final Time and Position of Sighting

Time: WP#: Lat: Long: Calculated Distance traveled: ➔ see section above.

Behavior and Additional Comments

Any behavioral notes obtained during the sighting (*e.g.* group formation, relative travel speed, feeding events or presumed copulation attempts, presence of other cetaceans or sharks in or around the animal(s) in the sighting, interaction with inanimate objects such marine debris). This section also includes notes on altitude of the survey plane during the encounter as well as any indications (or lack thereof) of the animal(s) reacting to the presence of the plane.

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Individual Sightings Tables

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All marine mammal sightings, including: bottlenose dolphin (*Tursiops truncatus*), Atlantic spotted dolphin (*Stenella frontalis),* short-beaked common dolphin (*Delphinus delphis*), fin whale (*Balaenoptera physalus*) and unidentified balaenopterid whale sightings in the Coastal VACAPES survey area from January through December 2016. Asterisk denotes an off-effort sighting.

Date	Time	Way Point	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort
30-Jan-2016	13:59:39	005	37.147066	-75.196840	10	2	Dde	2	90°	5	
30-Jan-2016	14:18:37	012	37.080197	-75.512697	9	3	Egl	2	90°	1	
2-Feb-2016	10:36:43	010	36.669236	-75.349988	2	3	Ttr	2	90°	6	
2-Feb-2016	14:09:09	055	36.964688	-75.567802	7	3	Egl	1	90°	1	
2-Feb-2016	9:38:37	008	36.615560	-75.357184		3	Mno	2	90°	1	*
2-Feb-2016	9:36:38	007	36.618361	-75.348882	1	3	Bph	2	90°	2	
17-Mar-2016	11:05:50	013	37.104089	-75.903568		2	Ttr	3	90°	1	*
17-Mar-2016	11:06:06	014	37.096083	-75.915430		2	Ttr	3	90°	1	*
17-Mar-2016	13:29:08	013	37.066338	-76.023102		2	Ttr	1	120°	4	*
17-Mar-2016	14:19:11	032	37.082846	-75.945366		2	Ttr	3	90°	10	*
17-Mar-2016	14:19:25	028	37.080540	-75.936539		2	Ttr	2	90°	2	*
17-Mar-2016	14:21:38	034	37.087677	-75.847109	9	2	Ttr	2	90°	1	
17-Mar-2016	15:03:42	043	37.018630	-75.681949	8	2	Ttr	2	120°	19	
17-Mar-2016	15:19:24	050	36.968727	-75.888557	7	2	Ttr	2	90°	12	
17-Mar-2016	15:19:32	051	36.968799	-75.883052	7	2	Ttr	2	90°	1	
17-Mar-2016	15:19:44	051	36.968852	-75.875200	7	2	Ttr	2	120°	3	
17-Mar-2016	15:20:38	052	36.968889	-75.840322	7	2	Ttr	2	90°	12	
17-Mar-2016	15:20:56	052	36.968975	-75.828675	7	2	Ttr	2	90°	4	
17-Mar-2016	15:21:32	053	36.968986	-75.805252	7	2	Ttr	2	90°	3	
17-Mar-2016	15:25:22	054	36.969278	-75.658658	7	2	Ttr	2	90°	9	
17-Mar-2016	16:15:52	068	36.904490	-75.683536	6	2	Ttr	2	90°	5	
17-Mar-2016	16:17:16	069	36.904371	-75.741607	6	2	Ttr	2	90°	1	
17-Mar-2016	16:20:38	074	36.906902	-75.746018	6	2	Ttr	2	90°	75	
17-Mar-2016	16:25:25	072	36.903960	-75.847458	6	2	Ttr	2	120°	6	
17-Mar-2016	16:25:29	077	36.903951	-75.849824	6	2	Ttr	2	120°	1	
17-Mar-2016	16:33:16	081	36.844190	-75.849244	5	3	Ttr	2	120°	5	
17-Mar-2016	16:33:37	077	36.844354	-75.835171	5	3	Ttr	2	90°	5	
17-Mar-2016	16:34:24	082	36.844796	-75.804211	5	3	Ttr	2	90°	15	
17-Mar-2016	16:34:31	083	36.844872	-75.799410	5	3	Ttr	2	90°	3	
17-Mar-2016	16:34:37	084	36.844933	-75.795597	5	3	Ttr	2	90°	15	
17-Mar-2016	16:54:29	097	36.854779	-75.071741	5	2	Ttr	1	90°	85	
17-Mar-2016	15:38:12	062	36.972542	-75.342410	7	2	Dde	3	90°	5	
18-Mar-2016	9:42:30	002	36.905585	-75.982065		2	Ttr	1	90°	10	*

Date	Time	Way Point	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort
18-Mar-2016	9:51:55	010	36.906566	-75.657103	6	2	Ttr	2	90°	1	
18-Mar-2016	10:39:35	023	36.967202	-75.684678	7	2	Ttr	3	90°	1	
18-Mar-2016	10:41:09	024	36.967125	-75.749962	7	2	Ttr	3	90°	2	
18-Mar-2016	10:42:57	019	36.966907	-75.824384	7	2	Ttr	2	45°	3	
18-Mar-2016	10:43:43	025	36.966625	-75.856422	7	2	Ttr	2	90°	1	
18-Mar-2016	10:50:34	022	37.024757	-75.934860	8	2	Ttr	1	45°	2	
18-Mar-2016	10:50:44	028	37.024836	-75.928119	8	2	Ttr	2	90°	1	
18-Mar-2016	10:51:16	029	37.025067	-75.906142	8	2	Ttr	3	110°	25	
18-Mar-2016	10:52:22	023	37.025439	-75.861557	8	2	Ttr	2	45°	2	
18-Mar-2016	10:53:29	024	37.025638	-75.816965	8	2	Ttr	2	45°	2	
18-Mar-2016	10:53:33	030	37.025586	-75.813698	8	2	Ttr	2	90°	1	
18-Mar-2016	10:54:01	031	37.025642	-75.795140	8	2	Ttr	2	90°	12	
18-Mar-2016	11:47:38	038	37.085758	-75.765830	9	2	Ttr	3	90°	18	
18-Mar-2016	11:47:46	039	37.085672	-75.771163	9	2	Ttr	3	90°	5	
18-Mar-2016	11:48:01	035	37.085633	-75.780161	9	2	Ttr	2	45°	3	
18-Mar-2016	11:52:28	041	37.072432	-75.829184		2	Ttr	4	90°	7	*
18-Mar-2016	11:52:47	037	37.066845	-75.831381	9	2	Ttr	2	45°	30	
18-Mar-2016	12:02:19	045	37.082739	-75.930543	9	2	Ttr	2	90°	20	
18-Mar-2016	12:11:43	049	37.061725	-76.002648		2	Ttr	3	90°	7	*
18-Mar-2016	13:52:42	045	37.075812	-75.981458		2	Ttr	2	90°	1	*
18-Mar-2016	13:52:53	050	37.080239	-75.975060		2	Ttr	3	90°	10	*
18-Mar-2016	13:58:41	046	37.125245	-75.884027		2	Ttr	2	100°	2	*
18-Mar-2016	14:00:21	051	37.142897	-75.819357		2	Ttr	2	90°	5	*
18-Mar-2016	14:01:11	053	37.143092	-75.785631	10	2	Ttr	2	100°	15	
18-Mar-2016	14:02:46	049	37.142794	-75.723948	10	2	Ttr	1	90°	2	
18-Mar-2016	14:04:32	050	37.142975	-75.656488	10	2	Ttr	2	70°	15	
18-Mar-2016	14:04:50	055	37.142967	-75.644810	10	2	Ttr	2	90°	20	
18-Mar-2016	14:09:56	052	37.143179	-75.444357	10	2	Ttr	2	90°	1	
18-Mar-2016	15:30:49	059	37.203044	-75.691914	11	2	Ttr	2	100°	4	
18-Mar-2016	15:58:31	067	36.719821	-75.446794	3	2	Ttr	2	90°	1	
18-Mar-2016	16:56:15	079	36.616180	-75.883538		2	Ttr	2	110°	5	*
18-Mar-2016	10:21:06	014	36.971797	-75.151227	7	2	Dde	2	90°	4	
18-Mar-2016	16:08:15	071	36.723920	-75.124797	3	2	Mno	3	90°	1	
18-Mar-2016	14:43:25	055	37.140428	-75.072933		2	BALA	1	90°	1	*
20-Apr-2016	13:57:23	044	36.905407	-75.914364	6	3	Ttr	3	90°	1	
20-Apr-2016	14:41:54	042	37.019207	-75.983356		2	Ttr	3	90°	10	*
20-Apr-2016	14:42:42	044	37.024919	-75.951493	8	2	Ttr	3	90°	15	
20-Apr-2016	14:45:21	054	37.025924	-75.841412	8	3	Ttr	2	140°	2	
20-Apr-2016	15:01:41	056	37.029411	-75.362961	8	3	Ttr	2	110°	3	

Date	Time	Way Point	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort
20-Apr-2016	15:32:57	063	37.093831	-75.482005	9	2	Ttr	2	120°	2	
20-Apr-2016	16:06:45	071	37.152300	-75.540570	10	3	Ttr	2	90°	2	
20-Apr-2016	16:31:36	059	37.205538	-75.422120	11	2	Ttr	2	90°	5	
20-Apr-2016	17:03:23	083	37.271405	-75.387040	12	2	Ttr	2	80°	6	
20-Apr-2016	17:20:46	089	37.326896	-75.237268	13	2	Ttr	2	100°	65	
10-May-2016	13:08:38	020	37.085401	-75.945465		2	Ttr	3	90°	5	*
10-May-2016	16:27:44	038	37.080944	-75.978291		2	Ttr	2	95°	1	*
10-May-2016	11:32:22	006	36.904863	-75.202245	6	3	Sfr	2	90°	125	
27-Jun-2016	11:47:50	065	36.725841	-75.662281	3	2	Ttr	2	110°	12	
27-Jun-2016	11:53:02	067	36.725125	-75.865814	3	2	Ttr	3	90°	2	
27-Jun-2016	13:38:08	072	36.786433	-75.900362	4	2	Ttr	2	110°	2	
27-Jun-2016	10:20:09	018	36.551677	-75.072072	0	1	Sfr	2	100°	30	
27-Jun-2016	10:28:32	020	36.555463	-75.061391		1	Sfr	3	30°	125	*
14-Jul-2016	10:23:27	016	37.158711	-75.225685	10	2	Ttr	2	110°	25	
14-Jul-2016	10:41:51	021	37.141629	-75.789228	10	2	Ttr	3	90°	40	
14-Jul-2016	11:30:54	036	37.024661	-75.840312	8	2	Ttr	3	90°	5	
14-Jul-2016	11:31:25	044	37.024382	-75.856201	8	2	Ttr	1	90°	1	
14-Jul-2016	11:32:45	046	37.020946	-75.852734	8	2	Ttr	1	90°	3	
14-Jul-2016	11:38:25	050	37.023566	-75.927648	8	2	Ttr	2	90°	6	
14-Jul-2016	14:47:45	092	36.854681	-75.959362		2	Ttr	2	120°	4	*
14-Jul-2016	17:00:49	119	36.551015	-75.700756	0	2	Ttr	2	90°	12	
14-Jul-2016	17:03:36	120	36.550198	-75.807390	0	2	Ttr	3	90°	12	
14-Jul-2016	17:03:41	121	36.550197	-75.811146	0	2	Ttr	2	90°	7	
14-Jul-2016	17:04:46	123	36.549852	-75.852907		2	Ttr	2	110°	4	*
8-Aug-2016	9:37:38	015	37.263506	-75.157898	12	1	Ttr	1	90°	25	
8-Aug-2016	10:48:03	053	37.085581	-75.854090	9	1	Ttr	2	110°	12	
8-Aug-2016	10:48:47	053	37.085636	-75.827838	9	1	Ttr	1	120°	2	
8-Aug-2016	10:48:56	054	37.085650	-75.822803	9	1	Ttr	2	100°	1	
8-Aug-2016	10:49:22	055	37.085648	-75.806403	9	1	Ttr	1	90°	8	
8-Aug-2016	10:51:13	060	37.085757	-75.736271	9	1	Ttr	3	90°	25	
8-Aug-2016	11:30:51	075	37.024714	-75.928106	8	2	Ttr	2	120°	3	
8-Aug-2016	11:31:16	076	37.024815	-75.944117	8	2	Ttr	2	90°	2	
8-Aug-2016	11:31:18	082	37.024810	-75.945434	8	1	Ttr	0	90°	6	
8-Aug-2016	12:21:28	099	36.905832	-75.989427		2	Ttr	2	120°	6	*
8-Aug-2016	15:37:58	170	36.606026	-75.813393	1	2	Ttr	3	90°	6	
8-Aug-2016	15:38:46	171	36.606363	-75.785400	1	2	Ttr	1	135°	1	
13-Sep-2016	10:27:37	019	36.787368	-75.921749	4	3	Ttr	2	90°	7	
13-Sep-2016	12:37:09	058	36.905670	-75.787987	6	3	Ttr	1	120°	1	
13-Sep-2016	13:52:25	100	37.250598	-75.500011	12	2	Ttr	3	45°	600	
21-Oct-2016	9:24:24	009	36.552265	-75.444759	0	1	Ttr	1	45°	30	

Date	Time	Way Point	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort
21-Oct-2016	10:03:30	012	36.607363	-75.787979	1	1	Ttr	2	110°	7	
21-Oct-2016	10:39:43	037	36.731979	-75.226497	3	1	Ttr	2	90°	125	
21-Oct-2016	10:53:31	038	36.724588	-75.661059	3	2	Ttr	2	100°	12	
21-Oct-2016	10:59:40	042	36.723434	-75.897532	3	2	Ttr	2	90°	5	
21-Oct-2016	13:39:00	076	36.904996	-75.949929	6	1	Ttr	2	110°	5	
21-Oct-2016	13:40:33	077	36.904793	-75.889855	6	1	Ttr	2	90°	5	
21-Oct-2016	14:25:49	084	36.960588	-75.859331	7	1	Ttr	1	90°	15	
21-Oct-2016	14:46:10	117	37.322545	-75.421241	13	1	Ttr	2	110°	1	
21-Oct-2016	14:46:57	118	37.322948	-75.391033	13	1	Ttr	2	100°	2	
7-Nov-2016	9:36:52	009	37.086216	-75.745703	9	3	Ttr	3	90°	12	
7-Nov-2016	10:29:20	016	36.966578	-75.945629	7	3	Ttr	3	110°	8	
7-Nov-2016	11:26:05	030	36.956988	-76.064418		3	Ttr	2	90°	10	*
10-Dec-2016	11:49:11	010	37.284108	-75.524476		3	Ttr	3	110°	3	*
10-Dec-2016	12:43:02	016	37.143148	-75.669403	10	2	Ttr	3	90°	8	
10-Dec-2016	12:56:24	019	37.088568	-75.728740	9	2	Ttr	2	90°	18	
10-Dec-2016	13:04:30	023	37.081875	-75.595835	9	2	Ttr	1	90°	1	
10-Dec-2016	10:26:52	003	36.971991	-75.998851		2	Mno	3	80°	1	*
10-Dec-2016	11:23:08	012	37.280594	-75.517368	12	2	Mno	4	90°	1	
10-Dec-2016	11:30:20	013	37.287523	-75.504611		2	Mno	3	90°	2	*
21-Dec-2016	10:21:50	009	36.605656	-75.727977	1	2	Ttr	2	80°	4	
21-Dec-2016	10:25:40	011	36.613398	-75.876767		2	Ttr	1	90°	1	*
21-Dec-2016	10:27:25	011	36.646461	-75.887817	1	1	Ttr	3	90°	4	
21-Dec-2016	11:17:55	018	36.760934	-75.936808		2	Ttr	2	90°	10	*
21-Dec-2016	11:18:14	019	36.769925	-75.941153		2	Ttr	3	90°	5	*
21-Dec-2016	11:24:35	021	36.787820	-75.721841	4	2	Ttr	3	90°	6	
21-Dec-2016	15:52:32	055	37.085862	-75.695364	9	2	Ttr	2	100°	5	
21-Dec-2016	12:13:24	039	36.943809	-75.945309		1	Mno	2	10°	1	*
21-Dec-2016	16:07:21	076	36.954361	-75.971474		1	Mno	4	90°	1	*
30-Jan-2016	13:59:39	005	37.147066	-75.196840	10	2	Dde	2	90°	5	
30-Jan-2016	14:18:37	012	37.080197	-75.512697	9	3	Egl	2	90°	1	
2-Feb-2016	10:36:43	010	36.669236	-75.349988	2	3	Ttr	2	90°	6	
2-Feb-2016	14:09:09	055	36.964688	-75.567802	7	3	Egl	1	90°	1	
2-Feb-2016	9:38:37	008	36.615560	-75.357184		3	Mno	2	90°	1	*
2-Feb-2016	9:36:38	007	36.618361	-75.348882	1	3	Bph	2	90°	2	
17-Mar-2016	11:05:50	013	37.104089	-75.903568		2	Ttr	3	90°	1	*
17-Mar-2016	11:06:06	014	37.096083	-75.915430		2	Ttr	3	90°	1	*
17-Mar-2016	13:29:08	013	37.066338	-76.023102		2	Ttr	1	120°	4	*
17-Mar-2016	14:19:11	032	37.082846	-75.945366		2	Ttr	3	90°	10	*
17-Mar-2016	14:19:25	028	37.080540	-75.936539		2	Ttr	2	90°	2	*
17-Mar-2016	14:21:38	034	37.087677	-75.847109	9	2	Ttr	2	90°	1	

Date	Time	Way Point	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort
17-Mar-2016	15:03:42	043	37.018630	-75.681949	8	2	Ttr	2	120°	19	
17-Mar-2016	15:19:24	050	36.968727	-75.888557	7	2	Ttr	2	90°	12	
17-Mar-2016	15:19:32	051	36.968799	-75.883052	7	2	Ttr	2	90°	1	
17-Mar-2016	15:19:44	051	36.968852	-75.875200	7	2	Ttr	2	120°	3	
17-Mar-2016	15:20:38	052	36.968889	-75.840322	7	2	Ttr	2	90°	12	
17-Mar-2016	15:20:56	052	36.968975	-75.828675	7	2	Ttr	2	90°	4	

Loggerhead sea turtle (*Caretta caretta*) and Leatherback sea turtle (*Dermochelys coriacea)* sightings in the coastal VACAPES survey area from January through December 2016. Asterisk denotes an off-effort sighting.

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort (*)
10-May-2016	11:19:21	003	36.906777	-75.512920	6	3	Cca	2	90°	1	
10-May-2016	13:08:04	018	37.085487	-75.924330	9	2	Cca	2	90°	1	
27-Jun-2016	10:10:13	005	36.550864	-75.454856	0	1	Cca	2	90°	1	
27-Jun-2016	10:10:38	006	36.550822	-75.437170	0	1	Dco	3	90°	1	
27-Jun-2016	10:10:51	007	36.550821	-75.427469	0	1	Cca	3	90°	1	
27-Jun-2016	10:11:41	006	36.550988	-75.393492	0	1	Cca	3	90°	1	
27-Jun-2016	10:11:41	008	36.550962	-75.393636	0	1	Cca	3	90°	1	
27-Jun-2016	10:11:56	007	36.551073	-75.383752	0	1	Cca	2	90°	1	
27-Jun-2016	10:12:12	008	36.551101	-75.373840	0	1	Cca	2	90°	1	
27-Jun-2016	10:12:24	009	36.551121	-75.366186	0	1	Cca	2	90°	3	
27-Jun-2016	10:12:35	009	36.551105	-75.359252	0	1	Cca	3	90°	1	
27-Jun-2016	10:13:00	010	36.551136	-75.344065	0	1	Cca	3	90°	1	
27-Jun-2016	10:13:22	010	36.551145	-75.331021	0	1	Cca	3	90°	1	
27-Jun-2016	10:13:30	011	36.551173	-75.325821	0	1	Cca	2	90°	1	
27-Jun-2016	10:14:22	011	36.551198	-75.294738	0	1	Cca	3	90°	1	
27-Jun-2016	10:14:43	012	36.551200	-75.281414	0	1	Cca	3	90°	1	
27-Jun-2016	10:14:49	012	36.551213	-75.277799	0	1	Cca	3	90°	1	
27-Jun-2016	10:15:31	013	36.551188	-75.250691	0	1	Cca	3	90°	1	
27-Jun-2016	10:16:34	013	36.551208	-75.210290	0	1	Cca	3	90°	1	
27-Jun-2016	10:16:52	014	36.551190	-75.198516	0	1	Cca	3	90°	1	
27-Jun-2016	10:17:18	014	36.551215	-75.181780	0	1	Cca	3	90°	1	
27-Jun-2016	10:17:30	015	36.551203	-75.173914	0	1	Cca	2	90°	1	
27-Jun-2016	10:18:24	015	36.551228	-75.139162	0	1	Cca	2	90°	1	

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort (*)
27-Jun-2016	10:18:44	016	36.551273	-75.126429	0	1	Cca	3	90°	1	
27-Jun-2016	10:19:22	016	36.551194	-75.101733	0	1	Cca	2	90°	1	
27-Jun-2016	10:39:11	022	36.606754	-75.076194	1	1	Cca	3	90°	3	
27-Jun-2016	10:39:23	023	36.606865	-75.083864	1	1	Cca	2	90°	1	
27-Jun-2016	10:39:38	024	36.607450	-75.093253	1	1	Cca	2	90°	3	
27-Jun-2016	10:39:54	023	36.608093	-75.103654	1	1	Cca	4	90°	1	
27-Jun-2016	10:40:15	025	36.608548	-75.116734	1	1	Cca	3	90°	1	
27-Jun-2016	10:40:39	026	36.608807	-75.131309	1	1	Cca	2	90°	2	
27-Jun-2016	10:40:44	024	36.608847	-75.134507	1	1	Cca	3	90°	2	
27-Jun-2016	10:40:57	025	36.608878	-75.142528	1	1	Cca	3	90°	2	
27-Jun-2016	10:43:22	027	36.608998	-75.234575	1	1	Cca	3	90°	1	
27-Jun-2016	10:43:51	028	36.608988	-75.253022	1	1	Cca	1	90°	1	
27-Jun-2016	10:44:13	029	36.608957	-75.267229	1	1	Cca	3	90°	2	
27-Jun-2016	10:44:42	027	36.608996	-75.285813	1	1	Cca	3	90°	1	
27-Jun-2016	10:44:50	030	36.608954	-75.290660	1	1	Cca	2	90°	1	
27-Jun-2016	10:48:39	032	36.609916	-75.304973	1	1	Cca	2	90°	1	
27-Jun-2016	10:50:39	031	36.608799	-75.406446	1	1	Cca	3	90°	1	
27-Jun-2016	10:56:18	034	36.608310	-75.630187	1	1	Cca	3	90°	1	
27-Jun-2016	10:58:01	039	36.607999	-75.697169	1	1	Cca	2	90°	1	
27-Jun-2016	10:59:49	040	36.607449	-75.766014	1	1	Cca	2	90°	1	
27-Jun-2016	11:07:18	044	36.668750	-75.784890	2	1	Cca	2	90°	1	
27-Jun-2016	11:11:13	045	36.669036	-75.621583	2	1	Cca	3	90°	1	
27-Jun-2016	11:14:25	047	36.669550	-75.499344	2	1	Cca	3	90°	2	
27-Jun-2016	11:16:32	048	36.669393	-75.420372	2	1	Cca	3	3°	1	
27-Jun-2016	11:17:33	049	36.669438	-75.381787	2	1	Cca	2	3°	1	
27-Jun-2016	11:19:06	051	36.669422	-75.321930	2	1	Cca	2	90°	1	
27-Jun-2016	11:19:46	052	36.669508	-75.296088	2	1	Cca	2	90°	1	
27-Jun-2016	11:20:14	053	36.669545	-75.278191	2	1	Cca	2	90°	1	
27-Jun-2016	11:20:34	054	36.669621	-75.265413	2	1	Cca	3	90°	1	
27-Jun-2016	11:21:28	055	36.669496	-75.229967	2	1	Cca	3	90°	1	
27-Jun-2016	11:22:49	056	36.669439	-75.177916	2	1	Cca	3	90°	1	
27-Jun-2016	11:23:02	047	36.669410	-75.169717	2	1	Cca	2	110°	1	
27-Jun-2016	11:23:17	057	36.669468	-75.160330	2	1	Cca	1	90°	1	
27-Jun-2016	11:23:42	058	36.669401	-75.144334	2	1	Cca	1	90°	2	
27-Jun-2016	11:24:23	059	36.669302	-75.118337	2	1	Cca	3	110°	1	
27-Jun-2016	11:24:33	060	36.669286	-75.112054	2	1	Cca	1	90°	2	
27-Jun-2016	11:25:33	049	36.669256	-75.074189	2	1	Cca	4	90°	1	
27-Jun-2016	11:27:30	063	36.703605	-75.023623		1	Dco	1	90°	1	*
27-Jun-2016	11:29:20	052	36.725392	-75.069057	3	1	Cca	3	90°	1	

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort (*)
27-Jun-2016	11:29:54	065	36.726075	-75.090208	3	1	Cca	2	90°	1	
27-Jun-2016	11:29:58	066	36.726127	-75.092667	3	1	Cca	2	90°	1	
27-Jun-2016	11:31:46	054	36.726510	-75.160030	3	1	Cca	3	90°	1	
27-Jun-2016	11:32:17	067	36.726522	-75.179634	3	1	Cca	2	90°	1	
27-Jun-2016	11:32:44	055	36.726507	-75.196296	3	1	Cca	3	90°	1	
27-Jun-2016	11:34:07	068	36.726459	-75.247968	3	1	Cca	2	90°	1	
27-Jun-2016	11:34:40	069	36.726435	-75.268976	3	1	Cca	2	90°	1	
27-Jun-2016	11:35:31	070	36.726471	-75.300656	3	1	Cca	2	90°	1	
27-Jun-2016	11:36:31	072	36.726539	-75.337867	3	1	Cca	2	90°	1	
27-Jun-2016	11:36:52	073	36.726555	-75.350574	3	1	Cca	2	90°	2	
27-Jun-2016	11:37:06	057	36.726591	-75.359098	3	1	Cca	3	90°	2	
27-Jun-2016	11:37:55	074	36.726593	-75.389569	3	1	Cca	2	90°	1	
27-Jun-2016	11:38:37	075	36.726595	-75.415354	3	1	Cca	3	90°	1	
27-Jun-2016	11:47:31	080	36.725868	-75.649862	3	1	Cca	1	90°	1	
27-Jun-2016	13:47:22	075	36.787148	-75.537516	4	2	Cca	2	90°	1	
27-Jun-2016	13:48:22	076	36.787118	-75.499093	4	2	Cca	2	90°	1	
27-Jun-2016	13:48:30	089	36.787138	-75.493903	4	1	Cca	3	90°	1	
27-Jun-2016	13:48:47	077	36.787183	-75.482762	4	2	Cca	3	90°	1	
27-Jun-2016	13:49:03	078	36.787254	-75.472355	4	2	Cca	3	90°	1	
27-Jun-2016	13:50:11	079	36.787319	-75.429117	4	2	Cca	3	110°	1	
27-Jun-2016	13:50:51	080	36.787287	-75.403548	4	2	Cca	3	90°	1	
27-Jun-2016	13:51:49	081	36.787305	-75.365355	4	2	Cca	2	90°	1	
27-Jun-2016	13:52:03	082	36.787289	-75.356470	4	2	Cca	3	90°	1	
27-Jun-2016	13:52:23	090	36.787262	-75.343504	4	1	Cca	2	90°	1	
27-Jun-2016	13:52:26	083	36.787236	-75.341333	4	2	Cca	3	90°	1	
27-Jun-2016	13:52:38	084	36.787241	-75.333857	4	2	Cca	2	90°	1	
27-Jun-2016	13:53:15	091	36.787220	-75.309806	4	1	Cca	3	90°	1	
27-Jun-2016	13:53:30	092	36.787183	-75.300343	4	1	Cca	2	90°	2	
27-Jun-2016	13:54:27	093	36.787274	-75.264046	4	1	Cca	2	90°	1	
27-Jun-2016	13:54:51	094	36.787239	-75.248513	4	1	Cca	2	90°	1	
27-Jun-2016	13:55:25	095	36.787214	-75.226569	4	1	Cca	2	90°	1	
27-Jun-2016	13:55:39	096	36.787251	-75.217431	4	1	Cca	3	45°	1	
27-Jun-2016	13:55:47	097	36.787292	-75.212373	4	1	Cca	2	80°	1	
27-Jun-2016	13:56:25	085	36.787211	-75.187086	4	2	Cca	2	90°	1	
27-Jun-2016	13:57:12	086	36.787144	-75.156255	4	2	Cca	2	90°	3	
27-Jun-2016	13:57:38	098	36.787104	-75.139482	4	1	Cca	2	80°	1	
27-Jun-2016	13:58:28	100	36.787051	-75.107042	4	1	Cca	3	90°	1	
27-Jun-2016	13:59:19	087	36.786955	-75.074668	4	2	Cca	2	90°	1	
27-Jun-2016	14:05:12	091	36.853023	-75.060178	5	2	Cca	3	90°	1	

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort (*)
27-Jun-2016	14:05:15	092	36.852972	-75.062418	5	2	Cca	3	90°	1	
27-Jun-2016	14:06:37	093	36.850729	-75.117409	5	2	Cca	2	90°	1	
27-Jun-2016	14:06:49	108	36.850646	-75.125949	5	1	Cca	2	90°	1	
27-Jun-2016	14:07:04	094	36.850591	-75.136378	5	2	Cca	3	90°	1	
27-Jun-2016	14:08:07	095	36.850253	-75.179332	5	2	Cca	2	90°	1	
27-Jun-2016	14:08:50	109	36.850017	-75.208448	5	1	Cca	2	90°	1	
27-Jun-2016	14:09:19	096	36.849912	-75.228586	5	2	Cca	1	90°	1	
27-Jun-2016	14:11:34	098	36.849312	-75.319970	5	2	Cca	2	90°	1	
27-Jun-2016	14:12:00	099	36.849201	-75.337303	5	2	Cca	3	110°	1	
27-Jun-2016	14:13:43	100	36.848620	-75.406454	5	2	Cca	2	90°	1	
27-Jun-2016	14:14:59	102	36.848255	-75.456752	5	2	Cca	2	90°	1	
27-Jun-2016	14:20:48	106	36.845468	-75.690329	5	2	Cca	2	90°	1	
27-Jun-2016	14:36:33	124	36.904737	-75.704850	6	3	Cca	3	90°	1	
27-Jun-2016	14:40:13	126	36.905167	-75.564592	6	2	Cca	3	90°	1	
27-Jun-2016	14:41:45	117	36.904733	-75.505528	6	2	Cca	3	90°	1	
27-Jun-2016	14:42:19	127	36.904917	-75.483367	6	2	Cca	3	90°	1	
27-Jun-2016	14:43:06	128	36.904897	-75.453578	6	2	Cca	3	90°	1	
27-Jun-2016	14:44:32	130	36.904921	-75.398002	6	2	Cca	3	90°	1	
27-Jun-2016	14:45:40	131	36.904848	-75.355125	6	2	Cca	2	90°	2	
27-Jun-2016	14:46:05	118	36.904886	-75.338681	6	2	Cca	2	90°	1	
27-Jun-2016	14:46:21	119	36.904925	-75.328682	6	2	Cca	2	90°	1	
27-Jun-2016	14:49:23	122	36.904720	-75.212229	6	2	Cca	1	90°	1	
27-Jun-2016	14:49:28	123	36.904731	-75.209020	6	2	Cca	3	90°	1	
27-Jun-2016	14:50:16	124	36.904919	-75.178506	6	2	Cca	2	90°	1	
27-Jun-2016	14:50:31	136	36.904889	-75.168866	6	2	Cca	3	80°	3	
27-Jun-2016	14:50:44	125	36.904857	-75.160419	6	2	Cca	2	90°	1	
27-Jun-2016	14:51:35	138	36.904819	-75.127940	6	2	Cca	3	80°	2	
27-Jun-2016	14:52:14	127	36.904818	-75.102686	6	2	Cca	2	90°	1	
27-Jun-2016	14:52:27	139	36.904803	-75.094850	6	2	Cca	2	90°	1	
27-Jun-2016	14:56:14	144	36.967180	-75.066149	7	2	Cca	3	90°	3	
27-Jun-2016	14:56:54	133	36.966786	-75.091143	7	2	Cca	2	90°	1	
27-Jun-2016	14:57:24	145	36.967597	-75.110107	7	2	Cca	3	80°	3	
27-Jun-2016	14:57:39	134	36.967751	-75.119564	7	2	Cca	2	90°	1	
27-Jun-2016	14:59:09	136	36.967823	-75.178388	7	2	Cca	2	90°	1	
27-Jun-2016	14:59:28	146	36.967767	-75.190670	7	2	Cca	3	90°	3	
27-Jun-2016	14:59:29	137	36.967768	-75.191651	7	2	Cca	2	120°	1	
27-Jun-2016	15:00:13	138	36.967617	-75.221263	7	2	Cca	2	90°	1	
27-Jun-2016	15:02:39	140	36.966915	-75.318783	7	2	Cca	1	90°	1	
27-Jun-2016	15:10:46	142	36.963719	-75.645997	7	2	Cca	2	90°	1	
27-Jun-2016	15:38:32	148	37.023681	-75.800396	8	2	Cca	1	90°	1	

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort (*)
27-Jun-2016	15:39:35	149	37.023817	-75.759507	8	2	Cca	2	90°	1	
27-Jun-2016	15:39:40	156	37.023862	-75.756147	8	2	Cca	2	100°	1	
27-Jun-2016	15:40:23	150	37.023935	-75.727656	8	2	Cca	2	90°	1	
27-Jun-2016	15:55:33	159	37.266559	-75.509105	12	2	Cca	2	80°	1	
27-Jun-2016	15:57:04	153	37.262169	-75.448033	12	2	Cca	2	90°	1	
27-Jun-2016	15:59:41	160	37.263109	-75.340345	12	2	Dco	2	70°	1	
27-Jun-2016	16:02:47	161	37.264397	-75.214539	12	2	Cca	3	90°	2	
27-Jun-2016	16:03:18	162	37.264569	-75.194154	12	2	Dco	1	70°	2	
27-Jun-2016	16:03:22	157	37.264569	-75.191025	12	2	Cca	2	90°	1	
27-Jun-2016	16:13:37	165	37.313820	-75.039631		2	Cca	2	90°	1	*
27-Jun-2016	16:14:23	167	37.323445	-75.066057	13	2	Cca	2	120°	1	
27-Jun-2016	16:14:50	169	37.321882	-75.084092	13	2	Cca	3	90°	1	
27-Jun-2016	16:17:06	175	37.323421	-75.176003	13	2	Cca	2	90°	1	
14-Jul-2016	9:41:37	006	37.265908	-75.243617	12	2	Cca	2	100°	1	
14-Jul-2016	9:42:13	007	37.265687	-75.260600	12	2	Cca	2	90°	1	
14-Jul-2016	10:20:49	013	37.147993	-75.190535	10	2	Cca	1	90°	1	
14-Jul-2016	10:21:01	015	37.148148	-75.198033	10	2	Cca	2	90°	1	
14-Jul-2016	10:21:11	014	37.148125	-75.204426	10	2	Cca	1	90°	1	
14-Jul-2016	10:30:25	019	37.146726	-75.333373	10	2	Cca	1	110°	1	
14-Jul-2016	10:39:07	020	37.143074	-75.681109	10	2	Cca	2	90°	1	
14-Jul-2016	10:51:24	030	37.087730	-75.732209	9	2	Cca	2	115°	1	
14-Jul-2016	11:07:40	029	37.034303	-75.134056		3	Cca	2	90°	1	*
14-Jul-2016	11:21:14	035	37.027164	-75.549355	8	2	Cca	2	115°	1	
14-Jul-2016	13:47:34	056	36.968327	-75.916282	7	2	Cca	2	90°	1	
14-Jul-2016	13:48:27	057	36.968500	-75.883658	7	2	Cca	2	90°	1	
14-Jul-2016	13:49:43	058	36.969127	-75.835273	7	2	Cca	3	90°	1	
14-Jul-2016	13:49:59	059	36.969016	-75.825199	7	2	Cca	3	90°	1	
14-Jul-2016	14:20:14	068	36.968351	-75.228370	7	2	Cca	2	90°	1	
14-Jul-2016	14:21:12	046	36.968179	-75.190417	7	2	Cca	2	80°	1	
14-Jul-2016	14:21:26	069	36.968141	-75.180885	7	2	Dco	3	90°	1	
14-Jul-2016	14:21:54	047	36.967793	-75.162020	7	2	Cca	3	90°	1	
14-Jul-2016	14:22:52	071	36.952262	-75.136174		2	Dco	3	110°	1	*
14-Jul-2016	14:33:37	050	36.907673	-75.492097	6	2	Cca	2	90°	1	
14-Jul-2016	14:36:31	075	36.906811	-75.606752	6	2	Cca	2	90°	1	
14-Jul-2016	14:44:43	056	36.904077	-75.936251	6	2	Cca	3	90°	1	
14-Jul-2016	14:49:51	094	36.843334	-75.874216	5	2	Cca	2	90°	1	
14-Jul-2016	14:55:46	097	36.846014	-75.649821	5	2	Cca	1	90°	1	
14-Jul-2016	15:02:19	059	36.848484	-75.394973	5	2	Cca	3	90°	1	
14-Jul-2016	15:07:58	099	36.850142	-75.177694	5	2	Cca	2	90°	1	
14-Jul-2016	15:10:42	101	36.801797	-75.137119		2	Cca	2	90°	1	*

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort (*)
14-Jul-2016	15:36:25	104	36.786519	-75.929563	4	2	Cca	2	90°	1	
14-Jul-2016	16:27:10	083	36.608085	-75.767757	1	1	Cca	2	90°	1	
14-Jul-2016	16:33:25	114	36.610650	-75.533129	1	2	Cca	2	90°	1	
14-Jul-2016	16:41:16	115	36.612924	-75.242151	1	2	Cca	2	90°	1	
8-Aug-2016	9:23:40	009	37.260214	-75.582962	12	1	Cca	2	90°	1	
8-Aug-2016	9:25:12	006	37.260815	-75.524967	12	1	Cca	1	90°	1	
8-Aug-2016	9:29:49	012	37.262504	-75.351189	12	1	Cca	1	90°	1	
8-Aug-2016	9:31:08	010	37.262975	-75.303372	12	1	Cca	1	110°	1	
8-Aug-2016	9:46:34	015	37.330041	-75.288884	13	1	Cca	1	90°	1	
8-Aug-2016	9:49:33	016	37.329245	-75.404613	13	1	Cca	2	90°	1	
8-Aug-2016	9:52:16	017	37.325885	-75.510511	13	1	Cca	1	90°	1	
8-Aug-2016	9:52:41	018	37.325272	-75.527121	13	1	Cca	1	90°	1	
8-Aug-2016	10:07:38	036	37.204933	-75.605179	11	1	Cca	2	90°	1	
8-Aug-2016	10:10:11	035	37.202196	-75.512193	11	1	Cca	2	90°	1	
8-Aug-2016	10:10:25	037	37.202033	-75.504003	11	1	Cca	2	90°	1	
8-Aug-2016	10:13:25	038	37.203682	-75.393586	11	1	Cca	1	90°	1	
8-Aug-2016	10:16:53	041	37.203642	-75.274314	11	1	Dco	2	90°	1	
8-Aug-2016	10:24:21	041	37.143475	-75.205739	10	1	Cca	1	90°	1	
8-Aug-2016	10:29:00	043	37.143520	-75.384434	10	1	Cca	1	90°	1	
8-Aug-2016	10:31:25	044	37.143480	-75.473531	10	1	Cca	2	90°	1	
8-Aug-2016	10:33:13	046	37.143441	-75.537785	10	1	Cca	1	90°	1	
8-Aug-2016	10:34:53	045	37.143229	-75.597268	10	1	Cca	2	90°	1	
8-Aug-2016	10:37:09	048	37.142999	-75.676249	10	1	Cca	1	90°	1	
8-Aug-2016	10:39:54	047	37.142751	-75.772233	10	2	Cca	2	90°	1	
8-Aug-2016	10:50:56	059	37.085724	-75.747595	9	1	Cca	2	90°	1	
8-Aug-2016	10:53:11	056	37.085928	-75.661309	9	1	Cca	0	90°	1	
8-Aug-2016	10:56:23	057	37.086228	-75.545623	9	1	Cca	1	90°	1	
8-Aug-2016	10:56:33	063	37.086252	-75.539883	9	2	Cca	2	90°	1	
8-Aug-2016	10:57:08	064	37.086218	-75.519793	9	2	Cca	2	110°	1	
8-Aug-2016	11:00:36	065	37.086030	-75.395235	9	2	Cca	2	120°	1	
8-Aug-2016	11:21:17	070	37.025616	-75.575105	8	2	Cca	1	90°	1	
8-Aug-2016	11:22:40	071	37.025556	-75.625896	8	2	Cca	1	90°	1	
8-Aug-2016	11:23:39	073	37.025463	-75.662152	8	1	Cca	1	90°	1	
8-Aug-2016	11:28:51	073	37.025006	-75.853757	8	2	Cca	1	100°	1	
8-Aug-2016	11:39:45	083	36.967247	-75.800231	7	2	Cca	1	80°	1	
8-Aug-2016	11:43:45	084	36.967404	-75.662330	7	2	Cca	2	110°	1	
8-Aug-2016	11:48:29	086	36.967090	-75.493642	7	2	Cca	2	90°	1	
8-Aug-2016	11:50:43	087	36.966813	-75.411944	7	2	Cca	2	100°	1	
8-Aug-2016	11:53:19	089	36.966547	-75.314845	7	1	Cca	2	90°	1	
8-Aug-2016	12:09:23	093	36.905860	-75.527309	6	2	Cca	2	100°	1	

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort (*)
8-Aug-2016	12:16:34	105	36.905687	-75.802125	6	1	Cca	1	90°	1	
8-Aug-2016	14:06:32	104	36.839605	-75.755454	5	1	Cca	2	90°	1	
8-Aug-2016	14:07:37	105	36.839149	-75.718143	5	1	Cca	2	90°	1	
8-Aug-2016	14:08:54	107	36.838741	-75.673861	5	1	Cca	2	110°	1	
8-Aug-2016	14:09:40	122	36.838520	-75.647313	5	1	Cca	1	90°	1	
8-Aug-2016	14:15:21	110	36.836144	-75.446462	5	1	Cca	1	90°	1	
8-Aug-2016	14:18:33	111	36.834832	-75.332295	5	1	Cca	1	100°	1	
8-Aug-2016	14:20:59	112	36.833686	-75.245948	5	1	Cca	1	90°	1	
8-Aug-2016	14:26:19	130	36.788448	-75.198322	4	1	Cca	0	90°	1	
8-Aug-2016	14:31:50	135	36.788871	-75.402579	4	1	Cca	1	90°	1	
8-Aug-2016	14:33:47	116	36.788783	-75.474909	4	1	Cca	2	80°	1	
8-Aug-2016	14:37:06	118	36.788700	-75.601116	4	1	Cca	2	80°	1	
8-Aug-2016	14:52:33	128	36.723771	-75.813014	3	1	Cca	2	120°	1	
8-Aug-2016	14:55:14	129	36.724093	-75.720825	3	1	Cca	2	90°	1	
8-Aug-2016	14:56:07	130	36.724104	-75.691489	3	1	Cca	2	80°	1	
8-Aug-2016	14:58:59	131	36.724303	-75.595430	3	1	Cca	2	75°	1	
8-Aug-2016	14:59:44	153	36.724455	-75.570091	3	1	Cca	1	90°	1	
8-Aug-2016	15:01:47	132	36.724556	-75.501582	3	1	Dco	3	90°	1	
8-Aug-2016	15:02:29	154	36.724542	-75.478253	3	1	Cca	1	90°	1	
8-Aug-2016	15:03:42	133	36.724488	-75.438293	3	1	Cca	2	130°	1	
8-Aug-2016	15:08:36	138	36.724605	-75.278115	3	1	Cca	2	90°	1	
8-Aug-2016	15:22:23	164	36.670847	-75.460800	2	2	Cca	1	100°	1	
8-Aug-2016	15:31:18	166	36.670047	-75.802201	2	2	Cca	1	110°	1	
8-Aug-2016	15:37:42	150	36.605256	-75.823009	1	2	Cca	2	120°	1	
8-Aug-2016	15:47:01	173	36.606893	-75.500922	1	2	Cca	1	90°	1	
8-Aug-2016	16:10:13	161	36.552420	-75.569853	0	2	Cca	2	90°	1	
8-Aug-2016	16:12:12	179	36.552089	-75.644745	0	2	Cca	1	110°	1	
13-Sep-2016	12:59:12	039	36.966299	-75.241296	7	3	Cca	2	90°	1	
13-Sep-2016	13:06:21	041	36.964284	-75.513372	7	3	Cca	2	90°	2	
13-Sep-2016	13:40:28	055	37.203377	-75.703782	11	3	Cca	2	90°	1	
13-Sep-2016	13:48:46	097	37.262180	-75.590524	12	2	Cca	2	135°	1	
13-Sep-2016	14:01:57	103	37.265895	-75.280698	12	2	Cca	1	110°	1	
13-Sep-2016	14:04:40	104	37.266826	-75.180536	12	2	Cca	2	90°	1	
13-Sep-2016	14:18:04	068	37.321181	-75.563032	13	3	Cca	1	90°	1	
21-Oct-2016	9:51:03	010	36.607892	-75.299592	1	1	Dco	2	90°	1	
21-Oct-2016	10:20:01	018	36.670665	-75.412382	2	1	Cca	3	90°	1	
21-Oct-2016	10:20:18	019	36.670752	-75.401624	2	1	Cca	2	90°	1	
21-Oct-2016	10:22:08	026	36.667500	-75.334161	2	1	Cca	2	90°	1	
21-Oct-2016	10:23:48	027	36.669271	-75.354196	2	1	Cca	3	90°	1	
21-Oct-2016	10:27:17	031	36.670729	-75.217930	2	1	Dco	1	90°	1	

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #	Off Effort (*)
21-Oct-2016	10:35:03	027	36.724698	-75.106858	3	2	Cca	2	90°	1	
21-Oct-2016	10:44:44	035	36.725169	-75.323221	3	2	Cca	3	90°	2	
21-Oct-2016	10:45:42	036	36.724946	-75.361299	3	2	Cca	3	90°	1	
21-Oct-2016	11:15:54	053	36.788794	-75.399892	4	1	Cca	2	120°	1	
21-Oct-2016	11:24:19	059	36.788355	-75.054345	4	1	Cca	2	90°	1	
21-Oct-2016	11:29:26	052	36.848809	-75.129142	5	1	Cca	3	90°	1	
21-Oct-2016	13:45:17	079	36.905600	-75.702307	6	1	Cca	2	90°	1	
21-Oct-2016	13:46:09	081	36.906126	-75.668070	6	1	Cca	2	90°	1	
21-Oct-2016	13:47:36	082	36.905935	-75.610034	6	1	Cca	1	90°	1	
21-Oct-2016	13:48:13	083	36.905962	-75.584787	6	1	Cca	2	90°	1	
21-Oct-2016	13:49:01	084	36.906286	-75.552512	6	1	Cca	2	100°	1	
21-Oct-2016	13:54:13	087	36.906451	-75.344203	6	1	Cca	1	90°	1	
21-Oct-2016	13:57:30	089	36.906510	-75.212519	6	1	Cca	2	90°	1	
21-Oct-2016	13:59:23	090	36.906471	-75.134651	6	1	Dco	2	100°	1	
21-Oct-2016	14:00:36	091	36.906366	-75.084016	6	1	Dco	2	100°	1	
21-Oct-2016	14:06:52	094	36.966527	-75.143853	7	1	Cca	2	110°	1	
21-Oct-2016	14:08:22	076	36.965747	-75.200027	7	1	Cca	3	90°	1	
21-Oct-2016	14:12:51	078	36.964994	-75.366812	7	1	Cca	3	90°	1	
21-Oct-2016	14:15:39	079	36.964309	-75.471741	7	1	Cca	3	90°	1	
21-Oct-2016	14:17:43	080	36.963246	-75.550304	7	1	Cca	3	90°	1	
21-Oct-2016	14:40:54	114	37.321907	-75.629427	13	1	Cca	1	90°	1	
21-Oct-2016	14:44:22	115	37.322539	-75.491888	13	1	Cca	2	90°	1	
21-Oct-2016	14:46:18	089	37.322752	-75.416659	13	1	Cca	3	90°	1	
21-Oct-2016	14:47:27	119	37.322951	-75.372151	13	1	Cca	2	90°	1	
21-Oct-2016	14:48:44	120	37.323043	-75.322422	13	1	Cca	3	90°	1	
21-Oct-2016	14:49:37	090	37.322936	-75.288065	13	1	Cca	3	90°	1	
21-Oct-2016	14:50:13	121	37.323196	-75.264500	13	1	Cca	3	90°	1	
21-Oct-2016	14:51:02	122	37.322889	-75.232411	13	1	Cca	2	70°	1	
21-Oct-2016	14:53:05	125	37.323301	-75.150765	13	1	Cca	1	90°	1	
21-Oct-2016	14:53:41	094	37.323278	-75.127236	13	1	Cca	3	90°	1	
21-Oct-2016	14:53:55	126	37.322994	-75.118158	13	1	Cca	1	90°	1	
21-Oct-2016	14:57:17	128	37.286726	-75.028705		1	Cca	3	3°	1	*
21-Oct-2016	15:00:58	098	37.265438	-75.141661	12	1	Cca	3	90°	1	
21-Oct-2016	15:07:57	132	37.263183	-75.389971	12	1	Cca	3	90°	1	
21-Oct-2016	15:12:23	101	37.261388	-75.548681	12	1	Cca	3	90°	1	
21-Oct-2016	15:14:20	133	37.260448	-75.617831	12	1	Cca	3	90°	1	
21-Oct-2016	15:16:13	103	37.259473	-75.684579	12	1	Cca	3	90°	1	

Unidentified shark, manta ray (*Manta birostris*), cownose ray (*Rhinoptera bonasus*), ocean sunfish (*Mola mola)* and cobia (*Rachycentron canadum*) sightings in the coastal VACAPES survey area from January through December 2016.

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #
27-Jun-2016	10:41:43	026	36.608857	-75.171320	1	1	Hammerhead	2	90°	1
27-Jun-2016	10:50:09	030	36.608760	-75.386101	1	1	Shark	2	90°	1
27-Jun-2016	11:24:24	048	36.669255	-75.117978	2	1	Shark	2	100°	1
27-Jun-2016	11:42:04	078	36.726072	-75.542778	3	1	Shark	3	90°	1
27-Jun-2016	11:45:07	078	36.726072	-75.542778	3	1	Shark	3	90°	1
27-Jun-2016	11:47:45	081	36.725818	-75.658873	3	1	Shark	2	90°	1
27-Jun-2016	13:59:48	088	36.786634	-75.055857	4	2	Shark	2	90°	1
27-Jun-2016	14:09:07	110	36.849966	-75.219843	5	1	Hammerhead	3	45°	1
27-Jun-2016	14:10:19	097	36.849657	-75.269242	5	2	Shark	2	110°	1
27-Jun-2016	14:11:29	111	36.849315	-75.316689	5	1	Shark	2	70°	1
27-Jun-2016	14:12:55	112	36.848742	-75.374211	5	1	Shark	3	60°	1
27-Jun-2016	14:13:30	113	36.848675	-75.397651	5	1	Shark	2	60°	1
27-Jun-2016	14:14:55	101	36.848273	-75.454143	5	2	Shark	3	90°	1
27-Jun-2016	14:15:52	103	36.847846	-75.490977	5	2	Shark	3	90°	1
27-Jun-2016	14:46:22	132	36.904946	-75.328112	6	2	Shark	2	60°	1
27-Jun-2016	14:49:01	121	36.904743	-75.226436	6	2	Shark	3	90°	1
27-Jun-2016	16:13:03	164	37.295179	-75.038340		2	Shark	2	90°	1
27-Jun-2016	16:19:53	178	37.323361	-75.288155	13	2	Shark	2	90°	1
14-Jul-2016	14:07:48	064	36.957311	-75.635484	7	2	Sharks	3	90°	40
14-Jul-2016	14:53:51	096	36.845276	-75.724401	5	2	Shark	2	120°	1
8-Aug-2016	15:11:33	160	36.724397	-75.177297	3	1	Shark	2	110°	1
21-Oct-2016	9:42:57	006	36.571440	-75.030993		1	Hammerhead	1	90°	1
21-Oct-2016	10:20:30	020	36.670701	-75.394011	2	1	Shark	2	90°	1
21-Oct-2016	10:21:37	025	36.670845	-75.351339	2	1	Shark	3	90°	1
21-Oct-2016	10:28:52	032	36.670854	-75.151761	2	1	Hammerhead	1	90°	1
21-Oct-2016	10:44:11	034	36.725184	-75.302193	3	2	Shark	3	90°	1
21-Oct-2016	11:22:16	057	36.788523	-75.138171	4	1	Shark	1	90°	1
21-Oct-2016	11:22:42	058	36.788694	-75.120475	4	1	Hammerhead	2	90°	1
21-Oct-2016	11:24:13	048	36.788391	-75.058548	4	1	Hammerhead	2	90°	1
21-Oct-2016	11:32:31	054	36.848219	-75.241870	5	1	Shark	2	110°	1
21-Oct-2016	11:51:21	059	36.841470	-75.930024	5	1	Sharks	3	90°	2
21-Oct-2016	13:49:33	085	36.906112	-75.530553	6	1	Shark	1	90°	1
21-Oct-2016	13:52:20	086	36.906479	-75.419553	6	1	Hammerhead	1	90°	1
21-Oct-2016	13:58:36	070	36.906231	-75.167475	6	1	Sharks	2	90°	2
21-Oct-2016	13:58:51	071	36.906590	-75.156834	6	1	Sharks	2	90°	2

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #
21-Oct-2016	14:50:29	091	37.322966	-75.253967	13	1	Shark	2	90°	1
21-Oct-2016	10:27:21	023	36.670709	-75.214721	2	2	Manta ray	2	90°	1
21-Oct-2016	10:28:43	024	36.670879	-75.158004	2	2	Manta ray	2	90°	1
27-Jun-2016	11:01:39	037	36.607118	-75.836254	1	1	Cownose ray	3	90°	1
27-Jun-2016	11:33:34	056	36.726541	-75.227448	3	1	Cownose ray	3	90°	6
27-Jun-2016	11:46:06	063	36.727795	-75.594508	3	2	Cownose ray	2	90°	3
27-Jun-2016	11:50:25	066	36.725541	-75.763788	3	2	Cownose ray	2	90°	4
27-Jun-2016	13:59:01	101	36.786977	-75.086063	4	1	Cownose ray	3	90°	20
27-Jun-2016	13:59:16	102	36.786935	-75.076717	4	1	Cownose ray	2	90°	10
27-Jun-2016	14:00:54	105	36.806130	-75.032522		1	Cownose ray	3	90°	200
27-Jun-2016	14:17:19	104	36.847316	-75.549086	5	2	Cownose ray	2	90°	2
27-Jun-2016	14:19:38	105	36.845997	-75.642426	5	2	Cownose ray	3	110°	7
27-Jun-2016	14:44:09	129	36.904953	-75.412924	6	2	Cownose ray	3	90°	30
27-Jun-2016	14:47:11	133	36.904968	-75.296803	6	2	Cownose ray	3	90°	50
27-Jun-2016	14:47:16	120	36.904962	-75.293151	6	2	Cownose ray	2	90°	2
27-Jun-2016	14:47:47	134	36.904953	-75.273432	6	2	Cownose ray	3	90°	30
27-Jun-2016	14:49:41	135	36.904799	-75.200542	6	2	Cownose ray	3	90°	40
27-Jun-2016	14:50:56	137	36.904841	-75.152573	6	2	Cownose ray	2	90°	40
27-Jun-2016	14:51:26	126	36.904826	-75.133487	6	2	Cownose ray	2	110°	20
27-Jun-2016	14:53:03	128	36.904716	-75.071960	6	2	Cownose ray	3	90°	50
27-Jun-2016	14:54:44	130	36.938280	-75.041098		2	Cownose ray	2	90°	50
27-Jun-2016	14:56:10	143	36.967530	-75.063709	7	2	Cownose ray	2	80°	50
27-Jun-2016	14:58:02	135	36.967834	-75.134107	7	2	Cownose ray	2	90°	1
27-Jun-2016	15:01:05	139	36.967423	-75.255522	7	2	Cownose ray	1	90°	5
27-Jun-2016	15:32:10	146	36.965705	-75.987309		2	Cownose ray	2	90°	100
27-Jun-2016	16:01:39	155	37.263920	-75.260879	12	2	Cownose ray	1	90°	4
27-Jun-2016	16:02:54	156	37.264406	-75.210377	12	2	Cownose ray	2	90°	20
27-Jun-2016	16:03:50	158	37.264744	-75.172160	12	2	Cownose ray	2	90°	6
27-Jun-2016	16:04:19	159	37.264839	-75.152996	12	2	Cownose ray	2	90°	7
27-Jun-2016	16:04:45	160	37.264965	-75.135370	12	2	Cownose ray	2	90°	25
27-Jun-2016	16:14:25	168	37.323311	-75.067041	13	2	Cownose ray	3	90°	75
27-Jun-2016	16:14:45	168	37.321911	-75.080656	13	2	Cownose ray	2	110°	10
27-Jun-2016	16:15:13	169	37.322507	-75.099439	13	2	Cownose ray	2	90°	6
27-Jun-2016	16:15:27	170	37.322839	-75.108921	13	2	Cownose ray	3	90°	15
27-Jun-2016	16:15:29	170	37.322910	-75.110330	13	2	Cownose ray	2	110°	8
27-Jun-2016	16:15:50	171	37.323149	-75.124413	13	2	Cownose ray	2	90°	6
27-Jun-2016	16:16:08	172	37.323301	-75.136852	13	2	Cownose ray	2	110°	1
27-Jun-2016	16:16:40	173	37.323397	-75.158695	13	2	Cownose ray	2	90°	5

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Species	Angle out	Degree Forward	Best #
27-Jun-2016	16:17:03	174	37.323422	-75.174176	13	2	Cownose ray	2	90°	4
27-Jun-2016	16:17:57	176	37.323442	-75.210169	13	2	Cownose ray	2	90°	4
27-Jun-2016	16:19:50	177	37.323365	-75.286054	13	2	Cownose ray	2	90°	5
27-Jun-2016	16:25:08	179	37.322937	-75.502422	13	2	Cownose ray	2	90°	4
14-Jul-2016	9:22:31	003	37.321539	-75.667544	13	2	Cownose ray	3	100°	75
14-Jul-2016	9:57:57	009	37.259965	-75.701373	12	2	Cownose ray	3	90°	100
14-Jul-2016	9:58:13	010	37.259845	-75.708968	12	2	Cownose ray	3	90°	200
14-Jul-2016	9:58:37	007	37.259625	-75.720256	12	2	Cownose ray	1	90°	12
14-Jul-2016	11:38:50	051	37.023390	-75.943366	8	2	Cownose ray	2	90°	15
14-Jul-2016	16:47:13	086	36.552747	-75.187335	0	3	Cownose ray	2	80°	40
14-Jul-2016	16:54:48	118	36.552068	-75.469412	0	2	Cownose ray	3	90°	50
13-Sep-2016	9:38:44	007	36.607428	-75.853098	1	3	Cownose ray	2	90°	70
13-Sep-2016	12:33:06	057	36.905001	-75.934462	6	3	Cownose ray	2	110°	7
21-Oct-2016	9:45:55	009	36.606687	-75.100565	1	1	Cownose ray	2	90°	50
21-Oct-2016	10:04:33	013	36.607276	-75.829387	1	1	Cownose ray	2	90°	30
21-Oct-2016	10:10:36	016	36.669747	-75.775240	2	1	Cownose ray	1	90°	25
21-Oct-2016	10:33:51	035	36.724684	-75.061739	3	1	Cownose ray	2	90°	75
21-Oct-2016	10:43:45	032	36.725393	-75.285127	3	2	Cownose ray	2	90°	1000
21-Oct-2016	10:43:59	033	36.725065	-75.294160	3	2	Cownose ray	3	90°	500
21-Oct-2016	10:44:33	040	36.724915	-75.316399	3	1	Cownose ray	1	90°	300
21-Oct-2016	11:13:35	052	36.788590	-75.494207	4	1	Cownose ray	1	90°	50
21-Oct-2016	13:45:21	080	36.905680	-75.699652	6	1	Cownose ray	1	90°	15
21-Oct-2016	14:20:53	081	36.962432	-75.671170	7	1	Cownose ray	2	90°	40
21-Oct-2016	15:14:39	102	37.260251	-75.628868	12	1	Cownose ray	2	90°	10
10-May-2016	11:26:25	004	36.907046	-75.264649	6	3	Ocean sunfish	2	90°	1
27-Jun-2016	10:48:21	029	36.612420	-75.316663	1	1	Cobia	2	90°	2
27-Jun-2016	11:18:49	046	36.669455	-75.332719	2	1	Ocean sunfish	2	90°	1
27-Jun-2016	13:58:19	099	36.787067	-75.113440	4	1	Ocean sunfish	2	80°	1

Commercial, military and other vessel sightings in the coastal VACAPES survey area from January through December 2016

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
29-Jan-2016	14:09:17	003	36.545114	-75.725288	0	3	4	90°	2	Tug and barge
29-Jan-2016	14:19:03	004	36.551618	-75.266583	0	3	5	45°	1	Cargo vessel
29-Jan-2016	14:26:10	007	36.613523	-75.215799	1	4	3	90°	1	Cargo vessel
29-Jan-2016	14:30:19	008	36.612208	-75.369543	1	4	3	70°	1	Cargo vessel
29-Jan-2016	14:38:54	008	36.609383	-75.668742	1	4	3	45°	1	Tug and barge
29-Jan-2016	14:58:49	012	36.671834	-75.316415	2	4	2	45°	1	Cargo vessel
29-Jan-2016	15:06:36	015	36.722796	-75.221127	3	4	4	10°	1	Cargo vessel
29-Jan-2016	15:13:53	016	36.724075	-75.490147	3	4	4	90°	1	Car carrier
30-Jan-2016	15:06:50	014	37.030932	-75.336627	8	3	3	90°	1	Commercial fishing vessel
30-Jan-2016	15:57:46	020	36.834789	-75.327323	5	3	3	90°	1	Cargo vessel
2-Feb-2016	9:18:19	003	36.550342	-75.546003	0	3	4	100°	1	Cargo vessel
2-Feb-2016	10:30:27	017	36.668979	-75.605756	2	3	3	90°	1	Cargo vessel
2-Feb-2016	10:54:59	013	36.726223	-75.597602	3	3	3	90°	1	Cargo vessel
2-Feb-2016	10:58:33	014	36.725536	-75.745824	3	3	3	90°	1	Cargo vessel
2-Feb-2016	11:06:25	027	36.786705	-75.867957	4	3	3	90°	1	Cargo vessel
2-Feb-2016	11:07:07	029	36.786581	-75.839525	4	3	3	90°	1	Tug and barge
2-Feb-2016	11:09:03	030	36.786830	-75.760224	4	3	2	45°	1	Cargo vessel
2-Feb-2016	11:15:02	033	36.787015	-75.513755	4	3	3	30°	1	Cargo vessel
2-Feb-2016	11:15:35	034	36.786982	-75.490979	4	3	4	75°	1	Cargo vessel
2-Feb-2016	11:30:29	020	36.836709	-75.355089	5	3	3	90°	1	Commercial fishing vessel
2-Feb-2016	11:32:02	037	36.837492	-75.418994	5	3	3	30°	1	Cargo vessel
2-Feb-2016	11:32:46	021	36.837925	-75.449731	5	3	4	90°	1	Cargo vessel
2-Feb-2016	11:37:26	038	36.839691	-75.644464	5	3	3	45°	1	Cargo vessel
2-Feb-2016	11:37:52	039	36.839909	-75.663066	5	3	3	45°	1	Barge
2-Feb-2016	11:38:25	040	36.840112	-75.685648	5	3	3	45°	1	Cargo vessel
2-Feb-2016	13:37:18	045	36.905549	-75.957367	6	3	3	135°	1	Cargo vessel
2-Feb-2016	13:39:39	026	36.903934	-75.858272	6	3	3	90°	1	Cargo vessel
2-Feb-2016	13:41:12	027	36.904129	-75.794417	6	3	4	90°	1	Cargo vessel
2-Feb-2016	13:43:03	046	36.904307	-75.717943	6	3	3	75°	1	Tug and barge
2-Feb-2016	13:44:38	028	36.904350	-75.652255	6	3	3	80°	1	Cargo vessel
2-Feb-2016	13:46:06	047	36.904434	-75.590385	6	3	4	80°	1	Cargo vessel
2-Feb-2016	13:48:54	048	36.904079	-75.473478	6	3	2	15°	1	Cargo vessel
2-Feb-2016	13:49:39	049	36.904120	-75.441861	6	3	3	15°	1	Cargo vessel
2-Feb-2016	14:00:55	052	36.966873	-75.263731	7	3	3	60°	1	Cargo vessel
2-Feb-2016	14:03:42	053	36.966235	-75.374153	7	3	3	45°	1	Cargo vessel
2-Feb-2016	14:41:14	058	36.964096	-75.623628	7	3	3	50°	1	Cargo vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
2-Feb-2016	14:42:16	059	36.963601	-75.666373	7	3	3	45°	1	Cargo vessel
2-Feb-2016	14:42:31	060	36.963516	-75.676414	7	3	3	45°	1	Cargo vessel
2-Feb-2016	14:46:33	061	36.961852	-75.840269	7	3	3	30°	1	Cargo vessel
2-Feb-2016	14:57:36	064	37.023941	-75.751369	8	2	3	35°	1	Cargo vessel
2-Feb-2016	14:58:27	065	37.024046	-75.715997	8	2	3	15°	1	Cargo vessel
2-Feb-2016	15:15:48	068	37.087445	-75.224798	9	2	4	45°	1	Cargo vessel
2-Feb-2016	15:16:18	069	37.087520	-75.244824	9	2	4	45°	1	Cargo vessel
2-Feb-2016	15:20:07	070	37.087609	-75.402722	9	2	4	45°	1	Cargo vessel
2-Feb-2016	15:24:08	071	37.087834	-75.571815	9	2	3	60°	1	Cargo vessel
2-Feb-2016	15:26:27	072	37.087317	-75.666197	9	2	3	100°	1	Cargo vessel
2-Feb-2016	15:26:56	073	37.087269	-75.685326	9	2	4	45°	1	Cargo vessel
22-Feb-2016	10:26:39	027	37.084703	-75.177949	9	4	2	90°	1	Cargo vessel
22-Feb-2016	13:23:04	004	37.207624	-75.394118	11	3	3	30°	1	Cargo vessel
22-Feb-2016	13:35:08	005	37.146427	-75.296102	10	3	3	90°	1	Cargo vessel
22-Feb-2016	13:37:42	007	37.145484	-75.399817	10	3	3	60°	1	Cargo vessel
22-Feb-2016	14:27:05	014	36.967743	-75.459584	7	3	2	15°	1	Cargo vessel
22-Feb-2016	14:28:33	015	36.967794	-75.519760	7	3	3	30°	1	Cargo vessel
22-Feb-2016	14:33:14	016	36.967768	-75.710822	7	3	3	30°	1	Cargo vessel
22-Feb-2016	14:44:02	014	36.903931	-75.899111	6	3	3	90°	1	Cargo vessel
22-Feb-2016	14:47:14	020	36.907377	-75.784810	6	3	3	15°	1	Cargo vessel
22-Feb-2016	14:53:33	021	36.914844	-75.561910	6	3	3	30°	1	Cargo vessel
22-Feb-2016	15:07:34	024	36.847626	-75.184778	5	3	3	90°	1	Cargo vessel
22-Feb-2016	15:16:01	026	36.846103	-75.538207	5	3	3	15°	1	Cargo vessel
22-Feb-2016	15:18:28	027	36.845148	-75.639755	5	3	3	15°	1	Cargo vessel
22-Feb-2016	15:27:05	030	36.787874	-75.874126	4	3	3	10°	1	Cargo vessel
22-Feb-2016	15:32:54	032	36.789000	-75.671619	4	3	3	90°	1	Cargo vessel
22-Feb-2016	15:34:42	033	36.789509	-75.607688	4	3	4	45°	1	Cargo vessel
22-Feb-2016	15:40:40	020	36.790550	-75.394547	4	3	4	60°	1	Cargo vessel
22-Feb-2016	15:41:11	021	36.790571	-75.376129	4	3	3	45°	1	Cargo vessel
22-Feb-2016	15:46:20	023	36.791175	-75.195207	4	3	3	70°	1	Tanker
22-Feb-2016	16:01:54	026	36.726467	-75.666610	3	3	3	45°	1	Cargo vessel
22-Feb-2016	16:08:20	039	36.675541	-75.785949	2	3	3	45°	1	Cargo vessel
22-Feb-2016	16:15:21	040	36.671467	-75.543119	2	3	3	60°	1	Cargo vessel
22-Feb-2016	16:25:28	031	36.672834	-75.183884	2	3	3	90°	1	Tanker
22-Feb-2016	16:37:12	034	36.609608	-75.525548	1	3	3	90°	1	Cargo vessel
17-Mar-2016	10:17:34	003	37.322722	-75.545744	13	2	4	115°	3	Tug and barge
17-Mar-2016	10:55:51	009	37.260543	-75.533644	12	2	3	90°	2	Cargo vessel
17-Mar-2016	10:55:51	009	37.260543	-75.533644	12	2	3	90°	1	Tug
17-Mar-2016	13:52:43	019	37.205195	-75.046997	11	2	3	90°	1	Cargo vessel
17-Mar-2016	14:38:35	034	37.087892	-75.157189	9	2	3	90°	1	Cargo vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
17-Mar-2016	14:47:48	041	37.024187	-75.157699	8	2	4	60°	1	Cargo vessel
17-Mar-2016	15:19:30	050	36.968783	-75.884302	7	2	3	90°	2	Tug and barge
17-Mar-2016	15:35:56	056	36.969397	-75.376222	7	2	3	90°	1	Cargo vessel
17-Mar-2016	16:11:47	071	36.904945	-75.514014	6	2	4	90°	1	Cargo vessel
17-Mar-2016	16:14:02	072	36.904709	-75.607424	6	2	4	90°	1	Cargo vessel
17-Mar-2016	16:27:43	073	36.903498	-75.938731	6	2	3	80°	1	Cargo vessel
17-Mar-2016	16:39:19	080	36.846785	-75.608140	5	2	4	90°	1	Cargo vessel
17-Mar-2016	17:15:40	104	36.787144	-75.440643	4	2	4	90°	1	Cargo vessel
17-Mar-2016	17:15:51	087	36.787189	-75.447552	4	3	4	110°	1	Cargo vessel
17-Mar-2016	17:19:02	105	36.786805	-75.576282	4	2	4	90°	1	Cargo vessel
17-Mar-2016	17:21:31	106	36.786591	-75.676714	4	2	3	90°	1	Cargo vessel
18-Mar-2016	9:46:18	005	36.905583	-75.870116	6	2	3	90°	2	Tug and barge
18-Mar-2016	9:48:04	006	36.906006	-75.803581	6	2	2	110°	1	Commercial fishing vessel
18-Mar-2016	9:48:32	008	36.906093	-75.785710	6	2	3	90°	1	Commercial fishing vessel
18-Mar-2016	9:59:59	013	36.906869	-75.434070	6	2	3	90°	1	Cargo vessel
18-Mar-2016	10:06:33	006	36.906300	-75.183888	6	2	3	15°	1	Cargo vessel
18-Mar-2016	10:09:02	007	36.906120	-75.089744	6	2	4	45°	1	Cargo vessel
18-Mar-2016	10:12:50	010	36.968305	-75.062945	7	2	3	45°	1	Cargo vessel
18-Mar-2016	10:13:48	016	36.967280	-75.100805	7	2	3	90°	1	Cargo vessel
18-Mar-2016	10:13:50	017	36.967317	-75.102267	7	2	3	90°	1	Cargo vessel
18-Mar-2016	10:28:59	022	36.966835	-75.250309	7	2	3	90°	1	Cargo vessel
18-Mar-2016	10:32:42	018	36.967316	-75.402846	7	2	3	90°	1	Cargo vessel
18-Mar-2016	11:23:38	028	37.026159	-75.148326	8	2	4	30°	1	Cargo vessel
18-Mar-2016	11:32:07	031	37.085938	-75.182374	9	2	4	45°	1	Cargo vessel
18-Mar-2016	11:42:14	033	37.086034	-75.565732	9	2	4	40°	1	Cargo vessel
18-Mar-2016	14:05:19	051	37.142928	-75.626229	10	2	3	90°	2	Tug and barge
18-Mar-2016	14:05:28	056	37.142914	-75.620343	10	2	3	70°	2	Tug and barge
18-Mar-2016	17:30:17	083	36.550947	-75.446836	0	2	3	90°	1	Cargo vessel
20-Apr-2016	9:59:14	003	36.553540	-75.504167	0	4	3	45°	1	Supply vessel
20-Apr-2016	10:01:03	004	36.553808	-75.429423	0	4	3	70°	1	Cargo vessel
20-Apr-2016	10:05:00	005	36.554344	-75.263042	0	4	2	40°	1	Cargo vessel
20-Apr-2016	10:10:31	009	36.610670	-75.186998	1	3	3	90°	1	Cargo vessel
20-Apr-2016	10:10:54	010	36.610355	-75.202920	1	3	4	60°	1	Cargo vessel
20-Apr-2016	10:12:13	009	36.611407	-75.255880	1	4	4	90°	1	Tanker
20-Apr-2016	10:24:43	010	36.606498	-75.764488	1	4	4	90°	1	Cargo vessel
20-Apr-2016	10:37:53	016	36.672188	-75.580662	2	3	4	45°	1	Cargo vessel
20-Apr-2016	10:40:23	018	36.672509	-75.485575	2	3	3	45°	1	Cargo vessel
20-Apr-2016	10:41:14	013	36.672538	-75.452879	2	4	4	90°	1	Supply vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
20-Apr-2016	10:44:56	019	36.673266	-75.308578	2	3	3	15°	1	Cargo vessel
20-Apr-2016	10:53:18	016	36.729419	-75.248109	3	4	4	100°	1	Tanker
20-Apr-2016	10:57:38	018	36.728142	-75.417398	3	4	4	90°	1	Cargo vessel
20-Apr-2016	11:13:10	027	36.787978	-75.903387	4	3	3	45°	1	Cargo vessel
20-Apr-2016	11:19:16	028	36.789889	-75.670729	4	3	3	15°	1	Cargo vessel
20-Apr-2016	11:30:59	030	36.791752	-75.220842	4	3	3	10°	1	Cargo vessel
20-Apr-2016	11:43:56	035	36.845755	-75.533420	5	3	2	10°	1	Cargo vessel
20-Apr-2016	11:44:27	036	36.845389	-75.556267	5	3	3	30°	1	Cargo vessel
20-Apr-2016	13:57:49	032	36.905454	-75.898273	6	2	3	50°	1	Cargo vessel
20-Apr-2016	13:58:14	033	36.905663	-75.883326	6	2	4	90°	1	Cargo vessel
20-Apr-2016	14:00:15	045	36.906232	-75.810946	6	3	3	90°	3	Tug and barge
20-Apr-2016	14:37:54	050	36.967080	-75.915723	7	2	3	90°	1	Cargo vessel
21-Apr-2016	13:45:37	004	36.843546	-75.902447	5	3	3	90°	1	Cargo vessel
21-Apr-2016	13:46:08	005	36.843999	-75.880089	5	3	3	90°	1	Cargo vessel
21-Apr-2016	13:49:25	003	36.845736	-75.744542	5	3	4	120°	1	Cargo vessel
21-Apr-2016	13:49:40	004	36.845864	-75.734933	5	3	3	80°	1	Cargo vessel
21-Apr-2016	13:51:57	005	36.846755	-75.647515	5	3	3	75°	1	Cargo vessel
21-Apr-2016	13:58:25	006	36.849340	-75.394507	5	3	4	110°	1	Cargo vessel
21-Apr-2016	14:04:10	007	36.850830	-75.169565	5	3	3	90°	1	Cargo vessel
21-Apr-2016	14:14:29	017	36.906869	-75.466815	6	3	4	20°	2	Cargo vessel
21-Apr-2016	14:21:15	018	36.904926	-75.751690	6	3	3	45°	1	Cargo vessel
21-Apr-2016	14:24:02	012	36.904187	-75.868868	6	3	3	80°	1	Tanker
21-Apr-2016	14:24:34	019	36.903908	-75.891265	6	3	1	90°	1	Cargo vessel
21-Apr-2016	14:25:28	013	36.903378	-75.928747	6	3	3	90°	1	Supply vessel
21-Apr-2016	14:25:51	014	36.903244	-75.944774	6	3	3	80°	1	Tanker
21-Apr-2016	15:01:30	027	37.026465	-75.541131	8	3	4	30°	1	Cargo vessel
21-Apr-2016	15:05:03	028	37.025254	-75.677175	8	3	4	45°	1	Cargo vessel
21-Apr-2016	15:05:43	029	37.025054	-75.702873	8	3	3	15°	1	Tug
21-Apr-2016	15:06:43	030	37.024609	-75.740908	8	3	4	30°	1	Cargo vessel
21-Apr-2016	15:08:11	031	37.024133	-75.797538	8	3	4	15°	1	Cargo vessel
21-Apr-2016	15:11:59	033	37.022358	-75.947932	8	3	4	30°	1	Cargo vessel
21-Apr-2016	15:19:43	024	37.088435	-75.752462	9	4	4	85°	1	Tanker
21-Apr-2016	15:49:05	039	37.142550	-75.656016	10	3	3	45°	1	Tug
10-May-2016	11:10:23	004	36.906109	-75.818451	6	2	4	90°	1	Cargo vessel
10-May-2016	11:13:14	005	36.906117	-75.721850	6	2	4	90°	1	Cargo vessel
10-May-2016	11:16:35	006	36.906539	-75.608367	6	2	4	90°	1	Cargo vessel
10-May-2016	11:18:31	007	36.906771	-75.542306	6	2	3	90°	1	Cargo vessel
10-May-2016	11:45:18	010	36.907001	-75.050977	6	2	3	45°	1	Cargo vessel
27-Jun-2016	11:25:28	061	36.669296	-75.077594	2	1	4	90°	1	Tug
27-Jun-2016	11:30:04	053	36.726222	-75.096214	3	1	3	90°	1	Cargo vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
27-Jun-2016	13:44:57	088	36.787396	-75.631210	4	2	3	90°	2	Cargo vessel
27-Jun-2016	14:22:28	117	36.844824	-75.756676	5	2	3	90°	1	Cargo vessel
27-Jun-2016	14:33:58	114	36.904439	-75.804216	6	2	4	90°	1	Cargo vessel
27-Jun-2016	14:38:45	116	36.905075	-75.620192	6	2	4	90°	1	Cargo vessel
27-Jun-2016	14:52:50	140	36.904719	-75.079972	6	2	3	90°	1	Cargo vessel
27-Jun-2016	14:55:56	132	36.968167	-75.054997	7	2	4	90°	1	Cargo vessel
27-Jun-2016	15:30:04	152	36.961252	-75.899808	7	2	2	90°	1	Tanker
27-Jun-2016	15:36:18	147	37.023385	-75.886658	8	2	4	90°	1	Cargo vessel
14-Jul-2016	14:35:15	074	36.907133	-75.556010	6	2	4	90°	1	Cargo vessel
14-Jul-2016	14:37:04	076	36.906615	-75.628607	6	2	3	90°	1	Cargo vessel
14-Jul-2016	14:37:27	077	36.906470	-75.644216	6	2	2	90°	1	Cargo vessel
14-Jul-2016	14:43:27	089	36.904716	-75.883661	6	2	2	90°	1	Cargo vessel
14-Jul-2016	14:51:33	095	36.844195	-75.808865	5	2	2	90°	1	Cargo vessel
14-Jul-2016	14:57:55	098	36.847061	-75.565807	5	2	4	90°	1	Cargo vessel
14-Jul-2016	15:24:09	064	36.789096	-75.548525	4	3	4	90°	1	Cargo vessel
14-Jul-2016	15:27:00	066	36.788482	-75.636110	4	2	4	90°	1	Tanker
14-Jul-2016	15:32:00	069	36.787564	-75.788259	4	2	3	90°	1	Cargo vessel
14-Jul-2016	16:15:16	077	36.670111	-75.596461	2	3	4	120°	1	Cargo vessel
8-Aug-2016	10:34:36	047	37.143253	-75.587427	10	1	3	30°	1	Cargo vessel
8-Aug-2016	10:39:36	050	37.142695	-75.761608	10	1	4	90°	1	Cargo vessel
8-Aug-2016	10:53:00	061	37.085905	-75.668056	9	1	3	90°	1	Cargo vessel
8-Aug-2016	11:10:45	060	37.025246	-75.188738	8	1	4	120°	2	Cargo vessel
8-Aug-2016	11:10:53	061	37.025394	-75.193480	8	1	3	100°	1	Cargo vessel
8-Aug-2016	11:11:23	062	37.025653	-75.212440	8	1	4	75°	1	Cargo vessel
8-Aug-2016	11:12:16	063	37.025806	-75.245346	8	1	4	75°	1	Cargo vessel
8-Aug-2016	11:12:35	064	37.025844	-75.257566	8	1	4	45°	1	Cargo vessel
8-Aug-2016	11:16:27	065	37.025760	-75.398930	8	1	4	45°	1	Cargo vessel
8-Aug-2016	11:17:47	067	37.025721	-75.448095	8	1	4	45°	1	Cargo vessel
8-Aug-2016	11:20:39	069	37.025618	-75.551851	8	1	4	30°	1	Cargo vessel
8-Aug-2016	11:23:46	072	37.025431	-75.665879	8	2	4	90°	1	Cargo vessel
8-Aug-2016	11:26:16	074	37.025159	-75.757822	8	1	3	45°	1	Cargo vessel
8-Aug-2016	11:27:13	075	37.025148	-75.793027	8	1	4	50°	1	Cargo vessel
8-Aug-2016	11:27:31	076	37.025109	-75.803983	8	1	3	50°	1	Cargo vessel
8-Aug-2016	11:28:24	077	37.025076	-75.837060	8	1	3	90°	1	Cargo vessel
8-Aug-2016	11:28:37	078	37.025040	-75.845330	8	1	3	45°	1	Cargo vessel
8-Aug-2016	11:28:55	079	37.025014	-75.856306	8	1	3	45°	1	Cargo vessel
8-Aug-2016	11:29:07	080	37.024987	-75.864000	8	1	3	15°	1	Cargo vessel
8-Aug-2016	11:30:48	081	37.024706	-75.926390	8	1	4	10°	1	Cargo vessel
8-Aug-2016	11:39:37	087	36.967263	-75.804578	7	1	3	45°	1	Cargo vessel
8-Aug-2016	11:46:45	085	36.967145	-75.555627	7	2	4	90°	1	Cargo vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
8-Aug-2016	11:52:49	088	36.966609	-75.333564	7	2	3	90°	1	Cargo vessel
8-Aug-2016	11:57:17	090	36.965423	-75.170597	7	1	4	10°	1	Cargo vessel
8-Aug-2016	12:00:35	093	36.904476	-75.189719	6	1	3	30°	1	Cargo vessel
8-Aug-2016	12:00:47	094	36.904982	-75.197550	6	1	3	15°	1	Cargo vessel
8-Aug-2016	12:04:04	095	36.905695	-75.322792	6	1	4	30°	1	Cargo vessel
8-Aug-2016	12:04:56	096	36.905774	-75.356009	6	1	4	45°	1	Cargo vessel
8-Aug-2016	12:05:12	097	36.905818	-75.366622	6	1	3	30°	1	Cargo vessel
8-Aug-2016	12:05:28	092	36.905833	-75.376688	6	2	3	90°	1	Cargo vessel
8-Aug-2016	12:07:47	098	36.905823	-75.465662	6	1	0	90°	1	Cargo vessel
8-Aug-2016	12:08:25	100	36.905875	-75.490051	6	1	3	75°	1	Cargo vessel
8-Aug-2016	12:13:46	102	36.905737	-75.694906	6	1	3	45°	1	Cargo vessel
8-Aug-2016	12:17:51	106	36.905509	-75.850451	6	1	2	5°	1	Cargo vessel
8-Aug-2016	14:02:15	115	36.839372	-75.905671	5	1	3	90°	1	Cargo vessel
8-Aug-2016	14:04:05	119	36.840369	-75.842446	5	1	4	30°	1	Cargo vessel
8-Aug-2016	14:04:39	120	36.840135	-75.822410	5	1	4	90°	1	Cargo vessel
8-Aug-2016	14:05:57	121	36.839812	-75.776396	5	1	2	15°	1	Cargo vessel
8-Aug-2016	14:12:20	109	36.837436	-75.554490	5	1	2	90°	1	Cargo vessel
8-Aug-2016	14:15:10	125	36.836245	-75.453151	5	1	3	5°	1	Cargo vessel
8-Aug-2016	14:16:49	126	36.835561	-75.393801	5	1	4	60°	1	Cargo vessel
8-Aug-2016	14:16:58	127	36.835483	-75.388712	5	1	4	30°	1	Cargo vessel
8-Aug-2016	14:29:41	133	36.788806	-75.322996	4	1	4	130°	1	Cargo vessel
8-Aug-2016	14:30:08	115	36.788838	-75.339784	4	1	4	90°	1	Cargo vessel
8-Aug-2016	14:30:36	134	36.788847	-75.356866	4	1	4	160°	1	Cargo vessel
8-Aug-2016	14:35:51	117	36.788869	-75.553590	4	1	4	90°	1	Cargo vessel
8-Aug-2016	14:41:35	120	36.788140	-75.768178	4	1	3	90°	1	Cargo vessel
8-Aug-2016	14:50:30	147	36.722420	-75.883679	3	1	3	30°	1	Cargo vessel
8-Aug-2016	14:50:49	148	36.722657	-75.872874	3	1	4	45°	1	Cargo vessel
8-Aug-2016	14:51:23	149	36.722586	-75.853835	3	1	4	15°	1	Cargo vessel
8-Aug-2016	14:56:42	150	36.724202	-75.672011	3	1	4	30°	1	Cargo vessel
8-Aug-2016	14:57:16	151	36.724239	-75.653284	3	1	4	45°	1	Cargo vessel
8-Aug-2016	14:57:43	152	36.724313	-75.638268	3	1	4	45°	1	Cargo vessel
8-Aug-2016	15:05:50	156	36.724578	-75.367633	3	1	3	90°	1	Cargo vessel
8-Aug-2016	15:16:36	163	36.670980	-75.242697	2	2	3	100°	1	Cargo vessel
8-Aug-2016	15:40:39	172	36.606110	-75.719407	1	2	4	45°	2	Cargo vessel
8-Aug-2016	15:53:58	175	36.607207	-75.269241	1	2	3	30°	1	Cargo vessel
13-Sep-2016	9:08:39	007	36.552213	-75.500411	0	3	4	45°	1	Cargo vessel
13-Sep-2016	9:42:19	014	36.670103	-75.871097	2	3	4	120°	1	Cargo vessel
13-Sep-2016	9:44:05	016	36.669372	-75.805328	2	3	4	80°	1	Cargo vessel
13-Sep-2016	9:45:55	017	36.669852	-75.735117	2	3	3	90°	1	Cargo vessel
13-Sep-2016	9:49:06	021	36.670338	-75.614734	2	3	4	45°	1	Cargo vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
13-Sep-2016	9:57:21	022	36.670822	-75.308295	2	3	4	90°	1	Cargo vessel
13-Sep-2016	9:58:50	023	36.670671	-75.258137	2	3	4	30°	1	Cargo vessel
13-Sep-2016	10:04:49	026	36.722526	-75.188887	3	3	4	135°	1	Cargo vessel
13-Sep-2016	10:09:07	013	36.724652	-75.346754	3	3	3	60°	1	Cargo vessel
13-Sep-2016	10:13:27	027	36.724650	-75.508674	3	3	2	45°	1	Cargo vessel
13-Sep-2016	10:15:18	014	36.724588	-75.579062	3	3	4	60°	1	Cargo vessel
13-Sep-2016	10:29:39	033	36.787320	-75.849432	4	3	3	90°	1	Cargo vessel
13-Sep-2016	10:31:38	037	36.787956	-75.769397	4	3	3	45°	1	Cargo vessel
13-Sep-2016	10:33:57	038	36.788343	-75.677314	4	3	4	75°	1	Cargo vessel
13-Sep-2016	10:34:10	039	36.788091	-75.668276	4	3	4	60°	1	Cargo vessel
13-Sep-2016	10:35:19	040	36.788179	-75.622784	4	3	3	45°	1	Cargo vessel
13-Sep-2016	10:42:09	041	36.788555	-75.352398	4	3	3	45°	1	Cargo vessel
13-Sep-2016	10:50:00	044	36.842278	-75.181001	5	3	3	120°	1	Cargo vessel
13-Sep-2016	10:50:51	026	36.842460	-75.215326	5	3	1	90°	1	Tanker
13-Sep-2016	10:51:15	045	36.842755	-75.231634	5	3	3	45°	1	Cargo vessel
13-Sep-2016	10:52:20	046	36.842747	-75.273465	5	3	3	15°	1	Cargo vessel
13-Sep-2016	10:53:34	047	36.842561	-75.321880	5	3	4	90°	1	Cargo vessel
13-Sep-2016	10:59:21	048	36.842448	-75.552380	5	3	3	30°	1	Cargo vessel
13-Sep-2016	12:38:33	059	36.905786	-75.736901	6	3	3	45°	1	Cargo vessel
13-Sep-2016	12:40:09	062	36.906009	-75.678826	6	3	3	45°	1	Cargo vessel
13-Sep-2016	12:41:10	063	36.905751	-75.641838	6	3	4	60°	1	Cargo vessel
13-Sep-2016	13:05:16	070	36.964537	-75.471965	7	3	4	90°	1	Cargo vessel
13-Sep-2016	13:05:23	040	36.964625	-75.476433	7	3	4	90°	1	Tanker
13-Sep-2016	13:05:45	071	36.964439	-75.490287	7	3	4	45°	1	Cargo vessel
13-Sep-2016	13:07:00	072	36.963881	-75.537897	7	3	3	45°	1	Cargo vessel
13-Sep-2016	13:14:14	074	36.961221	-75.818439	7	3	2	60°	1	Cargo vessel
21-Oct-2016	9:16:39	004	36.551092	-75.762200	0	1	4	90°	1	Cargo vessel
21-Oct-2016	9:17:20	005	36.551229	-75.734030	0	1	4	90°	1	Cargo vessel
21-Oct-2016	9:21:16	007	36.551815	-75.574105	0	1	4	80°	1	Cargo vessel
21-Oct-2016	9:44:52	008	36.607174	-75.063364	1	1	3	90°	1	Tanker
21-Oct-2016	9:54:05	016	36.607702	-75.418724	1	1	3	45°	1	Cargo vessel
21-Oct-2016	10:08:23	019	36.668970	-75.864239	2	1	3	90°	1	Cargo vessel
21-Oct-2016	10:08:44	020	36.669187	-75.849243	2	1	3	90°	1	Cargo vessel
21-Oct-2016	10:15:11	022	36.670464	-75.597282	2	1	4	90°	1	Cargo vessel
21-Oct-2016	10:25:38	029	36.670677	-75.285154	2	1	3	45°	1	Cargo vessel
21-Oct-2016	10:43:13	030	36.725374	-75.264135	3	2	3	90°	1	Tanker
21-Oct-2016	10:49:33	041	36.724678	-75.509906	3	1	3	45°	1	Cargo vessel
21-Oct-2016	10:56:11	040	36.724237	-75.763251	3	2	4	80°	1	Cargo vessel
21-Oct-2016	11:03:16	044	36.787373	-75.911973	4	1	3	100°	1	Cargo vessel
21-Oct-2016	11:06:32	049	36.788068	-75.779322	4	1	3	70°	1	Cargo vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
21-Oct-2016	11:12:50	051	36.788761	-75.524821	4	1	4	90°	1	Cargo vessel
21-Oct-2016	11:15:54	045	36.788769	-75.399686	4	1	2	90°	1	Tanker
21-Oct-2016	11:21:29	056	36.788843	-75.170050	4	1	4	45°	1	Cargo vessel
21-Oct-2016	11:32:49	063	36.848026	-75.252869	5	1	3	30°	1	Cargo vessel
21-Oct-2016	11:33:24	064	36.847880	-75.274015	5	1	4	40°	1	Cargo vessel
21-Oct-2016	11:43:46	067	36.844522	-75.649632	5	1	3	60°	1	Cargo vessel
21-Oct-2016	11:44:41	070	36.844379	-75.683671	5	1	3	10°	1	Cargo vessel
21-Oct-2016	14:24:14	083	36.961102	-75.799210	7	1	4	90°	1	Tanker
7-Nov-2016	9:16:18	005	37.141829	-75.135929	10	4	1	90°	1	Cargo vessel
7-Nov-2016	9:23:11	007	37.085606	-75.168505	9	4	4	90°	1	Cargo vessel
7-Nov-2016	9:39:47	008	37.086270	-75.864755	9	4	4	90°	1	Cargo vessel
7-Nov-2016	9:56:36	012	37.024665	-75.413549	8	4	4	45°	1	Cargo vessel
7-Nov-2016	10:08:26	015	36.967891	-75.062233	7	4	3	70°	1	Cargo vessel
7-Nov-2016	10:25:24	016	36.967394	-75.783076	7	4	4	15°	1	Cargo vessel
7-Nov-2016	10:41:34	019	36.905927	-75.602295	6	4	4	45°	1	Cargo vessel
7-Nov-2016	10:46:49	020	36.905729	-75.393816	6	4	4	90°	1	Cargo vessel
7-Nov-2016	11:04:05	022	36.845962	-75.314529	5	4	3	45°	1	Cargo vessel
7-Nov-2016	11:09:13	023	36.844263	-75.531158	5	4	4	90°	1	Cargo vessel
7-Nov-2016	11:17:18	028	36.842337	-75.870375	5	3	3	90°	1	Cargo vessel
10-Dec-2016	11:14:08	009	37.264584	-75.305097	12	3	4	90°	1	Cargo vessel
10-Dec-2016	15:40:33	035	36.906439	-75.633002	6	3	4	90°	1	Cargo vessel
10-Dec-2016	16:00:25	035	36.846583	-75.645060	5	3	3	90°	1	Cargo vessel
10-Dec-2016	16:09:55	036	36.849983	-75.255652	5	3	4	90°	1	Cargo vessel
10-Dec-2016	16:18:14	042	36.790160	-75.262232	4	3	2	130°	1	Tanker
10-Dec-2016	16:28:14	039	36.787465	-75.626693	4	3	2	90°	1	Cargo vessel
21-Dec-2016	9:48:41	005	36.552114	-75.523952	0	1	2	30°	1	Cargo vessel
21-Dec-2016	9:49:32	003	36.552214	-75.490970	0	2	3	90°	1	Tanker
21-Dec-2016	9:54:36	006	36.552913	-75.296111	0	1	4	80°	1	Cargo vessel
21-Dec-2016	10:14:40	009	36.606577	-75.453937	1	2	4	120°	1	Cargo vessel
21-Dec-2016	10:17:04	008	36.606366	-75.545712	1	2	3	60°	1	Tanker
21-Dec-2016	10:32:33	013	36.670410	-75.789134	2	1	4	45°	1	Cargo vessel
21-Dec-2016	10:34:58	014	36.670653	-75.702843	2	1	4	45°	1	Cargo vessel
21-Dec-2016	10:35:27	015	36.670761	-75.684818	2	1	2	15°	1	Cargo vessel
21-Dec-2016	10:43:13	016	36.671347	-75.390588	2	2	3	100°	1	Cargo vessel
21-Dec-2016	10:44:53	017	36.671540	-75.325717	2	2	4	90°	1	Cargo vessel
21-Dec-2016	10:47:27	018	36.671457	-75.227635	2	3	4	30°	1	Cargo vessel
21-Dec-2016	11:11:28	016	36.724461	-75.709715	3	2	4	90°	1	Tanker
21-Dec-2016	11:19:36	023	36.785587	-75.907871	4	1	3	45°	1	Cargo vessel
21-Dec-2016	11:21:56	024	36.787478	-75.820921	4	1	3	15°	1	Cargo vessel
21-Dec-2016	11:24:02	025	36.787868	-75.742839	4	1	2	25°	1	Cargo vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
21-Dec-2016	11:24:27	026	36.787829	-75.726595	4	1	3	30°	1	Cargo vessel
21-Dec-2016	11:26:12	028	36.787949	-75.659360	4	1	4	30°	1	Cargo vessel
21-Dec-2016	11:33:01	030	36.788414	-75.390775	4	2	3	45°	1	Cargo vessel
21-Dec-2016	11:36:56	022	36.788404	-75.238403	4	2	3	90°	1	Tanker
21-Dec-2016	11:41:46	032	36.787909	-75.047184	4	2	3	90°	1	Cargo vessel
21-Dec-2016	11:46:06	025	36.849513	-75.103107	5	2	3	60°	1	Cargo vessel
21-Dec-2016	11:48:21	034	36.848802	-75.191135	5	2	3	45°	1	Cargo vessel
21-Dec-2016	11:54:24	026	36.847307	-75.426835	5	2	3	80°	1	Cargo vessel
21-Dec-2016	11:56:07	035	36.846597	-75.494532	5	1	1	75°	2	Cargo vessel
21-Dec-2016	11:58:55	036	36.845312	-75.605593	5	1	3	30°	1	Cargo vessel
21-Dec-2016	11:58:55	027	36.845439	-75.605571	5	2	3	100°	1	Commercial fishing vessel
21-Dec-2016	12:04:34	029	36.843152	-75.834310	5	2	3	90°	1	Tanker
21-Dec-2016	14:17:39	035	36.904836	-75.930632	6	1	2	45°	1	Cargo vessel
21-Dec-2016	14:17:58	044	36.905351	-75.917753	6	1	2	45°	1	Cargo vessel
21-Dec-2016	14:18:42	036	36.905620	-75.889616	6	1	2	80°	1	Cargo vessel
21-Dec-2016	14:18:59	045	36.905618	-75.878283	6	1	3	45°	1	Cargo vessel
21-Dec-2016	14:21:57	038	36.906031	-75.765482	6	1	2	70°	1	Tanker
21-Dec-2016	14:23:05	039	36.906707	-75.722871	6	1	3	90°	1	Cargo vessel
21-Dec-2016	14:29:00	048	36.906812	-75.496148	6	1	4	45°	1	Cargo vessel
21-Dec-2016	14:29:38	042	36.906791	-75.471502	6	1	4	90°	1	Cargo vessel
21-Dec-2016	14:49:09	052	36.967138	-75.301459	7	1	3	60°	1	Cargo vessel
21-Dec-2016	14:52:49	054	36.967280	-75.446833	7	1	4	30°	1	Cargo vessel
21-Dec-2016	14:59:53	056	36.967397	-75.730426	7	1	3	15°	1	Cargo vessel
21-Dec-2016	15:11:23	061	37.025167	-75.865200	8	1	3	15°	1	Cargo vessel
21-Dec-2016	15:24:38	064	37.026248	-75.362242	8	1	3	30°	1	Cargo vessel
21-Dec-2016	15:39:02	054	37.086076	-75.183903	9	2	3	90°	1	Cargo vessel
21-Dec-2016	15:45:58	067	37.086279	-75.447045	9	1	4	90°	2	Cargo vessel
21-Dec-2016	15:46:39	068	37.086321	-75.473301	9	1	4	60°	1	Cargo vessel
21-Dec-2016	15:47:21	069	37.086319	-75.499559	9	1	4	75°	1	Cargo vessel
21-Dec-2016	15:54:50	072	37.085880	-75.782577	9	1	3	45°	1	Cargo vessel
21-Dec-2016	15:58:31	073	37.084134	-75.921560	9	1	3	90°	1	Cargo vessel
22-Dec-2016	9:23:55	003	37.323382	-75.367200	13	3	2	90°	1	Cargo vessel
22-Dec-2016	9:42:52	010	37.263674	-75.356962	12	4	3	90°	1	Cargo vessel
22-Dec-2016	10:05:28	014	37.205528	-75.345704	11	3	3	90°	1	Commercial fishing vessel
22-Dec-2016	10:51:12	022	37.087882	-75.477905	9	3	2	90°	1	Commercial fishing vessel
22-Dec-2016	11:16:21	025	37.024437	-75.510123	8	4	3	60°	2	Tug and barge
29-Jan-2016	14:16:17	003	36.550315	-75.388889	0	3	4	45°	1	Military
29-Jan-2016	14:55:12	013	36.670160	-75.479464	2	4	3	90°	1	Military

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
30-Jan-2016	15:01:29	013	37.028841	-75.540290	8	3	3	90°	1	USCG
2-Feb-2016	10:28:22	013	36.669017	-75.688792	2	3	3	90°	1	Military
2-Feb-2016	10:58:53	015	36.725421	-75.759874	3	3	3	90°	1	Military
2-Feb-2016	11:05:03	024	36.788725	-75.924577	4	3	2	120°	1	Military
2-Feb-2016	11:06:44	028	36.786622	-75.854753	4	3	2	90°	1	Military
2-Feb-2016	11:11:09	031	36.787063	-75.674519	4	3	0	90°	1	Military
22-Feb-2016	13:21:10	003	37.207120	-75.463132	11	3	3	45°	1	USCG
22-Feb-2016	14:39:21	017	36.966718	-75.965452	7	3	2	15°	1	Military
22-Feb-2016	14:43:06	013	36.903777	-75.932582	6	3	3	90°	1	Military
22-Feb-2016	15:10:07	025	36.848249	-75.294606	5	3	3	60°	1	Military
22-Feb-2016	15:53:09	036	36.729561	-75.306050	3	3	3	30°	1	Military
22-Feb-2016	16:19:30	041	36.672098	-75.395914	2	3	2	10°	1	Military
22-Feb-2016	16:33:17	044	36.610982	-75.362460	1	3	3	45°	1	Military
17-Mar-2016	16:04:02	065	36.905069	-75.196745	6	2	3	90°	1	Military
17-Mar-2016	17:07:53	085	36.787104	-75.142081	4	2	2	90°	1	Military
18-Mar-2016	9:44:04	004	36.904472	-75.952523	6	2	2	90°	1	USCG
18-Mar-2016	10:01:06	005	36.906878	-75.391468	6	2	3	45°	1	Military
18-Mar-2016	10:30:38	017	36.966940	-75.318132	7	2	3	45°	1	Military
18-Mar-2016	11:19:04	027	37.026102	-75.320861	8	2	3	45°	1	Military
18-Mar-2016	11:44:44	034	37.085692	-75.659379	9	2	4	45°	1	Military
18-Mar-2016	15:54:42	062	36.726508	-75.596864	3	2	4	90°	1	Military
18-Mar-2016	16:37:02	074	36.669206	-75.332872	2	2	4	90°	1	Military
18-Mar-2016	16:39:55	075	36.669109	-75.450296	2	2	3	80°	1	Military
18-Mar-2016	17:29:54	082	36.551111	-75.431990	0	2	4	90°	1	Military
20-Apr-2016	9:53:50	003	36.552336	-75.722862	0	3	4	90°	1	Military
20-Apr-2016	9:57:13	004	36.553076	-75.586665	0	3	4	75°	1	Military
20-Apr-2016	10:03:57	006	36.554177	-75.308345	0	3	4	90°	1	Military
20-Apr-2016	10:12:03	008	36.611443	-75.249101	1	4	3	90°	1	Military
20-Apr-2016	10:31:10	015	36.669860	-75.835952	2	3	3	45°	1	Military
20-Apr-2016	10:39:32	017	36.672321	-75.517904	2	3	3	15°	1	Military
20-Apr-2016	10:55:42	017	36.728770	-75.341019	3	4	3	60°	1	Military
20-Apr-2016	11:04:49	020	36.725433	-75.704234	3	3	3	90°	1	Military
20-Apr-2016	11:12:31	025	36.786837	-75.927694	4	3	2	135°	3	Military
20-Apr-2016	11:12:50	026	36.787817	-75.916121	4	3	3	90°	1	Military
20-Apr-2016	11:17:03	023	36.789122	-75.755419	4	3	3	90°	1	Military
20-Apr-2016	11:24:38	029	36.790822	-75.465264	4	3	1	10°	1	Military
20-Apr-2016	11:38:50	034	36.847710	-75.322136	5	3	3	30°	1	Military
20-Apr-2016	11:49:55	037	36.843051	-75.786898	5	3	4	115°	1	Military
20-Apr-2016	11:51:42	038	36.842061	-75.862261	5	3	3	45°	2	Military
20-Apr-2016	11:52:39	039	36.841633	-75.902669	5	3	3	45°	3	Military

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
20-Apr-2016	14:05:50	035	36.908084	-75.598182	6	3	3	80°	1	Military
20-Apr-2016	14:29:53	049	36.967592	-75.595117	7	2	4	90°	1	Military
20-Apr-2016	14:38:57	051	36.966804	-75.957978	7	2	3	90°	1	Military
21-Apr-2016	13:48:25	009	36.845598	-75.781601	5	3	3	30°	1	Military
21-Apr-2016	13:58:33	011	36.849372	-75.389452	5	3	4	80°	1	Military
21-Apr-2016	14:06:59	014	36.908552	-75.162623	6	3	3	90°	1	Military
21-Apr-2016	14:08:51	015	36.907837	-75.236076	6	3	4	30°	1	Military
21-Apr-2016	14:13:37	016	36.907041	-75.431409	6	3	4	30°	1	Military
21-Apr-2016	14:47:58	024	36.969074	-75.228788	7	3	4	60°	1	Military
10-May-2016	11:07:38	003	36.905928	-75.910687	6	2	4	90°	1	Military
27-Jun-2016	11:09:11	041	36.668968	-75.706461	2	1	3	90°	1	USCG
27-Jun-2016	11:46:36	064	36.726775	-75.613641	3	2	1	90°	1	Military
27-Jun-2016	11:52:08	082	36.725197	-75.830567	3	1	3	90°	1	Military
27-Jun-2016	13:41:39	087	36.786927	-75.760126	4	2	4	90°	1	Military
27-Jun-2016	13:46:04	074	36.787409	-75.587694	4	2	2	90°	1	Military
27-Jun-2016	14:14:34	114	36.848343	-75.439862	5	1	4	90°	1	Military
27-Jun-2016	14:23:22	108	36.844448	-75.791653	5	2	3	90°	1	Military
27-Jun-2016	14:25:07	109	36.843551	-75.859790	5	2	2	90°	1	Military
27-Jun-2016	14:33:26	113	36.904313	-75.824920	6	2	3	90°	1	Military
14-Jul-2016	14:45:01	090	36.903991	-75.948536	6	2	3	130°	1	Military
14-Jul-2016	15:18:57	103	36.789722	-75.387615	4	2	4	90°	1	Military
14-Jul-2016	15:54:07	109	36.730395	-75.332519	3	2	4	90°	1	Military
8-Aug-2016	12:14:47	095	36.905783	-75.734054	6	2	3	90°	1	USCG
8-Aug-2016	14:38:14	119	36.788662	-75.643315	4	1	4	90°	1	Military
13-Sep-2016	9:08:05	006	36.552181	-75.521144	0	3	4	90°	1	Military
13-Sep-2016	9:26:06	006	36.607497	-75.370259	1	3	4	90°	1	Military
13-Sep-2016	10:30:49	035	36.787639	-75.802991	4	3	2	30°	1	Military
13-Sep-2016	11:03:07	028	36.842245	-75.704865	5	3	1	45°	1	Military
13-Sep-2016	12:40:10	035	36.905993	-75.677922	6	3	4	90°	1	Military
13-Sep-2016	13:05:16	070	36.964537	-75.471965	7	3	4	90°	1	Military
21-Oct-2016	9:17:47	006	36.551202	-75.715521	0	1	3	45°	1	Military
21-Oct-2016	9:59:16	011	36.607729	-75.620897	1	1	4	90°	1	Military
21-Oct-2016	10:10:11	021	36.669661	-75.791172	2	1	3	30°	1	Military
21-Oct-2016	10:55:13	039	36.724422	-75.726165	3	2	4	90°	1	Military
21-Oct-2016	10:58:53	041	36.723740	-75.867262	3	2	4	100°	1	Military
21-Oct-2016	11:03:53	045	36.786997	-75.887565	4	1	2	30°	1	Military
21-Oct-2016	11:04:31	046	36.787362	-75.862536	4	1	3	75°	1	Military
21-Oct-2016	11:04:50	047	36.787680	-75.849269	4	1	4	135°	1	Military
21-Oct-2016	11:28:24	051	36.849048	-75.090648	5	1	4	90°	1	Military
21-Oct-2016	11:37:28	065	36.846988	-75.423142	5	1	3	30°	1	Military

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
21-Oct-2016	11:44:09	068	36.844658	-75.663815	5	1	3	30°	1	Military
21-Oct-2016	11:44:22	069	36.844286	-75.671777	5	1	2	15°	1	Military
21-Oct-2016	11:47:20	057	36.843179	-75.780746	5	1	4	140°	3	Military
21-Oct-2016	11:50:16	071	36.841971	-75.887587	5	1	2	45°	1	Military
21-Oct-2016	13:42:57	066	36.905338	-75.794960	6	1	3	90°	2	Military
21-Oct-2016	13:45:25	067	36.905762	-75.697532	6	1	4	90°	1	Military
21-Oct-2016	13:47:31	068	36.906056	-75.613667	6	1	3	90°	1	Military Research
21-Oct-2016	14:13:11	096	36.964726	-75.378614	7	1	3	90°	1	Military
21-Dec-2016	9:43:54	003	36.552015	-75.707314	0	1	4	90°	1	Military
21-Dec-2016	12:02:30	028	36.844238	-75.749664	5	2	3	90°	1	USCG
21-Dec-2016	14:27:14	041	36.906584	-75.564252	6	1	3	85°	1	USCG
21-Dec-2016	14:52:30	053	36.967186	-75.434611	7	1	4	45°	1	Military
29-Jan-2016	15:06:15	016	36.722624	-75.207791	3	4	3	90°	1	Recreational fishing vessel
30-Jan-2016	9:47:39	003	36.903937	-75.507696	6	2	3	90°	2	Recreational fishing vessel
30-Jan-2016	14:52:28	012	37.023831	-75.883084	8	3	3	70°	1	Trawl vessel
30-Jan-2016	15:20:54	017	36.965761	-75.414203	7	3	3	90°	1	Charter boat
30-Jan-2016	15:27:35	019	36.963574	-75.652762	7	3	3	90°	1	Recreational fishing vessel
30-Jan-2016	15:33:03	020	36.961718	-75.848493	7	3	2	90°	1	Recreational fishing vessel
2-Feb-2016	10:18:08	007	36.607356	-75.786011	1	3	3	90°	1	Recreational fishing vessel
2-Feb-2016	10:28:30	014	36.669042	-75.683584	2	3	3	120°	1	Unknown
2-Feb-2016	10:29:26	015	36.669168	-75.646202	2	3	3	90°	1	Recreational fishing vessel
2-Feb-2016	10:29:32	016	36.669191	-75.642145	2	3	2	90°	2	Recreational fishing vessel
2-Feb-2016	10:34:35	018	36.669216	-75.437937	2	3	3	90°	1	Recreational fishing vessel
2-Feb-2016	10:55:30	021	36.726164	-75.618726	3	3	3	15°	2	Recreational fishing vessel
2-Feb-2016	11:05:34	025	36.789197	-75.903086	4	3	2	145°	1	Recreational fishing vessel
2-Feb-2016	11:05:50	026	36.787598	-75.891842	4	3	3	90°	1	Recreational fishing vessel
2-Feb-2016	11:12:53	032	36.787268	-75.602837	4	3	3	45°	1	Recreational fishing vessel
2-Feb-2016	14:07:28	031	36.965144	-75.526162	7	3	3	90°	1	Recreational fishing vessel
2-Feb-2016	16:10:05	045	37.204599	-75.730350	11	2	3	90°	1	Charter boat
22-Feb-2016	14:34:41	010	36.967764	-75.769979	7	3	3	90°	1	Trawl vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
22-Feb-2016	15:27:34	031	36.787647	-75.858739	4	3	2	90°	1	Recreational fishing vessel
17-Mar-2016	10:47:57	009	37.263833	-75.183201	12	3	3	90°	1	Recreational fishing vessel
17-Mar-2016	13:39:20	018	37.205209	-75.593925	11	2	4	90°	1	Recreational fishing vessel
17-Mar-2016	13:51:32	023	37.205152	-75.094978	11	2	4	90°	1	Trawl vessel
17-Mar-2016	14:06:32	030	37.140865	-75.487559	10	2	3	90°	1	Trawl vessel
17-Mar-2016	14:10:30	026	37.140909	-75.645124	10	2	3	90°	1	Trawl vessel
17-Mar-2016	16:44:07	081	36.848805	-75.412521	5	2	4	90°	1	Recreational fishing vessel
17-Mar-2016	17:26:16	089	36.786144	-75.861854	4	2	4	140°	1	Unknown
18-Mar-2016	9:48:08	007	36.906032	-75.801388	6	2	3	90°	1	Recreational fishing vessel
18-Mar-2016	9:49:59	009	36.906330	-75.730591	6	2	2	90°	1	Recreational fishing vessel
18-Mar-2016	11:41:07	032	37.086103	-75.523966	9	2	3	30°	1	Recreational fishing vessel
18-Mar-2016	11:42:44	037	37.086023	-75.583969	9	2	4	90°	1	Recreational fishing vessel
18-Mar-2016	14:01:21	048	37.143105	-75.778772	10	2	3	100°	1	Recreational fishing vessel
18-Mar-2016	14:02:40	054	37.142808	-75.727600	10	2	4	90°	1	Trawl vessel
18-Mar-2016	14:06:14	057	37.143040	-75.590236	10	2	1	90°	1	Recreational fishing vessel
20-Apr-2016	10:03:00	005	36.554075	-75.348670	0	3	4	90°	1	Unknown
20-Apr-2016	10:11:16	011	36.610876	-75.217920	1	3	4	30°	1	Unknown
20-Apr-2016	10:30:34	014	36.669892	-75.858829	2	3	3	115°	1	Recreational fishing vessel
20-Apr-2016	10:52:01	022	36.729632	-75.184232	3	3	4	45°	1	Unknown
20-Apr-2016	11:37:38	033	36.847867	-75.272846	5	3	4	45°	1	Unknown
20-Apr-2016	15:57:52	069	37.144510	-75.687151	10	3	4	90°	1	Trawl vessel
20-Apr-2016	16:36:34	060	37.204268	-75.612588	11	2	3	90°	1	Trawl vessel
21-Apr-2016	13:45:21	003	36.843234	-75.914798	5	3	2	135°	1	Recreational fishing vessel
21-Apr-2016	13:46:18	006	36.844087	-75.872476	5	3	3	90°	1	Recreational fishing vessel
21-Apr-2016	13:46:36	007	36.844379	-75.858165	5	3	4	90°	1	Recreational fishing vessel
21-Apr-2016	13:46:45	008	36.844510	-75.851549	5	3	4	135°	1	Recreational fishing vessel
21-Apr-2016	13:55:15	010	36.848016	-75.519376	5	3	3	45°	1	Recreational fishing vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
21-Apr-2016	14:19:56	011	36.905476	-75.695730	6	3	3	90°	1	Recreational fishing vessel
21-Apr-2016	14:28:55	022	36.968366	-75.975849	7	3	2	135°	1	Trawl vessel
21-Apr-2016	14:32:01	023	36.969361	-75.855849	7	3	3	90°	1	Recreational fishing vessel
21-Apr-2016	14:35:07	017	36.969475	-75.727657	7	3	3	90°	1	Recreational fishing vessel
21-Apr-2016	14:35:15	018	36.969550	-75.721837	7	3	3	90°	1	Recreational fishing vessel
21-Apr-2016	15:11:21	032	37.022886	-75.922474	8	3	3	45°	1	Recreational fishing vessel
21-Apr-2016	15:18:51	036	37.088201	-75.788077	9	3	3	45°	1	Sailboat
21-Apr-2016	15:49:04	028	37.142586	-75.655873	10	3	2	45°	1	Recreational fishing vessel
10-May-2016	12:19:34	013	37.024406	-75.849087	8	3	4	90°	1	Sailboat
10-May-2016	14:57:02	023	37.142725	-75.663877	10	2	3	90°	1	Trawl vessel
10-May-2016	15:31:59	029	37.203701	-75.586577	11	3	4	90°	1	Trawl vessel
10-May-2016	16:17:01	036	37.320443	-75.629577	13	2	4	135°	1	Recreational fishing vessel
27-Jun-2016	10:58:55	035	36.607654	-75.731921	1	1	4	140°	1	Head boat
27-Jun-2016	10:59:26	036	36.607550	-75.751157	1	1	4	60°	1	Charter boat
27-Jun-2016	11:06:42	043	36.668594	-75.809160	2	1	3	90°	1	Recreational fishing vessel
27-Jun-2016	13:41:19	073	36.786848	-75.773030	4	2	3	90°	1	Recreational fishing vessel
27-Jun-2016	14:25:14	119	36.843531	-75.864037	5	3	4	90°	1	Recreational fishing vessel
27-Jun-2016	14:27:01	120	36.842540	-75.935154	5	3	1	90°	1	Recreational fishing vessel
27-Jun-2016	14:27:15	110	36.842662	-75.944630	5	2	3	90°	1	Recreational fishing vessel
27-Jun-2016	14:34:34	115	36.904493	-75.780785	6	2	3	90°	1	Recreational fishing vessel
27-Jun-2016	15:04:22	141	36.966548	-75.388249	7	2	3	90°	1	Recreational fishing vessel
27-Jun-2016	15:07:07	147	36.965666	-75.498000	7	2	2	110°	1	Charter boat
27-Jun-2016	15:07:19	148	36.965598	-75.506017	7	2	2	100°	1	Charter boat
27-Jun-2016	15:07:32	149	36.965529	-75.514802	7	2	3	90°	1	Charter boat
27-Jun-2016	15:38:51	155	37.023736	-75.788101	8	2	3	90°	1	Sailboat
27-Jun-2016	16:25:29	171	37.322853	-75.516980	13	2	4	60°	1	Recreational fishing vessel
14-Jul-2016	9:22:42	003	37.321568	-75.660942	13	2	3	60°	1	Recreational fishing vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
14-Jul-2016	9:39:21	006	37.266514	-75.171346	12	2	3	90°	1	Recreational fishing vessel
14-Jul-2016	10:31:28	020	37.146368	-75.375849	10	2	2	90°	1	Recreational fishing vessel
14-Jul-2016	10:59:53	032	37.088785	-75.385629	9	2	3	90°	1	Recreational fishing vessel
14-Jul-2016	11:23:48	037	37.026557	-75.622941	8	2	3	60°	1	Recreational fishing vessel
14-Jul-2016	11:38:51	039	37.023400	-75.944378	8	2	3	90°	1	Recreational fishing vessel
14-Jul-2016	13:52:32	060	36.968796	-75.730129	7	2	3	90°	3	Trawl vessel
14-Jul-2016	14:16:43	067	36.968627	-75.364560	7	2	4	90°	1	Recreational fishing vessel
14-Jul-2016	14:25:53	073	36.908833	-75.192672	6	2	3	90°	1	Recreational fishing vessel
14-Jul-2016	14:34:39	051	36.907308	-75.532584	6	2	4	45°	1	Recreational fishing vessel
14-Jul-2016	14:35:08	052	36.907216	-75.551544	6	2	3	40°	1	Recreational fishing vessel
14-Jul-2016	14:39:31	085	36.905934	-75.726364	6	2	1	90°	1	Recreational fishing vessel
14-Jul-2016	14:44:19	055	36.904365	-75.918865	6	2	3	90°	1	Recreational fishing vessel
14-Jul-2016	14:58:08	058	36.847122	-75.557496	5	2	3	90°	1	Recreational fishing vessel
14-Jul-2016	15:12:15	062	36.790334	-75.179581	4	2	3	90°	1	Charter boat
14-Jul-2016	15:31:01	067	36.787768	-75.758572	4	2	3	90°	1	Recreational fishing vessel
14-Jul-2016	15:34:15	070	36.786994	-75.859556	4	2	3	90°	1	Recreational fishing vessel
14-Jul-2016	15:49:17	107	36.728970	-75.513625	3	2	2	90°	1	Recreational fishing vessel
14-Jul-2016	15:52:37	108	36.729986	-75.388986	3	2	1	90°	1	Recreational fishing vessel
14-Jul-2016	16:15:19	078	36.670111	-75.598737	2	3	4	130°	1	Recreational fishing vessel
8-Aug-2016	9:34:22	013	37.263839	-75.189305	12	1	0	90°	1	Recreational fishing vessel
8-Aug-2016	10:18:43	042	37.203673	-75.213250	11	1	3	90°	2	Recreational fishing vessel
8-Aug-2016	10:38:13	049	37.142820	-75.714090	10	1	3	45°	2	Recreational fishing vessel
8-Aug-2016	10:40:04	048	37.142712	-75.778137	10	2	3	90°	1	Charter boat
8-Aug-2016	10:40:15	049	37.142684	-75.784617	10	2	3	90°	1	Charter boat
8-Aug-2016	10:50:17	054	37.085662	-75.772301	9	1	3	60°	1	Recreational fishing vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
8-Aug-2016	11:17:20	066	37.025736	-75.431335	8	1	4	45°	1	Recreational fishing vessel
8-Aug-2016	11:20:19	068	37.025616	-75.539500	8	1	4	45°	1	Recreational fishing vessel
8-Aug-2016	11:50:48	088	36.966770	-75.408634	7	1	3	45°	1	Recreational fishing vessel
8-Aug-2016	12:08:11	099	36.905848	-75.480696	6	1	3	70°	1	Recreational fishing vessel
8-Aug-2016	12:12:10	094	36.905814	-75.634262	6	2	3	90°	1	Recreational fishing vessel
8-Aug-2016	12:14:09	103	36.905733	-75.709361	6	1	2	45°	1	Recreational fishing vessel
8-Aug-2016	12:14:35	104	36.905698	-75.725984	6	1	1	90°	1	Recreational fishing vessel
8-Aug-2016	14:03:45	118	36.840430	-75.854322	5	1	3	45°	1	Recreational fishing vessel
8-Aug-2016	14:08:24	106	36.838958	-75.691264	5	1	3	90°	1	Recreational fishing vessel
8-Aug-2016	14:42:34	139	36.788125	-75.805468	4	1	4	90°	1	Recreational fishing vessel
8-Aug-2016	14:49:48	145	36.720222	-75.906110	3	1	2	90°	1	Recreational fishing vessel
8-Aug-2016	14:50:58	127	36.722491	-75.867972	3	1	3	90°	1	Recreational fishing vessel
13-Sep-2016	9:17:25	008	36.552776	-75.175439	0	3	4	90°	1	Recreational fishing vessel
13-Sep-2016	9:42:48	015	36.667987	-75.853642	2	3	3	100°	2	Recreational fishing vessel
13-Sep-2016	10:27:19	030	36.785758	-75.930437	4	3	3	135°	6	Recreational fishing vessel
13-Sep-2016	10:28:03	031	36.786394	-75.908925	4	3	3	110°	2	Recreational fishing vessel
13-Sep-2016	10:29:18	032	36.787205	-75.863705	4	3	2	90°	1	Recreational fishing vessel
13-Sep-2016	10:30:32	034	36.787888	-75.814172	4	3	3	90°	1	Recreational fishing vessel
13-Sep-2016	10:31:12	036	36.787852	-75.787038	4	3	4	80°	1	Recreational fishing vessel
13-Sep-2016	11:05:47	049	36.841920	-75.808735	5	3	2	30°	1	Recreational fishing vessel
13-Sep-2016	11:07:57	050	36.841300	-75.894642	5	3	3	90°	1	Recreational fishing vessel
13-Sep-2016	11:08:25	029	36.841230	-75.912881	5	3	2	90°	2	Recreational fishing vessel
13-Sep-2016	11:09:19	051	36.841398	-75.947743	5	3	2	30°	6	Recreational fishing vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
13-Sep-2016	12:32:41	056	36.904920	-75.949456	6	3	3	90°	3	Recreational fishing vessel
13-Sep-2016	12:34:20	034	36.905057	-75.890242	6	3	3	90°	2	Recreational fishing vessel
13-Sep-2016	12:38:50	060	36.905534	-75.726260	6	3	3	60°	1	Recreational fishing vessel
13-Sep-2016	12:39:46	061	36.905848	-75.692270	6	3	3	90°	1	Recreational fishing vessel
13-Sep-2016	12:47:15	064	36.906227	-75.415979	6	3	4	45°	1	Recreational fishing vessel
13-Sep-2016	12:48:32	065	36.906362	-75.369060	6	3	3	45°	1	Recreational fishing vessel
13-Sep-2016	12:49:55	066	36.906288	-75.319688	6	3	3	45°	1	Recreational fishing vessel
13-Sep-2016	12:58:14	038	36.965605	-75.204034	7	3	1	90°	1	Yacht
13-Sep-2016	12:58:26	069	36.965840	-75.211505	7	3	4	90°	1	Recreational fishing vessel
13-Sep-2016	13:09:59	073	36.962781	-75.651820	7	3	3	110°	1	Recreational fishing vessel
13-Sep-2016	13:15:39	075	36.960602	-75.873348	7	3	3	80°	1	Recreational fishing vessel
13-Sep-2016	13:29:04	049	37.142400	-75.698086	10	3	4	90°	1	Recreational fishing vessel
13-Sep-2016	13:30:19	086	37.142717	-75.651150	10	2	3	90°	1	Sailboat
13-Sep-2016	13:39:14	053	37.203698	-75.656803	11	3	3	90°	1	Sailboat
13-Sep-2016	13:45:59	094	37.261406	-75.694334	12	2	2	90°	1	Recreational fishing vessel
13-Sep-2016	13:50:09	098	37.262911	-75.540067	12	2	3	100°	1	Recreational fishing vessel
13-Sep-2016	14:17:36	107	37.321134	-75.544392	13	2	3	45°	1	Recreational fishing vessel
13-Sep-2016	14:20:35	109	37.320832	-75.662912	13	2	2	30°	1	Sailboat
21-Oct-2016	9:16:04	003	36.551010	-75.786104	0	1	3	135°	1	Recreational fishing vessel
21-Oct-2016	11:22:19	047	36.788513	-75.136331	4	1	4	90°	1	Charter boat
21-Oct-2016	11:40:36	066	36.845797	-75.536113	5	1	2	20°	1	Recreational fishing vessel
21-Oct-2016	13:40:21	064	36.904807	-75.898174	6	1	3	90°	1	Recreational fishing vessel
21-Oct-2016	14:01:01	072	36.906119	-75.066539	6	1	4	90°	1	Recreational fishing vessel
21-Oct-2016	14:27:55	085	36.959592	-75.939264	7	1	3	90°	1	Charter boat
21-Oct-2016	15:14:32	134	37.260516	-75.624565	12	1	3	90°	1	Recreational fishing vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
7-Nov-2016	9:41:10	009	37.085812	-75.920727	9	4	3	60°	1	Recreational fishing vessel
10-Dec-2016	15:18:04	032	36.968755	-75.357017	7	3	4	90°	1	Recreational fishing vessel
10-Dec-2016	15:49:10	032	36.903891	-75.938534	6	3	3	90°	1	Trawl vessel
10-Dec-2016	15:53:01	038	36.842479	-75.943616	5	3	2	90°	1	Sailboat
10-Dec-2016	15:56:16	039	36.844556	-75.813879	5	3	3	110°	1	Recreational fishing vessel
10-Dec-2016	16:31:39	040	36.787124	-75.752136	4	3	2	90°	1	Pilot boat
10-Dec-2016	16:32:08	044	36.787167	-75.769908	4	2	3	90°	1	Recreational fishing vessel
21-Dec-2016	9:48:11	004	36.552046	-75.543246	0	1	3	90°	1	Recreational fishing vessel
21-Dec-2016	11:25:21	027	36.787868	-75.692257	4	1	3	120°	1	Recreational fishing vessel
21-Dec-2016	11:27:42	029	36.788168	-75.600420	4	1	3	70°	1	Recreational fishing vessel
21-Dec-2016	11:41:15	031	36.788096	-75.067701	4	2	2	15°	1	Recreational fishing vessel
21-Dec-2016	14:21:31	037	36.905983	-75.782044	6	1	3	90°	1	Recreational fishing vessel
21-Dec-2016	14:26:10	040	36.906693	-75.605409	6	1	2	90°	1	Recreational fishing vessel
21-Dec-2016	14:27:08	046	36.906618	-75.567857	6	1	3	60°	2	Recreational fishing vessel
21-Dec-2016	14:28:39	047	36.906875	-75.509534	6	1	3	45°	2	Recreational fishing vessel
21-Dec-2016	14:31:18	049	36.907011	-75.406596	6	1	3	30°	1	Recreational fishing vessel
21-Dec-2016	14:51:12	046	36.967389	-75.382665	7	2	4	90°	1	Recreational fishing vessel
21-Dec-2016	14:59:19	055	36.967283	-75.707829	7	1	2	30°	1	Recreational fishing vessel
21-Dec-2016	15:04:30	047	36.967114	-75.917560	7	2	4	110°	1	Recreational fishing vessel
21-Dec-2016	15:09:49	059	37.023792	-75.923992	8	1	3	90°	1	Recreational fishing vessel
21-Dec-2016	15:10:20	060	37.024807	-75.904530	8	1	3	90°	1	Recreational fishing vessel
21-Dec-2016	15:11:50	062	37.025243	-75.848445	8	1	2	15°	1	Recreational fishing vessel
21-Dec-2016	15:18:13	063	37.025991	-75.607763	8	1	2	45°	1	Recreational fishing vessel
21-Dec-2016	15:19:23	050	37.026010	-75.562451	8	1	3	90°	1	Trawl vessel
21-Dec-2016	15:49:01	070	37.086190	-75.562916	9	1	3	80°	1	Recreational fishing vessel

Date	Time	Waypoint	Latitude	Longitude-1	Track Number	BSS	Angle out	Degree Forward	Best #	Comments
21-Dec-2016	15:51:16	071	37.086096	-75.647404	9	1	2	90°	1	Recreational fishing vessel
22-Dec-2016	9:24:55	004	37.323224	-75.320033	13	3	3	110°	1	Recreational fishing vessel
22-Dec-2016	9:27:21	005	37.323628	-75.207600	13	3	3	90°	1	Recreational fishing vessel
22-Dec-2016	9:40:03	009	37.264299	-75.257282	12	4	3	90°	1	Recreational fishing vessel
22-Dec-2016	9:42:42	005	37.263815	75.350803	12	3	3	90°	1	Recreational fishing vessel
22-Dec-2016	10:47:19	021	37.087934	-75.664262	9	2	3	90°	1	Recreational fishing vessel