Protected Species Aerial Surveys in the Mid-Atlantic Region off Virginia, Maryland, Delaware, and New Jersey

Authors and Affiliation:

Tim Cole, Research Fishery Biologist
tim.cole@noaa.gov
National Oceanic and Atmospheric Administration, Northeast Fisheries Science Center

in collaboration with

Amy Whitt, CEO/Senior Marine Scientist
amy@azuraco.com
Azura Consulting LLC

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Project Managers: Heather Genievich and Caitlin McGarigal, NJDEP Division of Science and Research

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Shawn M. LaTourette, Commissioner

State of New Jersey
Phil Murphy, Governor

Board of Public Utilities
Christine Guhl-Sadovy, President

Visit the Research and Monitoring Initiative website: https://dep.nj.gov/offshorewind/rmi/

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Overview

The New Jersey offshore wind Research and Monitoring Initiative (RMI) is administered by the Department of Environmental Protection in collaboration with the Board of Public Utilities (BPU). The Initiative seeks to employ a rigorous scientific approach to research and monitoring of marine and coastal resources during the development, construction, operation and decommissioning of offshore wind as recommended in the New Jersey Offshore Wind Strategic Plan. The goal of the Research and Monitoring Initiative is to ensure that as New Jersey moves towards a clean energy economy, the State continues to protect and responsibly manage New Jersey's coastal & marine resources.

In order to meet these mandates, the RMI developed 14 Short-term Highest Priority Research and Monitoring Needs. This research project addresses priority 10, "Estimate habitat use, distribution, and abundance by season (e.g., overwintering harbor seals) for the right whale, other whales and dolphins…"

The National Oceanic and Atmospheric Administration's Northeast Fisheries Science Center has been funding a contractor to complete aerial cetacean surveys in the Mid-Atlantic Ocean for several years. However, waters off of central New Jersey were not being surveyed. In order to better address priority 10, the RMI funded NOAA and subsequently its contractor, Azura, to complete aerial surveys off of central New Jersey in January and February, 2024. The report that is enclosed provides an overview of the entire project, including areas outside of the northern New Jersey coast where RMI funding was focused.

In Figure 1 of the report body, RMI funding covered survey efforts for transects 1a through 14a. Data from all of these efforts is hosted by the Ocean Biodiversity Information System Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP). This specific dataset is titled "Mid-atlantic marine mammal visual survey in 2024" and is available at https://seamap.env.duke.edu/dataset/2314.

In addition, the results of these aerial surveys are provided in the form of data files and photographs to the North Atlantic Right Whale Consortium (NARWC) and stored in NOAA's National Centers for Environmental Information (NCEIS) database. These results are utilized by the Duke Marine Geospatial Laboratory to complete surface density models that inform cetacean management decisions. In the near term, the results are posted on WhaleMap, which displays a rolling two week summary of acoustic and visual whale observations and can be queried for various parameters (i.e., date, platform, species, observation type).

FINAL REPORT

Protected Species Aerial Surveys in the Mid-Atlantic Region off Virginia, Maryland, Delaware, and New Jersey

Winter 2024

Prepared for

National Oceanic and Atmospheric Administration
Northeast Fisheries Science Center
166 Water Street, Woods Hole, MA 02543-1026

Prepared by

Azura Consulting LLC
446 Trail View Lane, Garland, TX 75043

Submitted

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EXECUTIVE SUMMARY

Azura Consulting LLC (Azura) conducted systematic line-transect aerial surveys to determine the distribution and relative abundance of large whales off the coasts of Virginia, Maryland, Delaware, and New Jersey between 5 January and 6 March 2024. The primary target of these surveys was the North Atlantic right. Data on sei, humpback, blue, fin, sperm, and minke whales were also collected. The study area ranged from the New York Bight to south of Virginia Beach, Virginia, and included five survey areas: northern New Jersey (NONJ), southern New Jersey and the Delaware Bay entrance (NJDE), Maryland and Virginia (MDVA), the Virginia "Wedge" area (VAWE), and the Chesapeake Bay entrance (CBEN). The tracklines ran roughly perpendicular to the coast, were spaced 4 nautical miles (NM; 7 kilometers [km]) apart, and covered approximately 3,158 NM (5,849 km). The NJDE, MDVA, and CBEN tracklines extended offshore to approximately the 600-foot (ft; 183-meter [m]) depth contour. The easternmost points of the NONJ and VAWE tracklines ranged from the 85- to 295-ft (26- to 90-m) depth contours.

The Azura Team of two marine mammal observers and two pilots flew the surveys at an airspeed of approximately 100 knots (185 km/hour) and at an altitude of 1,000 ft (305 m) in a Partenavia P68C, a high-wing, twin-engine, fixed-gear, six-seat airplane equipped with bubble windows to maximize the observers' field of view. Surveys were flown under Visual Flight Rules conditions and limited to days with clear weather, good light conditions, high ceilings, and low wind speeds (Beaufort sea states of 4 or less). Most of the tracklines were flown twice. A total of 8,416 NM (15,586 km) was surveyed and included on-effort coverage of tracklines, circling, transits, and crosslegs.

A total of 43 large whale sightings were recorded: 11 right whale, 17 fin whale, 10 humpback whale, 2 sperm whale, 2 minke whale, and 1 unidentified large whale sightings. The fin, humpback, minke, and sperm whale sightings and unidentified large whale sighting were all recorded off New Jersey/Delaware. Right whales were recorded throughout the study area. A total of 16 individual right whales were matched to the North Atlantic Right Whale Catalog. Of these individuals, half were females and half were males. Only one individual (#3532 [male] "Resolution") was sighted on multiple days. Right whale behaviors observed included travel, surface feeding, and subsurface feeding. Coordinated feeding events were observed off Cape May and north of Little Egg Harbor Township, New Jersey. Two surface active groups, each with three individuals, were witnessed off Virginia. Dynamic Management Areas were initiated in areas where three or more right whales were observed. This research was conducted in compliance with the National Marine Fisheries Service (NMFS) Research Permit No. 27066 and under contract to the NMFS Northeast Fisheries Science Center. Results of this study will inform regulations to mitigate impacts of commercial fishing, vessel traffic, and wind energy development on right whales and other large whales protected under the Endangered Species Act and Marine Mammal Protection Act.

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ACRONYMS AND ABBREVIATIONS

Azura	Azura Consulting LLC
BSS	Beaufort sea state
CBEN	Chesapeake Bay entrance
ft	foot(feet)
km	kilometer(s)
kt	knot(s)
m	meter(s)
MDVA	Maryland and Virginia
NARWC	The North Atlantic Right Whale Consortium
NEFSC	Northeast Fisheries Science Center
NJDE	southern New Jersey and the Delaware Bay entrance
NM	nautical mile(s)
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NONJ	northern New Jersey
PSB	Protected Species Branch
VAWE	Virginia “Wedge” area
VFR	Visual Flight Rules

INTRODUCTION

BACKGROUND

The North Atlantic right whale (*Eubalaena glacialis*, hereafter "right whale") remains one of the most endangered large whales in the world with an estimated population size of about 360 individuals at the end of 2022. Despite decades of protection, a combination of anthropogenic impacts and a low calving rate continue to impede recovery of the species. With fewer than 70 reproductive females, any mortality and serious injury impedes recovery. Currently, the most significant threats to right whale survival include entanglement in fishing gear and collisions with vessels, which combined are responsible for a minimum of 139 documented dead, serious, or sublethal injuries/illness in the United States and Canada since 2017.

The National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Northeast Fisheries Science Center (NEFSC) is the research arm of NOAA Fisheries in the region. NEFSC plans, develops, and manages a multidisciplinary program of basic and applied research. Aerial surveys are required to assess the effects of commercial fishing, vessel traffic, and wind energy development on right whales along the east coast of the United States. Potential effects of these activities include entanglement, collision, displacement, behavior disruption, and stress (Kraus et al. 2019). Surveys are needed to identify areas of overlap and associated risks with fishing and shipping and to assess distribution of right whales before, during, and after wind energy construction. The results of this work will inform regulations to mitigate impacts of these activities on right whales.

OBJECTIVES

Under contract to the NEFSC, Azura Consulting LLC (Azura) conducted aerial surveys to obtain sightings data on large whales in the Mid-Atlantic region. These data will be used to determine the winter distribution and relative abundance of species, including the presence of individual right whales, and to inform efforts to mitigate anthropogenic impacts on protected species in this region.

METHODS

Azura conducted systematic line-transect aerial surveys to collect sightings data that can be used to map the distribution of large whales and estimate their relative abundance off the coasts of Virginia, Maryland, Delaware, and New Jersey. The primary target of these surveys was the right whale, while the sei (*Balaenoptera borealis*), blue (*B. musculus*), humpback (*Megaptera novaeangliae*), fin (*B. physalus*), sperm (*Physeter macrocephalus*), and minke (*B. acutorostrata*) whales were also recorded.

SURVEY AREAS

The study area extended from the New York Bight to south of Virginia Beach, Virginia, and included five survey areas: northern New Jersey (NONJ), southern New Jersey and the Delaware Bay entrance (NJDE), Maryland and Virginia (MDVA), the Virginia "Wedge" area (VAWE), and the Chesapeake Bay entrance (CBEN). The tracklines ran roughly perpendicular to the coast, were spaced 4 nautical miles (NM; 7 kilometers [km]) apart, and covered approximately 3,158 NM (5,849 km) (not including the crosslegs) (**Figure 1**).

- The NONJ Survey Area consisted of 14 east-southeast/west-northwest tracklines (1a-14a) extending offshore from the New York Bight and Sandy Hook, New Jersey, to Little Egg Harbor Township, New Jersey (**Figure 1**). The tracklines began 1.5 NM (2.8 km) from shore and extended out to the 85- to 157-foot (ft; 26 to 48-meter [m]) depth contours. The total trackline length was 289 NM (535 km).

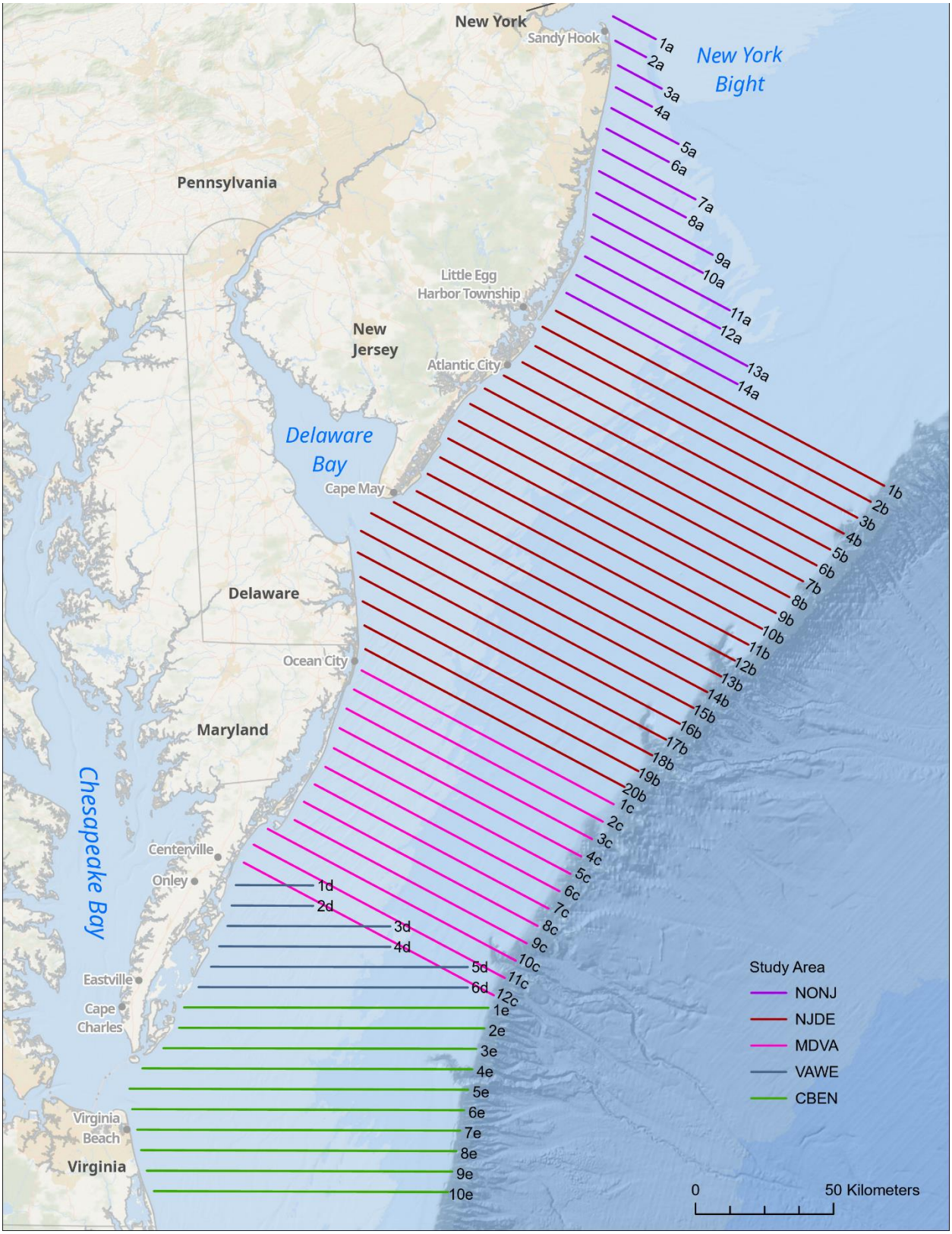

Figure 1. Planned survey tracklines

- The NJDE Survey Area consisted of 20 east-southeast/west-northwest tracklines (1b-20b) extending offshore of Delaware Bay with the northernmost line starting 1.5 NM (2.8 km) from the coast near Little Egg Harbor Township, New Jersey, and extending to the 600-ft (183-m) contour and the southernmost line starting 1.5 NM (2.8 km) from the coast near the Delaware/Maryland border and extending out to the 600-ft (183-m) contour (**Figure 1**). This was the largest survey area, totaling 1,408 NM (2,608 km) in trackline length.
- The MDVA Survey Area consisted of 12 east-southeast/west-northwest tracklines (1c-12c) extending offshore from Ocean City, Maryland, to Centerville, Virginia (**Figure 1**). The tracklines began 1.5 NM (2.8 km) from shore and extended out to the 600-ft (183-m) contour. The total trackline length was 644 NM (1,193 km).
- The VAWE Survey Area consisted of 6 east-west tracklines (1d-6d) extending offshore of northern Virginia between Onley and Eastville, Virginia (**Figure 1**). The tracklines began 1.5 NM (2.8 km) from shore and extended out to the 44- to 167-ft (24- to 90-m) depth contours. The total trackline length was 199 NM (369 km).
- The CBEN Survey Area consisted of 10 east-west tracklines (1e-10e) extending offshore of the Chesapeake Bay entrance with the northernmost line starting 1.5 NM (2.8 km) from the coast at around the same latitude as Cape Charles, Virginia, and extending offshore to the 600-ft (183-m) contour and the southernmost line starting 1.5 NM (2.8 km) from the coast just north of the Virginia/North Carolina border and extending out to the 600-ft (183-m) contour. The total trackline length was 618 NM (1,145 km).

SURVEY FREQUENCY

The survey period was from 5 January and 6 March 2024. The goal was to survey all tracklines twice, covering a total of 6,316 NM (11,697 km), not including the 4-NM (7-km) spacing between tracklines. When possible, three weeks elapsed between surveying the same trackline.

SURVEY METHODS

Survey Design

The surveys followed standard line-transect distance sampling methods (Buckland et al. 2001). A single-platform (one-team) approach was used, assuming g(0)=1. This sampling method allows for relative abundance to be calculated and minimizes the costs associated with a double-platform (two-team) approach for obtaining absolute abundance estimates. The single team consisted of two marine mammal observers – one observer at a window on each side of the aircraft. Marine mammal observers were listed as co-investigators on Marine Mammal Protection Act Permit No. 27066 which allows for Level B harassment of marine mammals during survey operations in the Atlantic.

Aircraft and Flight Operations

Surveys were flown in a Partenavia P68C, a high-wing, twin-engine, fixed-gear, six-seat airplane equipped with bubble windows at the center seats to increase the observers' field of view and a small window in the back which pops out to allow for photographs. The aircraft was operated by two pilots experienced in flying offshore wildlife surveys. The aircraft was flown at an altitude of 1,000 ft (305 m) and an airspeed of approximately 100 knots (kt; 185 km/hour). The aircraft carried sufficient fuel for 4 to 5 hours of flight time, including transits to and from the survey areas. When sighted whales were either identified as right whales or potentially identified as right whales, the aircraft left the trackline at a right angle to the sighting and circled the sighting to confirm species and, if a right whale, collect photographs for individual identification. All circling was done at a bank angle of 30 degrees or less.

Weather Conditions and Limitations

The surveys were flown under Visual Flight Rules (VFR) conditions and limited to days with clear weather, good light conditions, high ceilings, low wind speeds (12 kt or less), and visibility greater than 5 NM (9 km). Clouds, heavy precipitation, low ceiling/visibility, and otherwise adverse weather conditions were avoided under VFR to ensure both survey team safety and survey effectiveness. Surveys were not flown in sea states exceeding 4 on the Beaufort scale. When sea states reached a Beaufort 5 in the midst of a survey, tracklines were truncated, and the survey team flew toward good survey conditions to maximize coverage. The following environmental conditions, which may affect the ability to detect animals, were recorded prior to the start of each trackline and updated as conditions changed: Beaufort sea state (BSS), solar glare (magnitude of impairment [none, some, severe]), percent of cloud cover, visibility (how far the observers could see from the aircraft), and subjective overall quality of viewing conditions (excellent, good, moderate, poor, and unacceptable) based on the observer's ability to detect a right whale 1.5 NM (2.8 km) from the aircraft.

Effort

A description of the codes and categories of effort and tracks is included in **Appendix A**. While the aircraft was in "on effort" mode, observers actively searched for whales at survey altitude and speed and regularly updated the environmental conditions. The survey team was "on effort" when on tracklines and crosslegs between tracklines and when required to temporarily deviate from tracklines due to military operations. The survey team remained on effort when circling (i.e., to confirm and photograph right whale sightings) and during transits over water when survey parameters (e.g., survey altitude and speed) could be maintained. The survey team went "off effort" when survey parameters could not be maintained; however, observers continued to record and regularly update environmental conditions and actively search for whales.

Data Recording

Data were recorded using the AerialVisSurvey software (provided by NMFS Southeast Fisheries Science Center) on a laptop computer. The software records data into a Microsoft Access Database. The laptop computer was connected to a global positioning system receiver, and the aircraft's position along the trackline was automatically recorded every 8 seconds. Observers used this program to record environmental conditions and sightings data. Due to budgetary constraints, a dedicated data recorder was not possible, so a voice recorder was used to enable the observers to record data with minimal time spent with eyes off the water. During a sighting, one observer recorded the time and position of the sighting on the laptop while the second observer recorded the sighting information on a digital voice recorder. Any additional sightings data not entered in AerialVisSurvey but recorded via the voice recorder were entered into the Access database at the end of the survey day.

A digital inclinometer and painter's tape were used prior to the beginning of the survey to mark angle measurements on the bubble windows of the plane which enabled the observers to quickly measure the angle of the animal from the trackline during sightings. In addition, daily logs were maintained for recording flight time, error logs, issues/delays, and tracklines surveyed, and paper datasheets (see **Appendix B**) were used to record additional information for right whale sightings.

To maximize detections of large whales, each observer scanned out to approximately 1.5 NM from the aircraft. When the sighting was perpendicular to the aircraft, the observer took a measure of the angle to the sighting and recorded that measurement along with the sighting cue, species identification (to the lowest taxonomic level), identification reliability, estimate of group size (best estimate with a +/- confidence interval when number of animals was difficult to determine), number of calves, animal heading (if applicable), and behavior. During post processing, species names and

behaviors were converted to the codes outlined in The North Atlantic Right Whale Consortium (NARWC) database user guide (Kenney 2023).

Initial positions (latitude/longitude) were recorded when a sighting was made while on a trackline, during transit, or on a crossleg. Actual positions were recorded when the aircraft broke from the trackline, transit line, or crossleg and flew directly over the sighted animals in order to record the exact position of the animals. Final positions were recorded when the aircraft flew directly over the sighted animals in order to record the last position of the animals before resuming the survey. The team broke from the trackline only when the sighted whales were either identified as right whales or potential right whales in order to circle the sighting and confirm species and, if a right whale, collect photographs for individual identification. Actual and final positions were only recorded for right whales or for other whale species that were first sighted during a circling event since no initial position could be taken.

Photographs of right whales were taken for identification of individuals and submission to the NARW Catalog curated by the New England Aquarium. During each right whale sighting after the aircraft passed perpendicular to the whale and initial sighting data were recorded, the team remained on effort, broke from the trackline, and circled the sighting in order to obtain photographs for individual identification. Time spent circling the right whales was limited to the minimum time necessary to obtain photographs of the entire rostral callosity patterns and any visible scars or markings. The high-quality photographs of right whales were taken using a Canon EOS 7D Mark II digital SLR camera with a Canon EF telephoto 300mm f/4.0L IS USM lens or a Canon EOS R5 full-frame mirrorless camera with a Canon RF 100-500mm f/4.5-7.1L IS USM super-telephoto lens.

Data Quality Assurance/Quality Control

At the end of each survey day, a backup copy of the raw survey data was saved to an external hard drive as well as a Google Drive folder shared with NMFS. An additional audit copy was created, and the collected data was reviewed to correct any errors noted in the error log; the data recorded in the database was reconciled with that on any paper datasheets or voice recordings. For example, quality assurance and control included correcting misidentified species, correcting on/off segments, correcting mislabeled tracklines, and verifying and updating group sizes. The audited copy of the database was also stored on external media and to the Google Drive folder (NMFS included these data on WhaleMap). Photographs of right whales were uploaded to the Google Drive folder for NMFS identification and submission to the NARW Catalog.

Deliverables

Data Files

Deliverables to NMFS included the raw and corrected data files and right whale photographs. These files were uploaded to the Google Drive folder at the end of each survey day. NMFS shared the tracklines and right whale sightings with the public via display on WhaleMap (Johnson et al. 2021).

Daily Logs

We submitted a daily log of the events of each survey day to NMFS. These logs included the following information: team member names and positions in the aircraft, engine start and stop times, wheels up and wheels down times, total fight time, tracklines surveyed, general weather conditions (e.g., BSS), issues or delays, and total number of sightings of each species.

Post-Flight Reports

We submitted post-flight reports to NMFS within 24 hours of completion of each survey day. These reports included a map of the tracklines surveyed and large whale sightings, a brief summary of

survey conditions (BSS and overall conditions – excellent, good, moderate, poor, and unacceptable/off watch), the total number of large whales sighted per species, and right whale sighting details (time, latitude, longitude, group size, number of calves, and behavior).

Northeast Fisheries Science Center Protected Species Branch Data Files

The final effort and sightings data files for each survey day were combined and formatted to match the NARWC and NEFSC Protected Species Branch (PSB) format for daily file submissions. These files included additional coding for some data fields, such as legtype, legstage, and PSB legstage.

RESULTS

EFFORT

The total on-effort coverage was approximately 8,416 NM (15,586 km) for the entire study area and included tracklines, crosslegs, circling, and on-effort transits (**Table 1**, **Figure 2**). Most of the tracklines were completed twice (**Figure 3**). Poor weather conditions and military activities prevented the team from completing all of the tracklines twice during the survey period.

All tracklines in the NONJ Survey Area were completed twice. In the NJDE Survey Area, the team completed all tracklines once. During Round #2 of surveys in this area, they fully completed 14 and partially completed 3 of the 20 tracklines. In the MDVA Survey Area, the team completed 11 of the 12 lines during Round #1. During Round #2, one trackline was fully completed while eight tracklines were partially completed. Trackline 12c was only partially completed during both survey rounds; the VAWE Survey Area tracklines overlapped with most of 12c except for a small coastal section which could not be surveyed due to military activities. The team completed all tracklines in the VAWE Survey Area during Round #1 and five of the six tracklines during Round #2; the remaining line was partially completed. During Round #1, the team fully completed eight of the 10 CBEN tracklines and partially completed the remaining two lines which were cut short due to military activity. During Round #2, the team completed five of the tracklines.

Table 1. Effort per track category

TRACK CATEGORY	ON-EFFORT COVERAGE (NM)
Circling	978
Crossleg	853
Trackline	5,346
Transit	1,239
TOTAL	**8,416**

Note: NM = nautical mile(s)

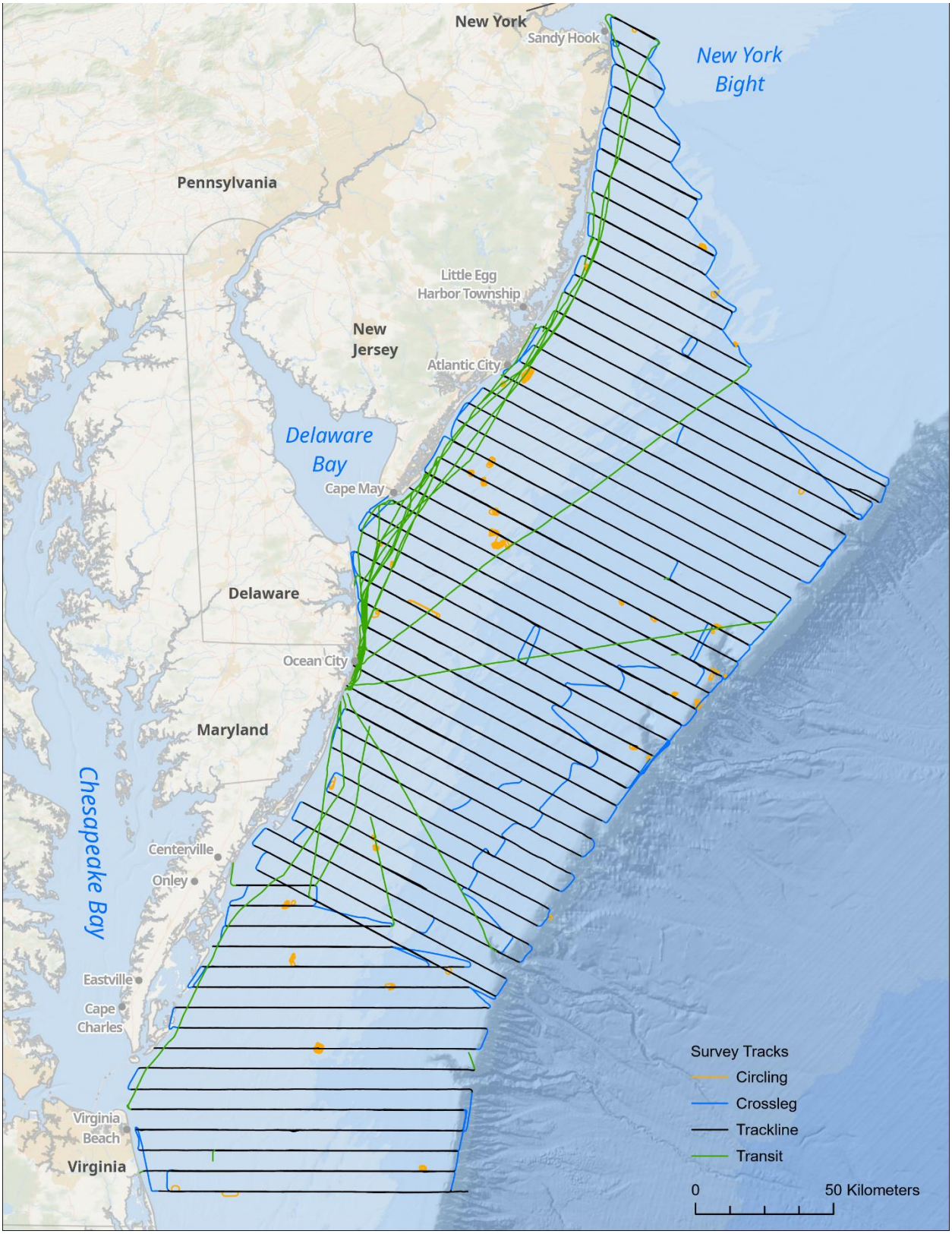

Figure 2. Survey tracks flown (on-effort coverage)

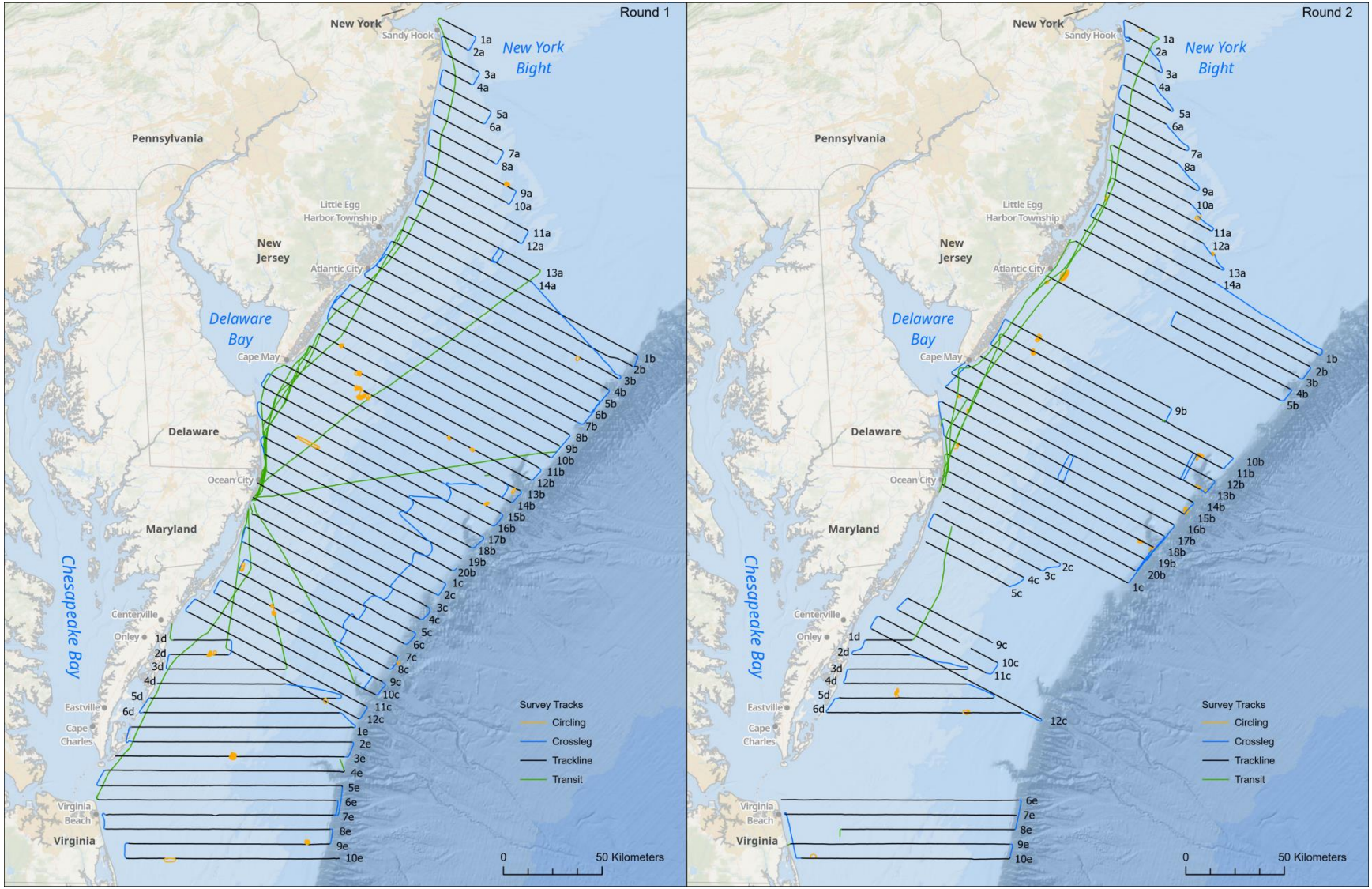

Figure 3. Survey tracks flown (on-effort coverage) during each round of surveys.

Surveys were flown on 19 days during the survey period (**Table 2**). Poor weather conditions prevented surveys from being flown on other days during the survey period. To maximize coverage of the survey areas during the limited survey period, survey efforts were focused in areas with good survey conditions. During survey days, the BSS ranged from 1 to 5 and was mostly a BSS 2 to 4 (95 percent) which is considered good to moderate sighting conditions (**Figure 4**).

Table 2. Summary of survey days and on-effort coverage

DATE	ON-EFFORT COVERAGE (NM)
1/5/2024	120
1/11/2024	554
1/12/2024	594
1/18/2024	514
1/22/2024	452
1/23/2024	495
1/24/2024	220
1/30/2024	477
2/1/2024	543
2/4/2024	538
2/8/2024	569
2/12/2024	327
2/15/2024	481
2/19/2024	450
2/20/2024	120
2/22/2024	393
2/25/2024	411
3/1/2024	531
3/3/2024	629

Note: NM = nautical mile(s)

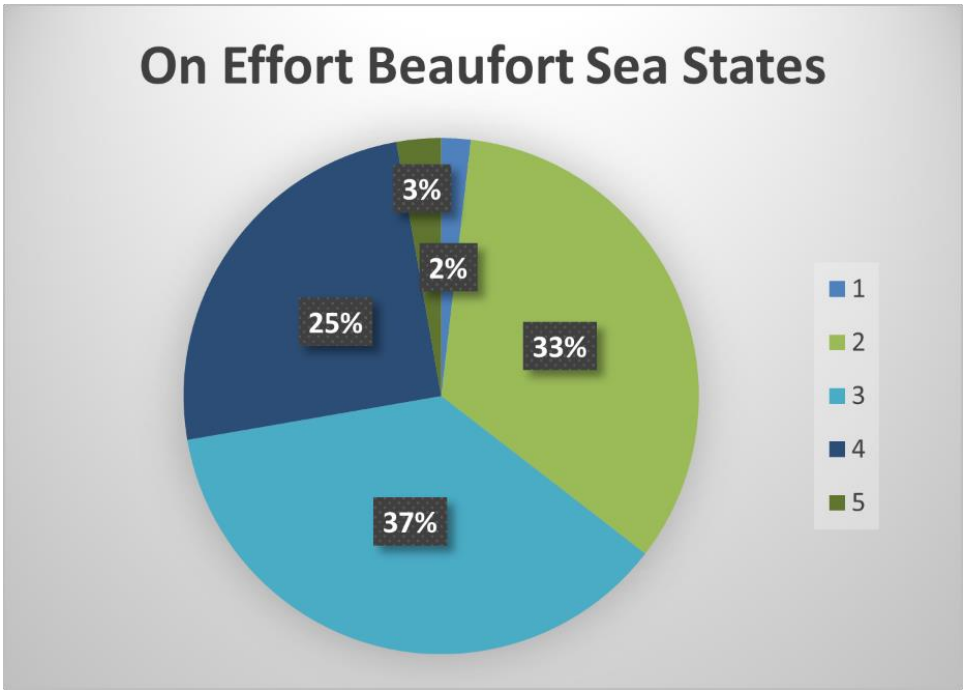

Figure 4. Summary of Beaufort sea states experienced during on-effort visual observations

SIGHTINGS

A total of 43 large whale sightings were recorded: 11 right whale, 17 fin whale, 10 humpback whale, 2 sperm whale, 2 minke whale, and 1 unidentified large whale sightings (**Table 3**, **Figure 5**). No calves were recorded.

Right whales were recorded throughout the study area (**Figure 5**). Dynamic Management Areas were initiated in areas where three or more right whales were observed. A total of 16 individual right whales were matched to the NARW Catalog. Of these individuals, half were females and half were males. Only one individual (#3532 [male] "Resolution") was sighted on multiple days. Right whale behaviors observed included travel, surface feeding, and subsurface feeding. Coordinated feeding events were observed off Cape May and north of Little Egg Harbor Township, New Jersey. For example, on January 23, five sightings of right whales were recorded approximately 20 NM (37 km) off Cape May. Seven unique individuals were sighted, and six of these whales eventually came together and were surface feeding in coordination with the whales positioned directly in line. Two surface active groups, each with three individuals, were witnessed off Virginia.

The fin, humpback, minke, and sperm whale sightings and unidentified large whale sighting were all recorded off New Jersey/Delaware (**Figure 5**). The most common behavior observed was travel. Defecation was observed during two fin whale sightings, one of which was near the coordinated feeding right whales on January 23 off Cape May.

Table 3. Large whale sightings

Date	Latitude*	Longitude*	Survey Area	Trackline #	Group Size	Behavior	Distance from Shore (NM)	Water Depth (m)	NARW Catalog #
North Atlantic Right Whale									
2024-01-23	38.81881	-74.48662	NJDE	12b	1	travel, apparent feeding	18	18	7 unique individuals; 5 were identified: #4510 Shelagh (female), #3532 Resolution (male), #5142 (female), #4550 (female), #3120 Oakley (male)
2024-01-23	38.78848	-74.41396	NJDE	12b	2	travel	22	31	
2024-01-23	38.78161	-74.45301	NJDE	circling	1	associated with other cetaceans, travel, apparent feeding	20	30	
2024-01-23	38.77817	-74.46741	NJDE	circling	2	travel, apparent feeding	21	29	
2024-01-23	38.76937	-74.45826	NJDE	circling	1	travel, apparent feeding	20	26	
2024-01-24	37.59970	-75.33849	VAWE	2d	3	surface active group, bubbles observed, belly-to-belly contact, defecation	12	20	#1326 (male), #3892 (male), #4457 Seamount (male)
2024-01-24	37.78927	-74.97224	Transit through MDVA	transit	1	logging, diving possible reaction to plane	18	28	#4440 Avalanche (male)
2024-01-24	37.82744	-74.98302	Transit through MDVA	transit	3	surface active group	17	24	#2303 Jib (male), #2642 Echo (female), #3940 Koala (female)
2024-01-30	37.13455	-75.21027	CBEN	3e	2	travel	27	32	#3280 (female), #3903 (female)
2024-03-01	39.41468	-73.46636	NONJ	crossleg	2	subsurface feeding, slow travel, milling, blow	36	35	#3532 Resolution (male), #1032 Thorny (male)
2024-03-03	37.40153	-75.31499	VAWE	5d	1	blow with mist, slow and moderate travel	16	26	#3650 (female)
Fin Whale									
2024-01-12	39.72831	-73.58501	NONJ	9a	1	slow travel	23	34	---
2024-01-23	38.81417	-74.49829	NJDE	circling	1	defecation	17	21	---
2024-02-01	39.01532	-74.58109	NJDE	10b	1	travel	7	13	---

Date	Latitude*	Longitude*	Survey Area	Trackline #	Group Size	Behavior	Distance from Shore (NM)	Water Depth (m)	NARW Catalog #
2024-02-04	39.35359	-74.32575	Transit through NJDE	transit	2	travel	4	13	---
2024-02-04	39.78344	-74.05882	Transit through NJDE	transit	1	direct travel	2	11	---
2024-02-04	39.29644	-74.45061	Transit through NJDE	transit	1	travel	3	10	---
2024-02-08	39.22044	-74.54198	NJDE	7b	1	dive	3	13	---
2024-02-12	38.07304	-73.84436	NJDE	crossleg	1	travel, diving	60	305	---
2024-02-19	38.97249	-74.51232	NJDE	circling	1	travel	12	21	---
2024-02-19	38.70491	-74.90274	Transit through NJDE	transit	1	travel	8	25	---
2024-02-22	38.27445	-73.74593	NJDE	15b	3	travel south, diving, defecation	62	111	---
2024-02-22	38.35192	-73.57502	NJDE	13b	1	travel north	69	151	---
2024-02-25	37.94851	-73.95457	NJDE	crossleg	1	slow travel	58	214	---
2024-02-25	38.05601	-73.84868	NJDE	crossleg	1	subsurface, slow travel,	61	247	---
2024-02-25	38.23365	-73.65218	NJDE	crossleg	3	defecation, slow travel	67	286	---
2024-02-25	38.50026	-73.56381	NJDE	circling	1	slow travel	64	74	---
2024-02-25	38.50278	-73.57029	NJDE	11b	1	diving, blow, dolphins associated, slow travel	65	75	---
Humpback Whale									
2024-01-23	38.88716	-74.47160	NJDE	11b	2	diving, body contact, not belly to belly	16	19	---
2024-02-01	38.71271	-73.09912	NJDE	crossleg	1	stationary	72	147	---
2024-02-04	39.68310	-74.08833	Transit through NJDE	transit	1	travel	3	15	---
2024-02-04	39.66113	-74.10091	Transit through NJDE	transit	1	travel	2	12	---
2024-02-04	38.78318	-74.97184	Transit through NJDE	transit	2	travel	5	22	---

Date	Latitude*	Longitude*	Survey Area	Trackline #	Group Size	Behavior	Distance from Shore (NM)	Water Depth (m)	NARW Catalog #
2024-02-19	38.92350	-74.55138	NJDE	11b	1	travel	12	19	---
2024-02-19	38.98638	-74.52462	NJDE	10b	2	travel	11	14	---
2024-02-22	38.13395	-73.76712	NJDE	crossleg	1	stationary heading southwest	63	198	---
2024-02-25	38.84431	-74.54807	NJDE	12b	1	subsurface, slow travel, blow	14	26	---
2024-03-01	38.80300	-73.03632	NJDE	4b	1	milling, associated with dolphins	71	270	---
Minke Whale									
2024-02-04	39.67653	-74.09455	Transit through NJDE	transit	1	travel	3	12	---
2024-02-19	39.04661	-74.48636	NJDE	9b	2	travel	11	15	---
Sperm Whale									
2024-02-25	38.33092	-73.52637	NJDE	crossleg	1	slow travel, blow	71	765	---
2024-02-25	38.35766	-73.58142	NJDE	13b	1	slow travel, blow	68	243	---
Unidentified Large Whale									
2024-03-01	38.78475	-74.91076	Transit through NJDE	transit	1	blow	8	13	---

Notes:

*Initial positions are provided. If no initial position was recorded, then the actual position is provided.

CBEN = Chesapeake Bay entrance; m = meter(s); MDVA = Maryland and Virginia; NARW = North Atlantic Right Whale; NJDE = southern New Jersey and the Delaware Bay entrance; NM = nautical mile(s); NONJ = northern New Jersey; VAWE = Virginia "Wedge" area

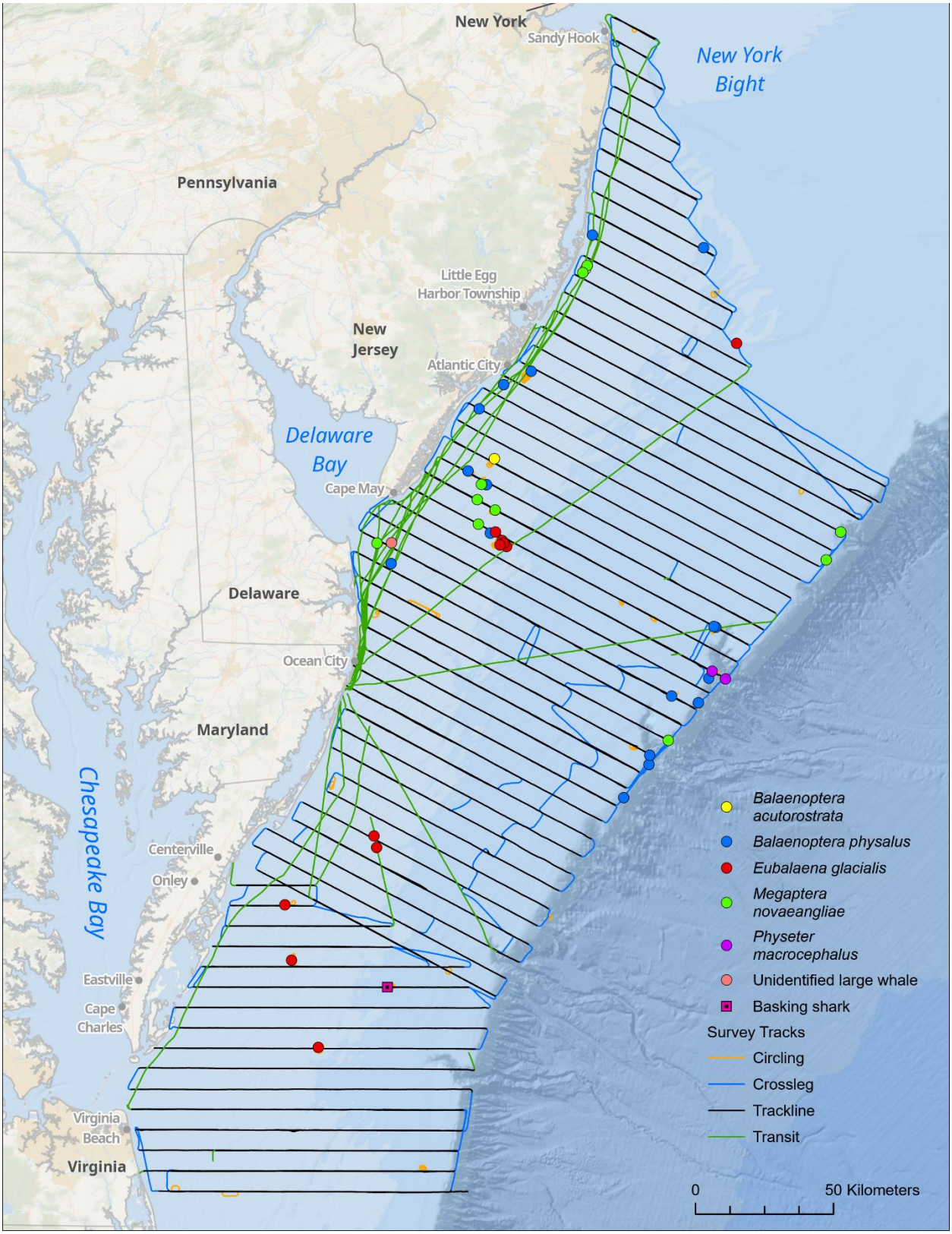

Figure 5. Sightings

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APPENDIX A: EFFORT AND TRACK CATEGORIES

Categories of effort and tracks recorded in the "SurveyTrack" tables in the Access database files

EFFORT CATEGORY	DESCRIPTION
On Effort	• Survey team maintained survey altitude (1,000 ft) and speed (100 kt), recorded and regularly updated environmental conditions, and actively searched for large whales. • Survey team was "on effort" during transit over water, when on tracklines, on the crosslegs between tracklines, when circling animals, and when the survey team temporarily deviated from tracklines due to military operations.
Off Effort	• Survey team did not consistently maintain survey altitude or speed. • Survey team was "off effort" during transit over land. • If slightly off survey parameters during any other time, "off effort" was utilized while still observing and recording off-effort sightings.
TRACK CATEGORY	**DESCRIPTION**
Transit	• Survey team was transiting over land or water. Survey plane maintained survey altitude and speed over water when possible.
Trackline #	• When on the trackline, we recorded the trackline number. Survey plane maintained survey altitude and speed.
Crossleg	• Survey plane flew a direct path from one trackline to the next and maintained survey altitude and speed.
Circling	• Survey plane broke from trackline to circle whales or potential whales.
Military Deviation	• Survey plane temporarily deviated from the trackline due to military operations and maintained survey altitude and speed.

APPENDIX B: RIGHT WHALE DATASHEET

Sighting # _____ Clearwater Marine Aquarium Research Institute (CMARI/GA) Whale Sighting Data Page ____ of ____

Date: / /	Initial Time: (L)	Initial Lat: ° N	Initial Long: ° W	Camera:	Photographer:
# Whales:	Final Time: (L)	Final Lat: ° N	Final Long: ° W	Heading:	Frame #s:

- ☐ Slow swimming, <1 knot (08)
- ☐ Moderate swimming, 1-10 knots (07)
- ☐ Fast swimming, >10 knots (06)
- ☐ Swimming upside down (15)
- ☐ Swimming on side (16)
- ☐ Swimming at surface (17)
- ☐ Swimming in one direction (34) (LIN TR)
- ☐ Milling (78)
- ☐ Logging motionless at surface (22) (LOG)
- ☐ Entangled (92) (FAST ENTGL) (ENTGL)*
- ☐ Associated w/cetaceans (5) (W/HMPBK) etc.*
- ☐ Dive, flukes not raised (23)
- ☐ Dive, flukes raised (24)
- ☐ Blow, mist visible (25)
- ☐ Mother with young (40)*
- ☐ Apparent nursing (42) (NURS)
- ☐ Non-sag body contact (44) (BOD CNT)
- ☐ Rolling, not in SAG (15-16) (ROLL)
- ☐ Breach (13) (BRCH)
- ☐ Flippering/ flipper slapping (19) (FLIP)
- ☐ Lobtail, tail slash (20) (LBTL) (TL SLSH)*
- ☐ Head lift (HD LFT)
- ☐ Surface active group (90) (SAG)
- ☐ Approacher to SAG (APPR)
- ☐ Focal Animal (FCL)
- ☐ Bubbles (58) (BUBLS) (UW EXH)*
- ☐ Distinct sub-groups (65)
- ☐ Belly to belly, (67) (BEL/BEL)
- ☐ Belly up (BEL UP)
- ☐ Black belly (BLK BEL)
- ☐ Black chin (BLK CHN)
- ☐ White belly (WH BEL)
- ☐ White chin (WH CHN)

Comments

*See NEAq descriptions for proper NEAq behavior codes. M=Mother, C=Calf, A=Adult, J=Juvenile