VACAPES Offshore Cetacean Study, Virginia Beach, VA

2024

Annual Progress Report

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Sperm whales (*Physeter macrocephalus*) off the coast of Virginia. Photograph taken under National Marine Fisheries Service Scientific Research Permit No. 21482.

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Science ⚓ Stewardship ⚓ Protection

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Acronyms and Abbreviations

°N	degrees North
°W	degrees West
BSS	Beaufort sea state
CATS	Customized Animal Tracking Solutions
cm	centimeter(s)
COMPASS	Cetacean Observation and Marine Protected Animal Survey Software
DTAG	digital acoustic recording tag
ESA	Endangered Species Act
GMT	Greenwich Mean Time
GPS	Global Positioning System
hr	hour(s)
ID	Identification Number
kHz	kilohertz
km	kilometer(s)
LiDAR	Light Detection and Ranging
LIMPET	Low-Impact Minimally Percutaneous Electronic Transmitter
m	meter(s)
Max	maximum
min	minute(s)
mm.ss	minutes.seconds
MMO	marine mammal observer
NARW	North Atlantic right whale
nm	nautical mile(s)
No.	number
OCS	Offshore Cetacean Study
OPAREA	Operating Area
photo-ID	photo-identification
SPOT	Smart Position and Temperature
U.S.	United States
VACAPES	Virginia Capes
VHF	very high frequency

1. Introduction and Background

The United States (U.S.) Navy routinely conducts training and testing activities within the Virginia Capes (VACAPES) Operating Area (OPAREA) off the Mid-Atlantic and Southeast U.S. The region encompassing the deeper waters of the continental shelf, shelf break, and continental slope has been recognized as an important habitat for multiple species of cetaceans. Kenney and Winn (1986) showed that the shelf edge from Cape Hatteras to Georges Bank was the second-most intensively used cetacean habitat off the northeastern U.S. based on 3 years of surveys conducted by the Cetacean and Turtle Assessment Program (CETAP 1982). More recent, still ongoing, broad-scale surveys by the National Marine Fisheries Service, including the Atlantic Marine Assessment Program for Protected Species, and marine mammal stock-assessment reports (Hayes et al. 2024), continue to show the same pattern.

Cetacean species known to be common seasonally in outer continental shelf, slope, and rise waters include both baleen whales and odontocetes, such as fin whales (*Balaenoptera physalus*), sei whales (*Balaenoptera borealis*), minke whales (*Balaenoptera acutorostrata*), humpback whales (*Megaptera novaeangliae*), sperm whales (*Physeter macrocephalus*), beaked whales (*Ziphius cavirostris*, *Mesoplodo*n spp.), long- and short-finned pilot whales (*Globicephala melas* and *G. macrorhynchus*, respectively), Risso's dolphins (*Grampus griseus*), common bottlenose dolphins (*Tursiops truncatus*), common dolphins (*Delphinus delphis*), Atlantic white-sided dolphins (*Lagenorhynchus acutus*), Atlantic spotted dolphins (*Stenella frontalis*), and striped dolphins (*Stenella coeruleoalba*) (CETAP 1982; Hain et al. 1985, 1992; Kenney and Winn 1986, 1987; Selzer and Payne 1988; Kenney 1990; Payne and Heinemann 1993; Waring et al. 1993, 2001; Northridge et al. 1997; Palka et al. 1997; Mead 2009; NEFSC and SEFSC 2012, 2013; Jefferson et al. 2014; Hayes et al. 2024). Fin, sei, and sperm whales are all listed as endangered under the U.S. Endangered Species Act (ESA).

Aerial and vessel surveys, as well as passive acoustic monitoring studies for the U.S. Navy Marine Species Monitoring Program (Mallette et al. 2017, 2018a; Salisbury et al. 2018; Foley et al. 2019; Cotter 2019), provide data on the distribution patterns of several species of cetaceans. These data support that the outer shelf area off Virginia within the VACAPES OPAREA would be an ideal location for more focused research on the ecology and behavior of several of these species. Offshore surveys were first conducted in association with the Mid-Atlantic Humpback Whale Monitoring project from April 2015 through June 2016 (Aschettino et al. 2016), and subsequently, a dedicated project focusing on outer continental shelf cetaceans was initiated in July 2016 (Engelhaupt et al. 2017).

Coverage has extended farther offshore as the study has evolved, and considering priority species are often encountered beyond the continental slope and not over the continental shelf, the project name has changed to the Offshore Cetacean Study (OCS, Engelhaupt et al. 2024). This progress report includes all offshore (i.e., near the shelf break and beyond) monitoring activities conducted in 2024 (January through July). The goals of this effort continue to focus on addressing fundamental information gaps related to marine mammal occurrence, exposure, and response as primary components of the conceptual framework for the U.S Navy's Marine Species Monitoring Program.

In order to address these informational gaps for offshore waters within the VACAPES OPAREA, a combination of techniques is being used, including: (1) photo-identification (photo-ID), photogrammetry, and behavioral data collection from vessels and drones to provide baseline assessments of animal movement patterns, site fidelity, habitat use, life history, and behavior; (2) biopsy sampling for incorporation into existing genetic studies (where opportunities exist) to identify individuals, establish gender, and assist in delineating stock structure; (3) satellite-linked telemetry tagging techniques to provide information about residency patterns, dive profiles, and habitat use across intermediate time scales (weeks to months); and (4) suction-cup tagging to investigate diving and foraging behavior through collection of high-resolution underwater movement and acoustic data across short-term time scales (hours to days).

Residency and movement patterns are of particular interest given the potential for repeated exposure to U.S. Navy training and testing activities known to occur within the area. Findings from work conducted near the continental shelf break off the coast of southeastern Virginia and Cape Hatteras, North Carolina, suggest a year-round presence of several species of cetaceans, including *Ziphius cavirostris* ("Ziphius") and short-finned pilot whales (McAlarney et al. 2018a, 2018b; Waples and Read 2020, 2021, 2022, 2023, 2024). Tagging efforts for this project provide opportunities to assess movement patterns of additional species, and may identify the extent of overlap between these animals as well as with offshore training and testing activities conducted within the VACAPES OPAREA. Given the duration of the tag attachments and experience from previous tagging studies within waters off Cape Hatteras, North Carolina (Baird et al. 2018), there is potential to track tagged animals more broadly, including through the Cherry Point OPAREA to the south and the Atlantic City OPAREA to the north.

Taking into consideration the multiple intermediate scientific objectives in the U.S. Navy's Strategic Planning Process (DoN 2013), the goals of this study are to assist the U.S. Navy and regulatory agencies with environmental planning and compliance by addressing the following questions:

- Which cetacean species occur within the VACAPES OPAREA off Virginia, and how does occurrence fluctuate seasonally?
- What are the baseline behaviors and ecological relationships of offshore cetaceans within the study area?
- Do individual cetaceans exhibit site fidelity within specific regions of the study area over periods of weeks, months, or years?
- What is the seasonal extent of cetacean movements within and around U.S. Navy VACAPES training range boxes?
- Do cetaceans spend significant time within or primarily move through areas of U.S. Navy live-fire or Anti-Submarine Warfare training events?

2. Methods

The primary survey area includes the offshore waters (approximately 90 to 160 kilometers [km] or 50 to 85 nautical miles [nm]) off the coast of Virginia (**Figure 1**). The offshore study area includes the outer continental shelf, shelf break, slope waters, and Norfolk and Washington Canyons. Depths within the core study area range from approximately 50 meters (m) to as much as 2,500 m.

2.1 Survey Operations

The 16.2-m offshore charter sport-fishing vessel *Top Notch* (**Figure 2)** was the primary vessel used in 2024 to support surveys. Other similar charter vessels were used when *Top Notch* was not available. Each vessel is equipped with a Global Positioning System (GPS) receiver, marine radio, emergency beacon, life raft, depth sounder, and emergency equipment. All captains are familiar with the Virginia Beach waterways and unique characteristics of the region and hold U.S. Coast Guard-approved 100-ton master's licenses. The scientific crew typically consisted of a minimum of three marine mammal observers (MMOs), but no more than five, including (at least) one photographer/drone operator, one tagging specialist, and one biopsy specialist/data recorder. Roles were generally interchangeable throughout surveys. An aerial survey platform was integrated at times to assist as a spotter in locating priority species for the vessel team to work with (Ozog and Engelhaupt 2025).

Survey departure times were planned to maximize weather and clearance windows, and to take into account the long transit time to reach the survey area (approximately 3 hours [hr] each way when transiting at 20-plus knots). Survey days were planned to use survey time within the area of interest during optimal weather conditions, including good visibility and a Beaufort sea state (BSS) of 3 or lower when possible, as well as access to the VACAPES OPAREA range boxes within the study area (K3, K4, I4, 1B1, 1B2, 1B3, and 1B4; **Figure 1**) so that the research vessels had clearance to operate when training was not being conducted.

All surveys departed from Rudee Inlet in Virginia Beach, Virginia. In order to maximize achievement of the project's core objectives, departures from the marina were scheduled at approximately sunrise or earlier, and a minimum of 12 hr was allocated for each survey day.. MMOs were on-effort during the outbound and inbound transit as long as there was sufficient daylight and a BSS of 4 or lower. Due to the distance from shore and overall effort required to complete each survey day, effort within the primary study area continued until the end of the survey day even if sea states turned unfavorable (BSS of 4 to 6), unless conditions were deemed to be unsafe. Every effort was made to avoid such circumstances by following weather forecasts closely before commencing a survey day.

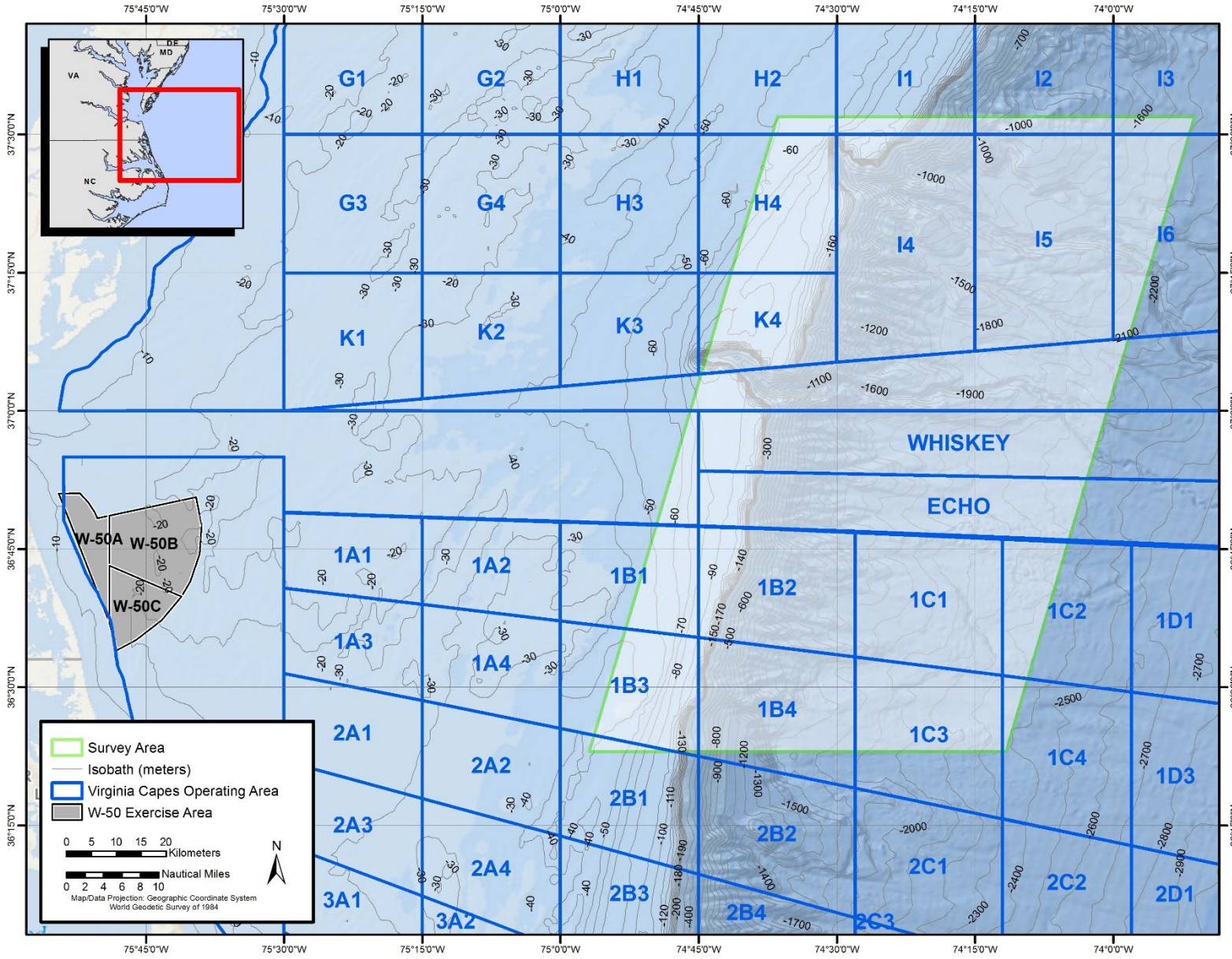

Figure 1. Map of the offshore study area off southeastern Virginia and northern North Carolina, and VACAPES training range surface grid within the region.

Figure 2. The primary sport-fishing vessel chartered for use during offshore surveys, the 16.2-m *Top Notch*.

The survey area for each day was chosen depending on weather conditions, clearance, and reports of high-priority species (e.g., information from recent aerial or vessel surveys). Areas of high U.S. Navy training use, such as the Norfolk Canyon area (**Figure 1**), were priorities. The survey vessel often followed pre-determined tracks that covered high-priority regions; however, because these surveys were intended to maximize the potential for making observations, they did not follow line-transect distance-sampling protocols. The vessel maintained a speed of approximately 18 to 22 km/hr (10 to 12 knots) during search efforts, which often followed a zig-zag pattern to waypoints chosen on the day of survey that would optimize coverage across the depth gradient within the areas that could be accessed that day.

The on-effort MMOs used both unaided eyes and 10x30 hand-held, image-stabilized binoculars. MMOs covered a 270-degree swath of observation area in front and to the sides of the survey vessel. Once in deep water (more than 400 m), a directional hydrophone was also used to listen for sperm whales periodically. If clicks were heard, every effort was made to localize the detections and maneuver the vessel toward where the whales were heard. If no clicks were heard, the vessel would continue transiting before stopping approximately 20 to 30 minutes (min) later to listen within a different area.

Once a sighting was made, one MMO focused on data entry using Cetacean Observation and Marine Protected Animal Survey Software (COMPASS; Richlen et al. 2019) running on an Apple iPad tablet, while others focused on visual tracking and obtaining photo-ID images of the individual or group. In addition to photo-ID, some species were targeted for drone data collection, biopsy sampling, satellite tagging, and/or suction-cup tagging. Baleen, sperm, and beaked whales were given highest priority in terms of time and effort spent collecting information as well as attempting to deploy tags and collect samples. Species not frequently

seen within the area, such as killer whales (*Orcinus orca*), false killer whales (*Pseudorca crassidens*), melon-headed whales (*Peponocephala electra*), and pygmy killer whales (*Feresa attenuata*) were also considered high-priority if encountered. Pilot whales and Risso's dolphins were generally medium-priority species and only approached if higher-priority species were not encountered; however, because of the high number of pilot whale sightings, groups were not always approached for identification to species and photo-ID documentation. Other delphinid species were low priority, and effort spent collecting data and conducting photo-ID was limited to confirming species identification, estimating group size, and determining initial behavior if time allowed.

During a high-priority marine mammal sighting, the research vessel would attempt to approach the animal(s) for photo-ID, biopsy sampling, focal-follow data collection, drone video collection, and/or tagging. The approach was done in a manner to minimize disturbance to the animals and maximize the crew's abilities to confirm species, estimate group size, and collect photo-IDs and video. The Chief Scientist made the decision regarding when to end data-collection efforts on a priority species or switch to a different sighting.

2.2 Photography, Photogrammetry, and Data Logging

Photo-ID images were collected using a digital single-lens reflex camera (Canon 7D Mark II or 1DX Mark II) or a mirrorless camera (Canon R5) with a zoom lens (Canon 100- to 400-millimeter). Every effort was made to obtain good-quality photographs of the flukes and/or dorsal fins of high-priority species encountered. Following each survey day, photographs were cropped and compiled in a format suitable for data sharing with other catalogs. All baleen whale images are added to HDR catalogs and are summarized in the *Mid-Atlantic Baleen Whale Photo-Identification Efforts: 2023/24 Annual Progress Report* (Aschettino et al. 2025a). Deep-diving whale images were added to the HDR catalogs shared with known regional and local catalogs North Atlantic and Mediterranean Sperm Whale Catalog curated by Whale Watch Azores, Cape Hatteras Short-finned Pilot Whale and Cuvier's Beaked Whale Catalogs maintained by Duke University (Waples and Read 2025).

During surveys, the data recorder maintained a log of observers, environmental conditions, and sighting information in COMPASS. Environmental data were updated whenever sighting conditions changed. When a sighting was made, information regarding the distance and bearing to the sighting, species identification, speed and direction of the animal(s), group size, photographs, and videos was logged when available. Sighting distances were estimated visually. Location data and vessel speed were obtained from a GPS unit feeding directly into the iPad and logging a location every 30 seconds.

The use of a drone was incorporated into the field effort beginning in 2019. A DJI Phantom 4 Pro V2.0 was used to collect morphometric data and assess overall body condition. Data were typically collected at flight heights between 15 and 30 m, depending on the behavior of the focal animal during the time of the encounter. The drone collected 4K ultra-high-definition video at 30 frames per second. Initial measurements were made from data using altitude values from the stock barometer (DJI Phantom 4 Pro); however HDR recently assembled and installed a custom Light Detection and Ranging (LiDAR) precision altimeter on the drone (described in Dawson et al. 2017) to increase precision. This upgrade improves accuracy of reading to ±5 centimeters

(cm). To allow for National Defense Authorization Act compliance, HDR has acquired an Astro Freefly drone, which is in the process of customization to allow the added feature of archival suction cup tag drops. While waiting for this to be completed, no drone data was collected during the 2024 season.

2.3 Biopsy Sample Collection

The survey team collected biopsy samples from priority species after finishing photo-ID image collection. Biopsy samples were collected with a sampling dart fired from a Barnett Recurve crossbow (Barnett Outdoors, LLC, Tarpon Springs, Florida). Skin samples were placed in a Whirl-Pak® bag after collection and stored in an ice cooler on the vessel. Samples were then cross-sectioned, placed in the appropriate Cryovial® storage tube, and stored in a freezer until ready for shipment. Samples for humpback and fin whale genetic analyses were collected for the University of Groningen, and samples for sperm whale genetic analyses were collected for Oregon State University.

2.4 Satellite Tagging

Three types of tags from Wildlife Computers (Redmond, Washington)—Argos-linked, location-only, Smart Position and Temperature (SPOT-365); Argos-linked, time-depth archival (SPLASH10-333); and Argos-linked, time-depth archival with Fastloc® GPS technology (SPLASH10-F-333), all in the external Low-Impact Minimally Percutaneous Electronic Transmitter (LIMPET) configuration (Andrews et al. 2008)—were deployed on priority species. Tags were deployed remotely with a DAN-INJECT J.M.SP.25 carbon dioxide projector (DAN-INJECT ApS, Børkop, Denmark).

The LIMPET design uses two surgical-grade titanium darts, measuring 6.8 cm long and containing six backwards-facing petals, to attach tags to or just below the dorsal fin. Tags were programmed to maximize the number of transmissions and locations received during attachment rather than to extend battery life, which was based on expected LIMPET tag attachment durations of less than 60 days on baleen and sperm whales. Based on satellite availability within the area, tags were programmed to transmit for 16 hr per day and were limited to 600 to 1,300 transmissions per day, depending on tag type and species.

In order to constitute a “dive” for the behavior and time-series data outputs of the SPLASH10 and SPLASH10-F tags, a dive definition was established for sperm whales in which a submergence needs to be both deeper than 2 m and longer than 5 min and dives shallower than 50 meters were ignored. The dive definition for baleen whales was deeper than 2 m and longer than 2 min. Locations of tagged individuals were tracked by estimated by the Argos system using the Kalman filtering location algorithm (Argos User’s Manual© 2007–2015 Collective Location Services), with the addition of GPS for SPLASH10-F tags. Using tools provided within Movebank, unrealistic Argos locations (e.g., on land) were manually removed prior to a further, final, Douglas Argos filtering step. Additional dive-data results were obtained using the statistical software R (R Core Team 2018).

2.5 Digital Archival Tagging

Suction-cup tag deployments for short-duration, high-resolution, dive data collection were added to the project beginning in the 2021 season. Digital acoustic recording tags (DTAGs; Johnson and Tyack 2003) are the only available suction-cup tags rated for deep water, and can be deployed on sperm whales and used to assess their fine-scale diving and foraging behavior in the Mid-Atlantic region, specifically in the VACAPES OPAREA. Version 3 DTAGs were deployed using a hand-held carbon fiber pole. DTAGs were equipped with hydrophones, pressure sensors, a three-axis accelerometer and magnetometer, as well as a GPS logger. The audio sampling rate was set to 240 kilohertz (kHz) for sperm whales. Programmed release time was set according to conditions and logistics to facilitate best opportunity for tag retrieval. Each tag also contained a very high frequency (VHF) transmitter that facilitates recovery of the tag using Communications Specialists, Inc. R-1000 VHF receivers with hand-held Yagi antennas (www.com-spec.com) to direct the vessel to the tag location after release from the animal.

Customized Animal Tracking Solutions (CATS) tags were incorporated for the 2022/23 season of the *Mid-Atlantic Nearshore and Mid-Shelf Baleen Whale Monitoring Project* (Aschettino et al. 2024a), and available for deployment during OCS surveys for baleen whales. CATS tags also used suction-cup attachments, were deployed using a hand-held carbon fiber pole, and must be retrieved for data recovery. The audio-sampling rate was set to 120 kHz for baleen whales, and programmed release time was set according to conditions and logistics to facilitate the best opportunity for tag retrieval. The customized CATS tag contained a 4K high-resolution video camera in addition to the diary that recorded accelerometer, magnetometer, gyroscope, and pressure data as well as a single hydrophone. The CATS tag also included a VHF transmitter and SPOT-6 satellite tag to support recovery.

Tag calibration and data visualization following recovery was completed using a suite of tools found on animaltags.org using MATLAB R2023a. CATS tag calibration steps are outlined in Cade et al. (2021).

3. Results

Fifteen offshore vessel surveys were conducted between March and July 2024, covering 4,510 km of trackline during more than 190 hr of effort (**Table 1; Figure 3**). Following detection of an unusually high number of baleen whale sightings during May, an increase in survey effort was directed to the area 100 to 120 km (approximately 54 to 65 nm) from shore during the following month.

Surveys during 2024 resulted in 169 marine mammal and 9 sea turtle sightings (**Figure 4** through **Figure 7**; **Appendices A** and **B**). Eleven cetacean taxa were identified (in order of decreasing frequency): fin whale (*n*=57), humpback whale (*n*=31), common dolphin (*n*=23), common bottlenose dolphin (*n*=14), pilot whale (*n*=12), North Atlantic right whale (NARW [*Eubalaena glacialis*]; *n*=11), sei whale (*n*=8), Risso's dolphin (*n*=7), sperm whale (*n*=5), and Atlantic spotted dolphin (*n*=1). One sea turtle species was identified: loggerhead turtle (*Caretta caretta*; *n*=9). Because both short- and long-finned pilot whales may occur within this region, most sightings of the genus *Globicephala* were not assigned a species unless they were closely approached and could be definitively identified, which was not typically the case.

Table 1. Summary of 2024 offshore survey effort and sightings within the VACAPES OCS study area.

Date	Survey Duration (min)	Distance Surveyed (km)	No. Sightings	No. Individuals	Baleen Whales No. Sightings/ No. Individuals	Deep Diving Whales[a] No. Sightings/ No. Individuals	Dolphins No. Sightings/ No. Individuals	Sea Turtles No. Sightings/ No. Individuals
1-Mar-24	698	299	6	107	3/7	0/0	3/100	0/0
13-Mar-24	761	326	11	501	2/3	4/5	5/493	0/0
14-Mar-24	819	316	10	182	5/9	1/7	4/166	0/0
2-May-24	730	192	12	44	10/25	1/15	1/4	0/0
13-May-24	787	299	14	114	11/24	0/0	3/90	0/0
22-May-24	896	337	10	114	4/21	3/52	3/41	0/0
25-May-24	922	287	7	43	6/33	0/0	1/10	0/0
26-May-24	686	306	7	151	3/16	0/0	4/135	0/0
29-May-24	891	317	10	117	7/35	0/0	1/80	2/2
30-May-24	717	261	16	41	16/41	0/0	0/0	0/0
1-Jun-24	746	320	25	364	17/46	0/0	7/317	1/1
4-Jun-24	699	326	14	149	6/9	1/21	5/116	2/3
10-Jun-24	801	323	15	173	6/28	6/108	3/37	0/0
12-Jun-24	733	274	19	147	11/19	0/0	4/117	4/11
3-Jul-24	721	327	2	15	0/0	1/5	1/10	0/0
Totals	**11,607**	**4,510**	**178**	**2,258**	**107/316**	**17/213**	**45/1,716**	**9/17**

Key: No. = number

[a] Sperm, pilot, and beaked whales

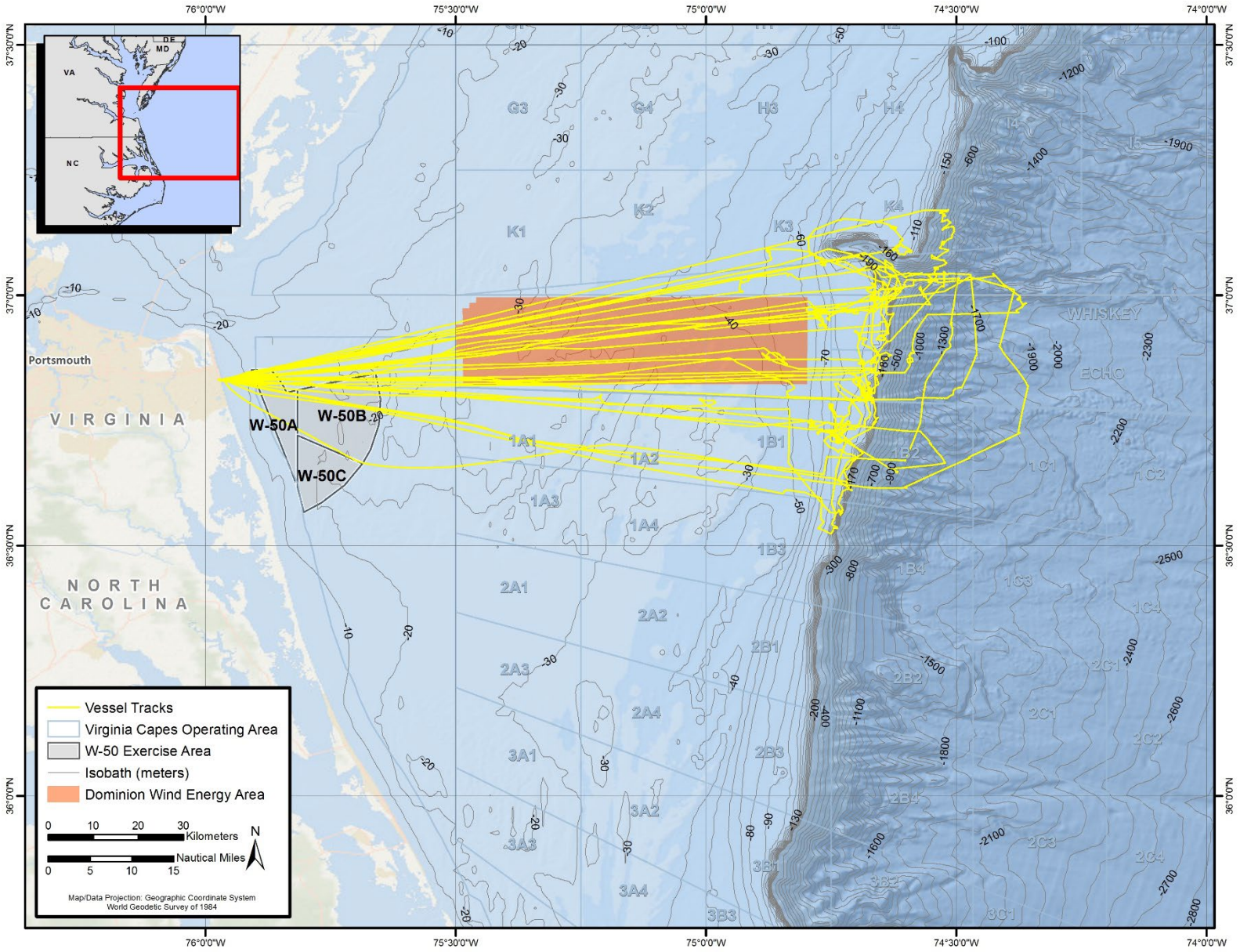

Figure 3. Offshore survey tracks for all surveys conducted in 2024.

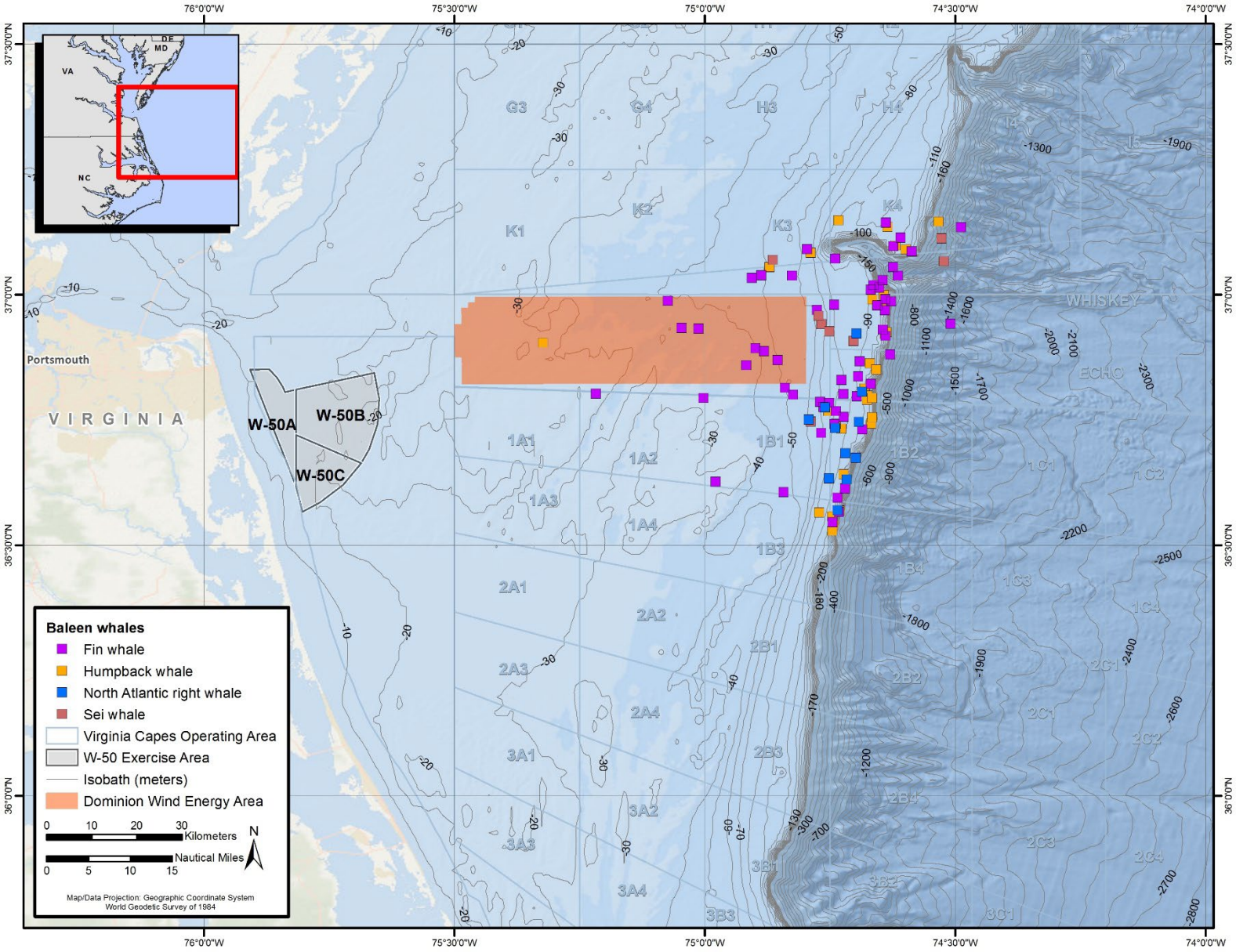

Figure 4. Locations of all baleen whale sightings (*n*=106) during OCS surveys in 2024.

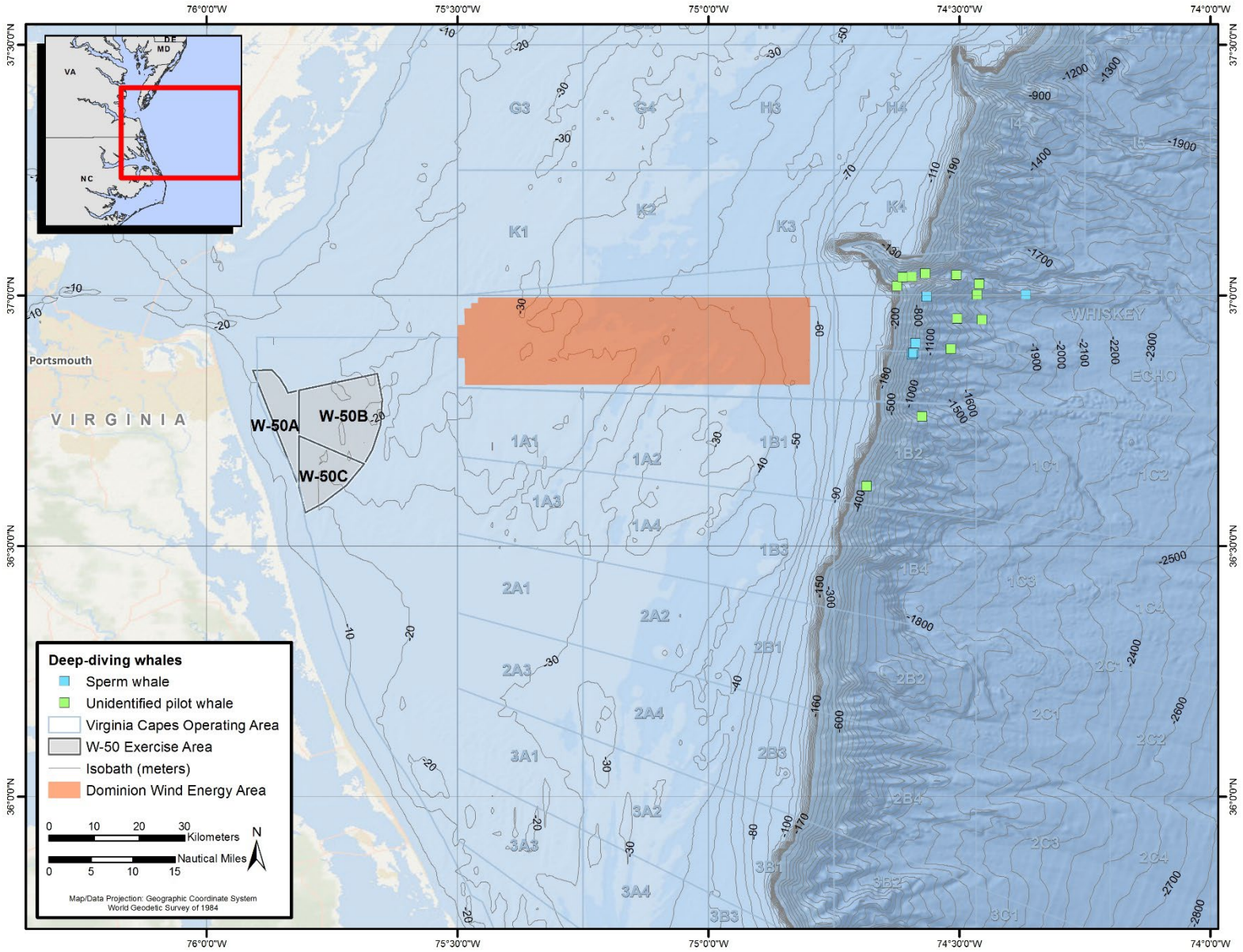

Figure 5. Locations of all deep diving whale sightings (*n*=16) during OCS surveys in 2024.

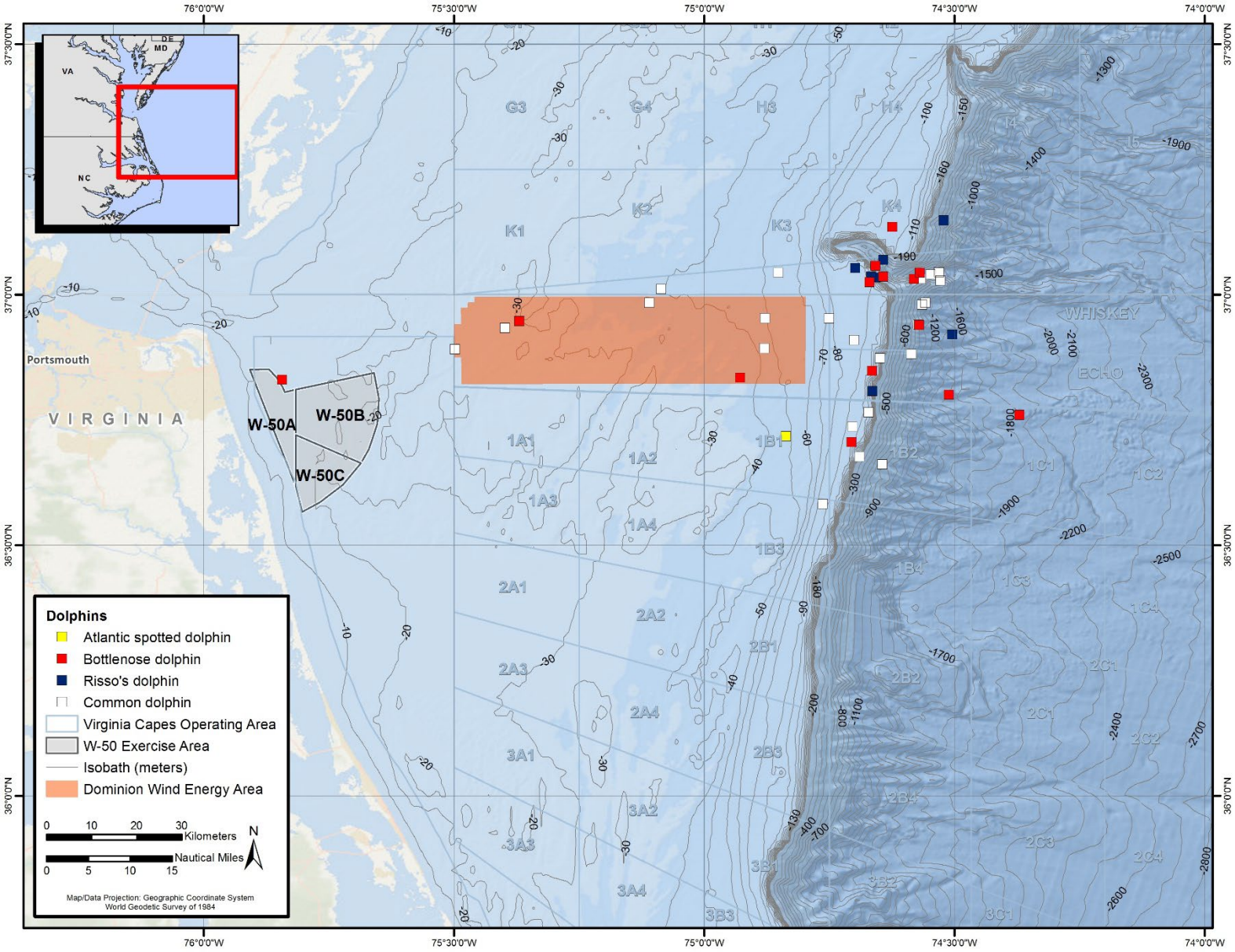

Figure 6. Locations of all dolphin sightings (*n*=43) during OCS surveys in 2024.

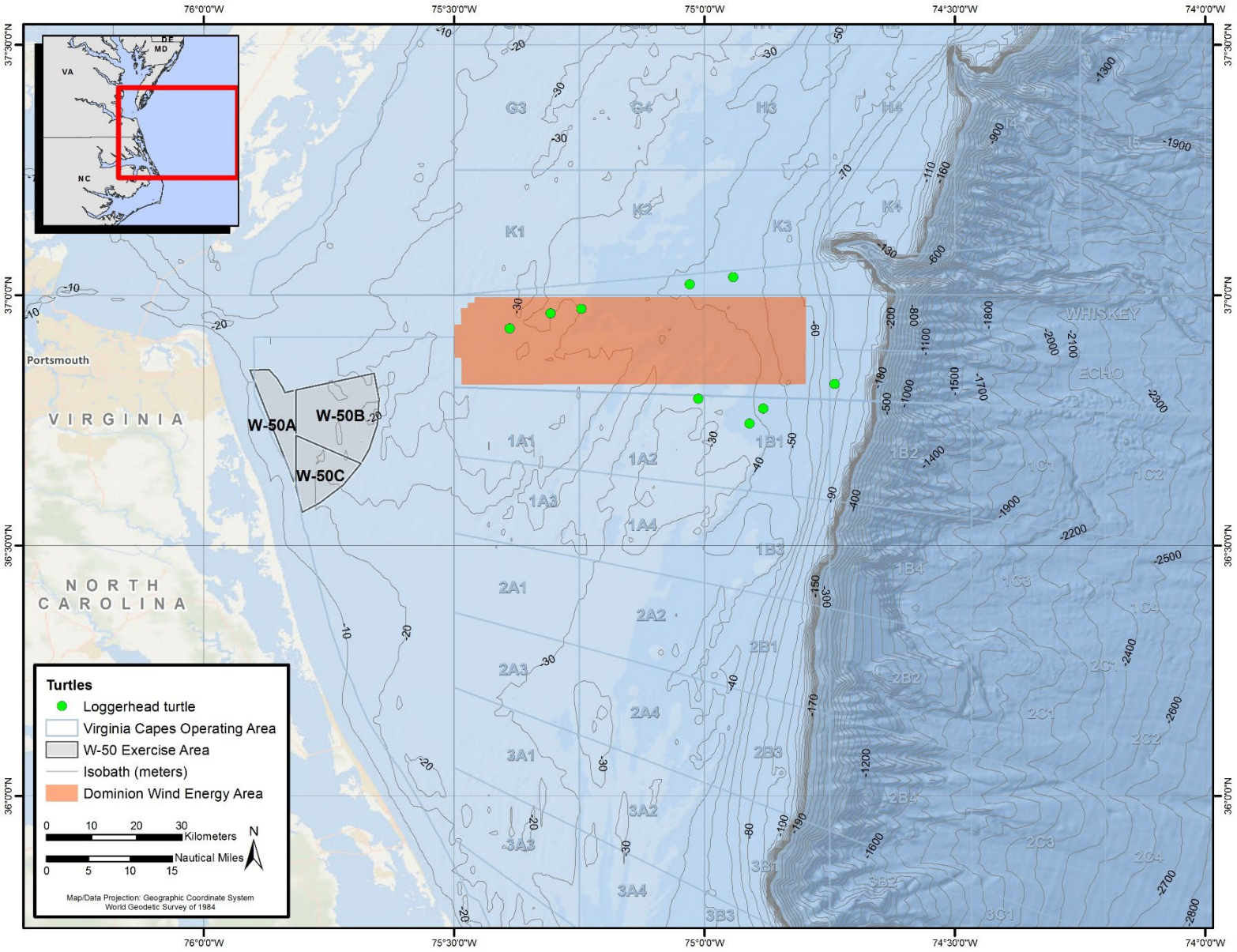

Figure 7. Locations of all sea turtle sightings (*n*=9) during OCS surveys in July 2024.

3.1 Photo-identification and Photogrammetry

Photo-ID images were collected from 86 of the 169 marine mammal sightings. All photographs of baleen whales were added to HDR's existing catalogs, and results are reported in Aschettino et al. 2025a, except sei whale images, which have been shared with the Northeast Fisheries Science Center to add to their catalog. Five unique sperm whales were identified in 2024 and added to the sperm whale catalog (**Appendix C**), which now contains 147 individuals. All sperm whale individuals photographed 13 May 2024 were new individuals to the catalog, and four of the five were re-sighted the following day. Of the total catalog of 147 individuals, 26 (17.7 percent) were sighted on more than 1 day, ranging from 1 to 2,185 days between first and last sightings (mean = 426, median = 343).

Drone video data was not recorded during this reporting period, and no additional photogrammetry analysis has been completed.

Pilot whale photographs have been provided to Duke University, and comparisons of individuals through 2024 with their Cape Hatteras catalog have been completed (Waples and Read 2025). Waples and Read (2025) added an additional four individuals to the pilot whale catalog for this project, none of which were re-sightings.

3.2 Biopsy Sample Collection and Genetic Analysis

In 2024, seven biopsies were collected: two from sperm whales, two from humpback whales, and three from fin whales (**Appendix C**). Processing and analysis of these samples will occur in the future. The sperm whale samples will be held at HDR and sent to Oregon State University for processing along with any additional samples collected during spring and summer 2025. The humpback and fin whale samples were sent to the University of Groningen to add to the data for the *Mid-Atlantic Nearshore and Mid-shelf Baleen Whales Monitoring Projec*t (Aschettino et al. 2025b).

3.3 Satellite Tagging

Ten satellite tags were successfully deployed in 2024: four on sperm whales, two on humpback whales, and four on fin whales (see **Table 2**, **Table 5**, and **Table 8** at the end of this subsection). Nine tags were either SPLASH10 or SPLASH10-F tags, which collected both location and dive depth/duration information (**Table 4**, **Table 7**, and T**able 10** at the end of this subsection).

Tag durations for sperm whales ranged from 10.1 to 32.5 days (**Table 2**). Locations from satellite-tagged sperm whales showed movements throughout the VACAPES OPAREA (**Figure 8** through **Figure 18**), with the exception of HDRVAPm146, whose track showed movement directly east of VACAPES with a break to the north and back to a similar track, outside the OPAREAs north of the study area (**Figure 9**). Within the VACAPES OPAREA, tagged sperm whales spent time in the boxes along the continental shelf break, including E3, E5, E6, F1, H4, I1, I2, I4, K4, 1C1, 1C2, 1C3, 1C4, 2C1, 2C2, 1D3, 1D4, 1D2, and 1E1, as well as the Whiskey and Echo Corridors (**Figure 9** through **Figure 18**).

Tagged sperm whales traveled up to 1,663 km from initial tag deployment locations, and 21.3 to 100.0 percent of their locations were within the VACAPES OPAREA (**Table 3**). Maximum dive depths were 1,023 and 1,119 m, and maximum dive durations were 47.5, 57.4, and 39.1 min (**Table 4**).

Tag durations for humpback whales were 5.5 and 10.1 days (**Table 5**). Locations from satellite-tagged humpback whales were all near the continental shelf break and south of the tag deployment coordinates (**Figure 13** and **Figure 14**). Locations were within several VACAPES OPAREA boxes (1B1, 1B2, 1B3, 1B4, 2B1, 2B2) as well as the Whiskey and Echo Corridors. Tagged humpback whales traveled up to 75 km from initial tag deployment locations, and 88.7 and 100.0 percent of their locations were within the VACAPES OPAREA (**Table 6**). Maximum dive depths were 225 and 209 m, and maximum dive durations were 8.8 and 9.9 min (**Table 7**).

Fin whale satellite tag durations ranged from 10.9 to 23.5 days (**Table 8**). Tag locations showed extensive movements limited to the VACAPES OPAREA and several into the Atlantic City OPAREA (**Figure 15** through **Figure 18**). Two of the individuals only spent time on the continental shelf (HDRVABp142**, Figure 15**; HDRVABp143, **Figure 16**), with the other two along the break, both in shallow water and over the slope (HDRVABp163, **Figure 17**; HDRVABp164, **Figure 18).** HDRVABp142 (**Figure 15**) and HDRVABp143 (**Figure 16**) spent time within the extended wind energy lease area also. Within the VACAPES OPAREA, tagged fin whale locations were contained in boxes B1, B2, B3, C1, C2, C3, D1, D2, D4, D5, E1, E2, E3, E4, E5, H1, H2, H3, H4K2, K3, K4, I2, I4, P1, 1A2, 1B1, 1B2, and within the Whiskey and Echo Corridor area where the wind energy lease area is located (**Figure 15** through **Figure 18**).

Tagged fin whales traveled 87 to 258 km from initial tag deployment locations, and 41.7 to 87.0 percent of their locations were within the VACAPES OPAREA (**Table 9**). Maximum dive depths ranged from 62 to 419 m, and maximum dive durations were from 10.4 to 11.6 min (**Table 10**).

Comparison of Argos and GPS locations collected from SPLASH10-F tags (**Figure 13 through Figure 18**) shows the greater accuracy of the GPS but reduced duration of dataset.

Table 2. Summary of tag deployment details for all sperm whale tags deployed in 2024.

Animal ID	Tag Type	Argos ID	Deployment (GMT)	Deployment Latitude (°N)	Deployment Longitude (°W)	Depth at Tagging Location (m)	Last Transmission (GMT)	Tag Duration (days)
HDRVAPm149	SPLASH10	202812	2024-Mar-13 18:03	36.8832	74.5920	783	2024-Apr-04 21:36	21.9
HDRVAPm146	SPLASH10	202814	2024-Mar-13 18:43	36.8672	74.5899	898	2024-Apr-15 20:44	32.5
HDRVAPm147	SPLASH10	204341	2024-Mar-14 19:25	37.1489	74.5285	917	2024-Mar-25 02:40	10.1
HDRVAPm148	SPOT6	229394	2024-Mar-14 20:17	37.1663	74.5319	917	2024-Mar-27 22:52	13.0

Key: GMT = Greenwich Mean Time; ID = Identification Number; °N = degrees North; °W = degrees West

Table 3. Summary of results from satellite-tag data for all sperm whale tags deployed in 2024.

Animal ID	Argos ID	No. of Locations Post Filtering	% Within VACAPES OPAREA	Max Distance from Initial Location (km)	Mean Distance from Initial Location (km)
HDRVAPm149	202812	318	99.7	157.3	49.7
HDRVAPm146	202814	507	21.3	1,663.2	706.9
HDRVAPm147	204341	131	100.0	73.7	33.8
HDRVAPm148	229394	124	100.0	46.1	19.9

Key: ID = Identification Number; Max = maximum; No. = number

Table 4. Summary of dive data for all sperm whale SPLASH10 tags deployed in 2024.

Animal ID	Argos ID	No. Dives Logged	Mean Dive Depth (m)	Max Dive Depth (m)	Mean Dive Duration (mm.ss)	Max Dive Duration (mm.ss)
HDRVAPm149	202812	589	525.1	1,023	34.02	47.48
HDRVAPm146	202814	1,143	328.3	1,119	28.65	57.35
HDRVAPm147	204341	229	416.1	1,023	27.10	39.12

Key: ID = Identification Number; Max = maximum; mm.ss = minutes.seconds; No. = number

Table 5. Summary of tag deployment details for all humpback whale tags deployed during OCS surveys in 2024.

Animal ID	Tag Type	Argos ID	Deployment (GMT)	Deployment Latitude (°N)	Deployment Longitude (°W)	Depth at Tagging Location (m)	Last Transmission (GMT)	Tag Duration (days)
HDRVAMn311	SPLASH10-F	208688	2024-May-13 18:07	36.9104	74.6497	128	2024-May-19 09:12	5.5
HDRVAMn312	SPLASH10-F	201572	2024-May-13 18:15	36.9121	74.6572	128	2024-May-23 21:53	10.1

Key: GMT = Greenwich Mean Time; ID = Identification Number; °N = degrees North; °W = degrees West

Table 6. Summary of results from satellite-tag data for all humpback whale tags deployed during OCS surveys in 2024.

Animal ID	Argos ID	No. of Locations Post Filtering	% Within VACAPES OPAREA	Max Distance from Initial Location (km)	Mean Distance from Initial Location (km)
HDRVAMn311	208688	112	100.0	75.8	28.5
HDRVAMn312	201572	309	88.7	53.6	25.5

Key: ID = Identification Number; Max = maximum; No. = number

Table 7. Summary of dive data for all humpback whale SPLASH10-F tags deployed during OCS surveys in 2024.

Animal ID	Argos ID	No. Dives Logged	Mean Dive Depth (m)	Max Dive Depth (m)	Mean Dive Duration (mm.ss)	Max Dive Duration (mm.ss)
HDRVAMn311	208688	415	90.9	225	4.04	8.75
HDRVAMn312	201572	915	75.4	209	3.85	9.82

Key: ID = Identification Number; Max = maximum; mm.ss = minutes.seconds; No. = number

Table 8. Summary of tag deployment details for all fin whale tags deployed during OCS surveys in 2024.

Animal ID	Tag Type	Argos ID	Deployment (GMT)	Deployment Latitude (°N)	Deployment Longitude (°W)	Depth at Tagging Location (m)	Last Transmission (GMT)	Tag Duration (days)
HDRVABp142	SPLASH10-F	221012	2024-May-29 12:04	36.8765	74.8443	55	2024-Jun-09 11:30	10.9
HDRVABp143	SPLASH10-F	221009	2024-May-29 12:57	36.8753	74.8744	55	2024-Jun-14 04:28	15.2
HDRVABp163	SPLASH10-F	240212	2024-Jun-12 16:32	37.1088	74.6106	99	2024-Jul-06 04:18	23.5
HDRVABp164	SPLASH10-F	240213	2024-Jun-12 17:45	37.0867	74.5931	115	2024-Jul-01 12:04	18.6

Key: GMT = Greenwich Mean Time; ID = Identification Number; °N = degrees North; °W = degrees West

Table 9. Summary of results from satellite-tag data for all fin whale tags deployed during OCS surveys in 2024.

Animal ID	Argos ID	No. of Locations Post Filtering	% Within VACAPES OPAREA	Max Distance from Initial Location (km)	Mean Distance from Initial Location (km)
HDRVABp142	221012	228	41.7	87.9	15.5
HDRVABp143	221009	269	87.0	237.3	92.4
HDRVABp163	240212	618	64.7	258.7	125.6
HDRVABp164	240213	424	74.8	209.5	103.3

Key: ID = Identification Number; Max = maximum; No. = number

Table 10. Summary of dive data for all fin whale SPLASH10-F tags deployed during OCS surveys in 2024.

Animal ID	Argos ID	No. Dives Logged	Mean Dive Depth (m)	Max Dive Depth (m)	Mean Dive Duration (mm.ss)	Max Dive Duration (mm.ss)
HDRVABp142	221012	710	22.5	76	3.10	10.58
HDRVABp143	221009	645	33.9	62	3.59	11.55
HDRVABp163	240212	1,690	86.5	419	3.60	10.38
HDRVABp164	240213	791	96.1	275	5.04	11.55

Key: ID = Identification Number; Max = maximum; mm.ss = minutes.seconds; No. = number

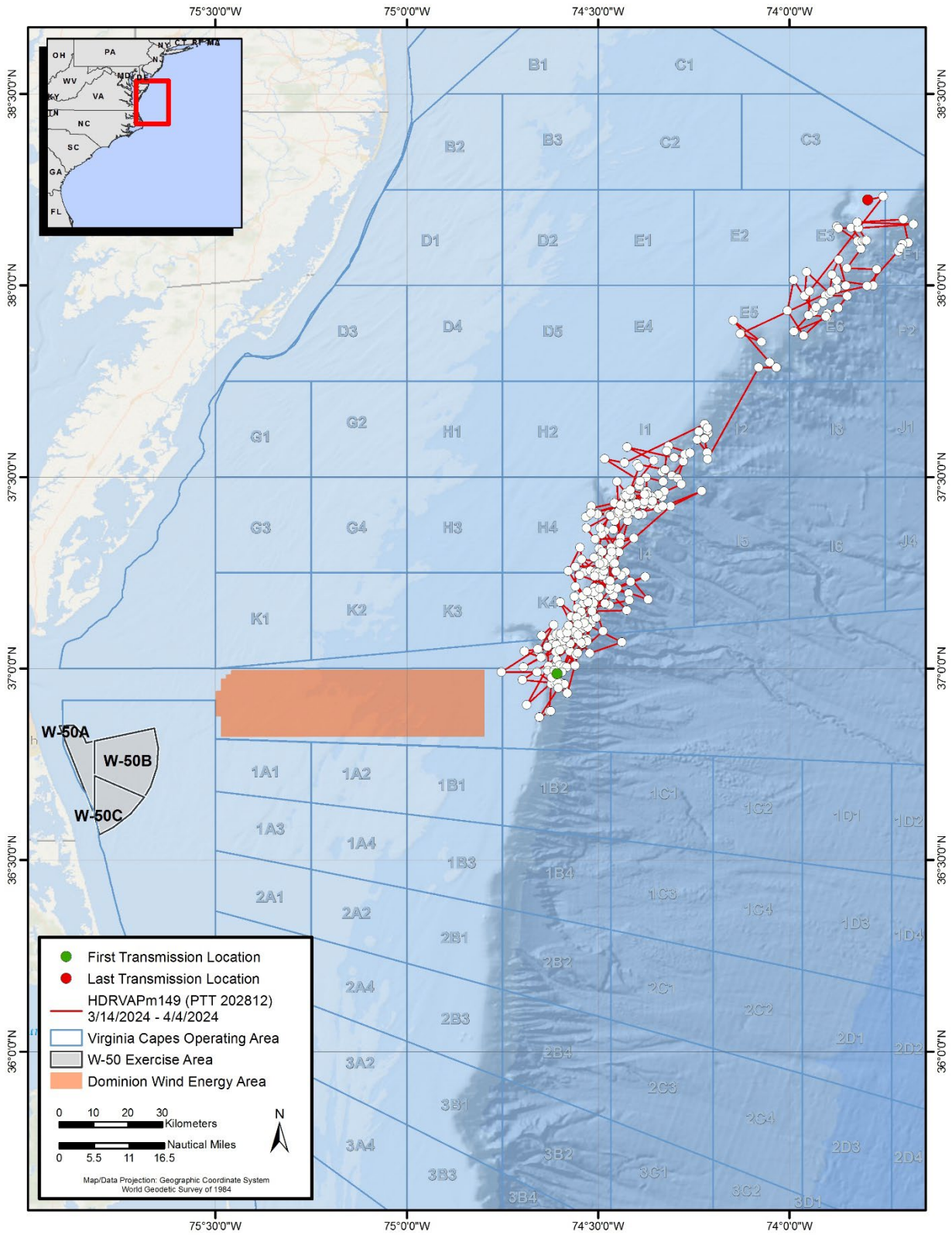

Figure 8. Filtered Argos locations (white dots) and track of sperm whale HDRVAPm149 over 21.9 days.

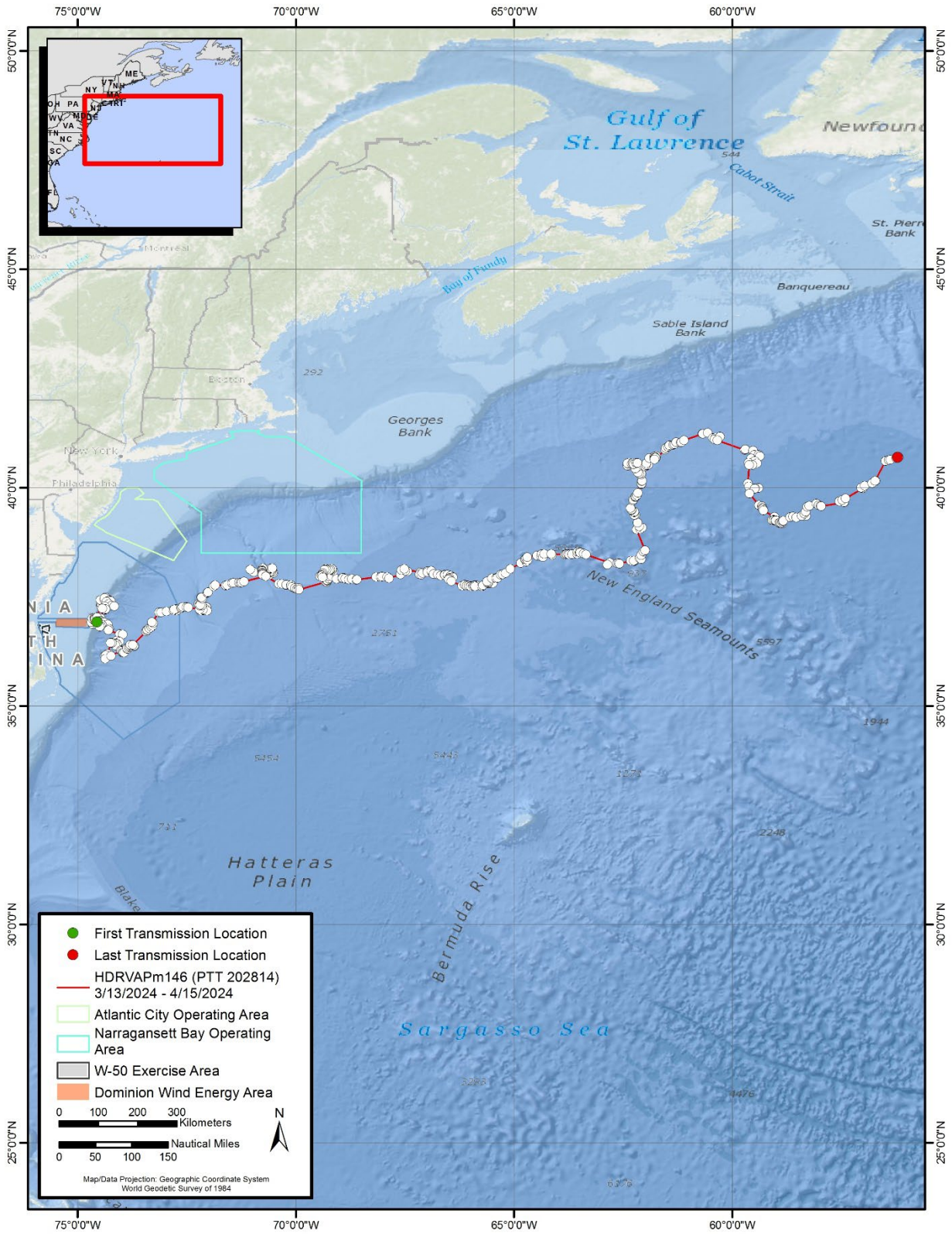

Figure 9. Filtered Argos locations (white dots) and track of sperm whale HDRVAPm146 over 32.5 days.

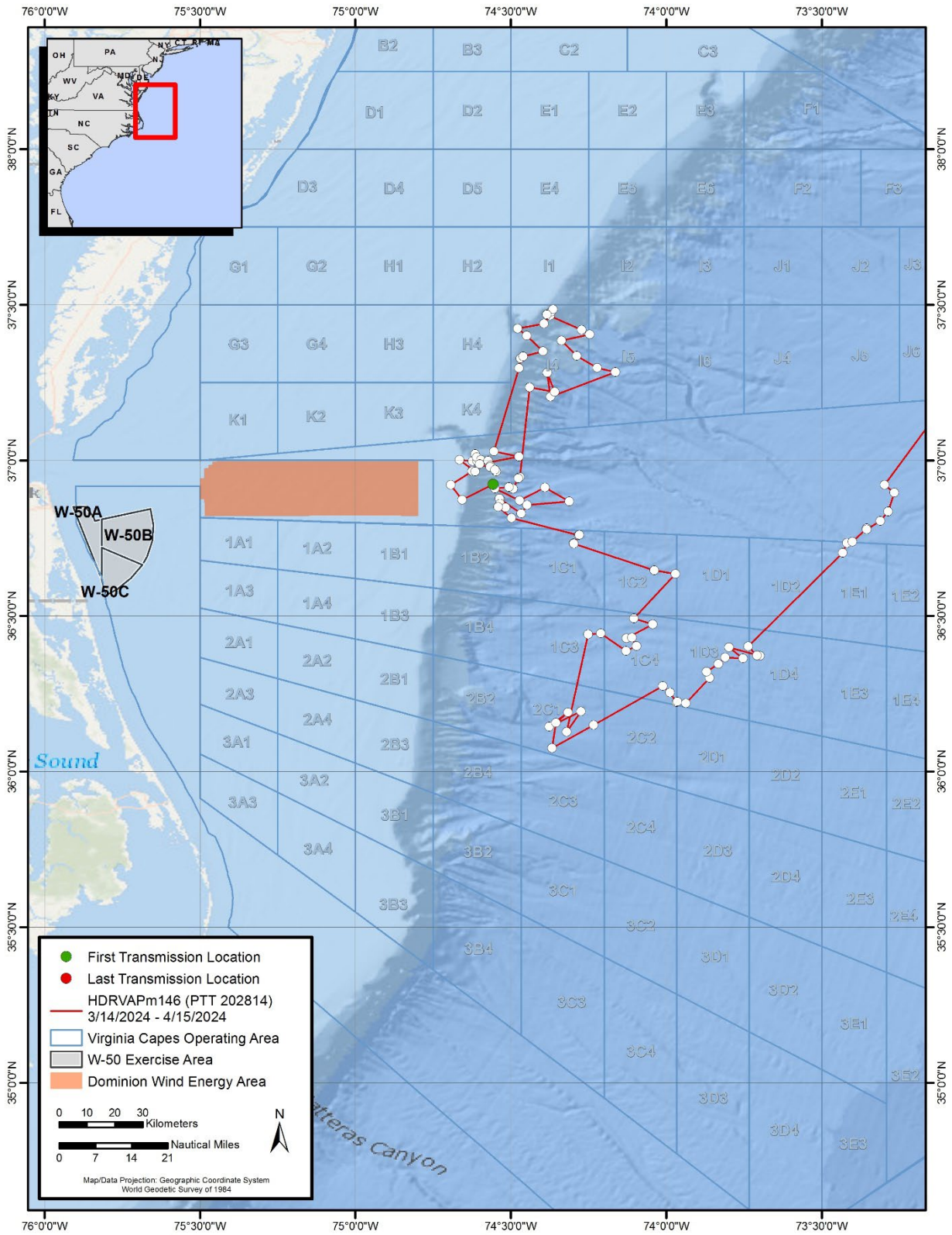

Figure 10. Filtered Argos locations (white dots) and track of sperm whale HDRVAPm146, zoomed to show detail of time spent within the VACAPES OPAREA.

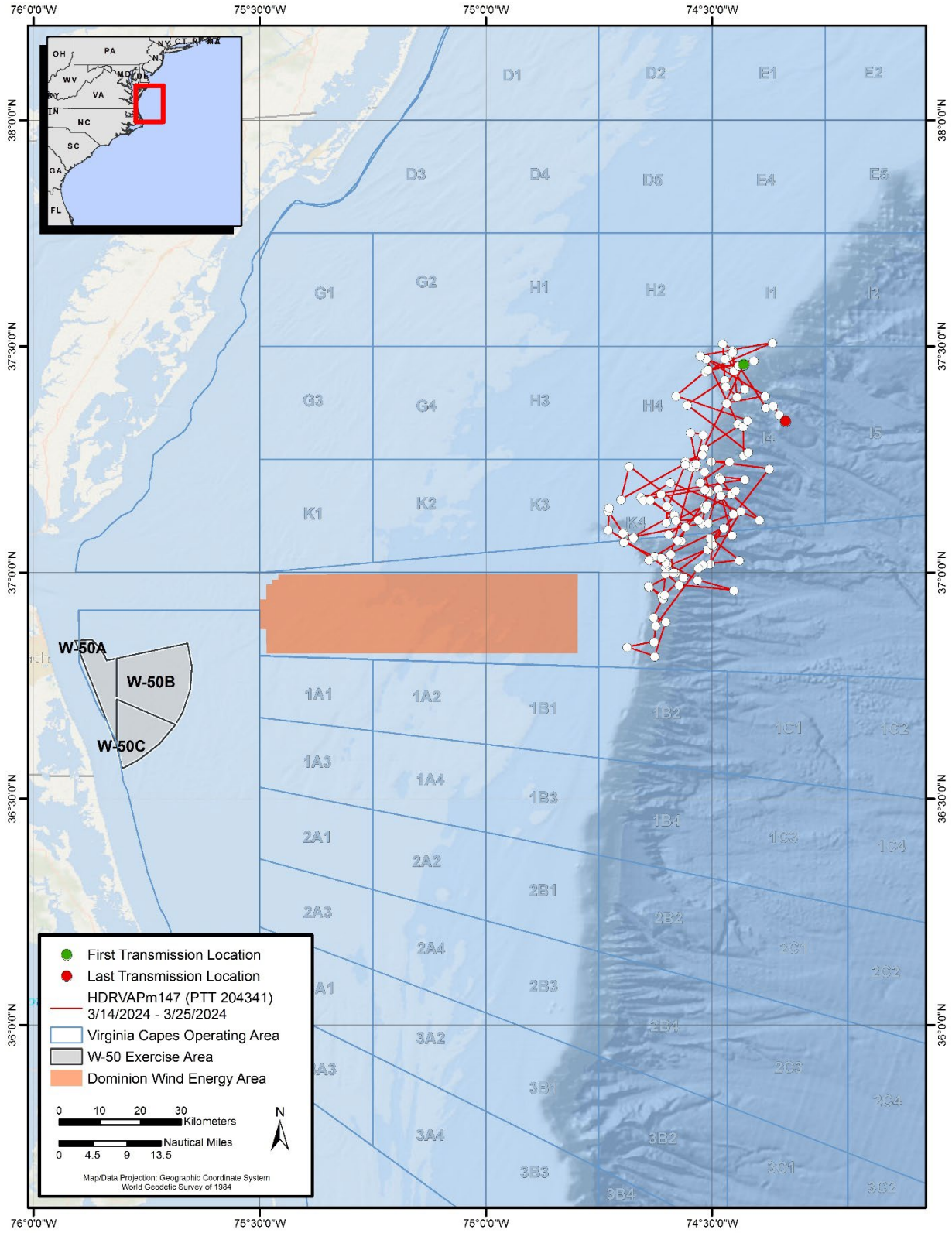

Figure 11. Filtered Argos locations (white dots) and track of sperm whale HDRVAPm147 over 10.1 days.

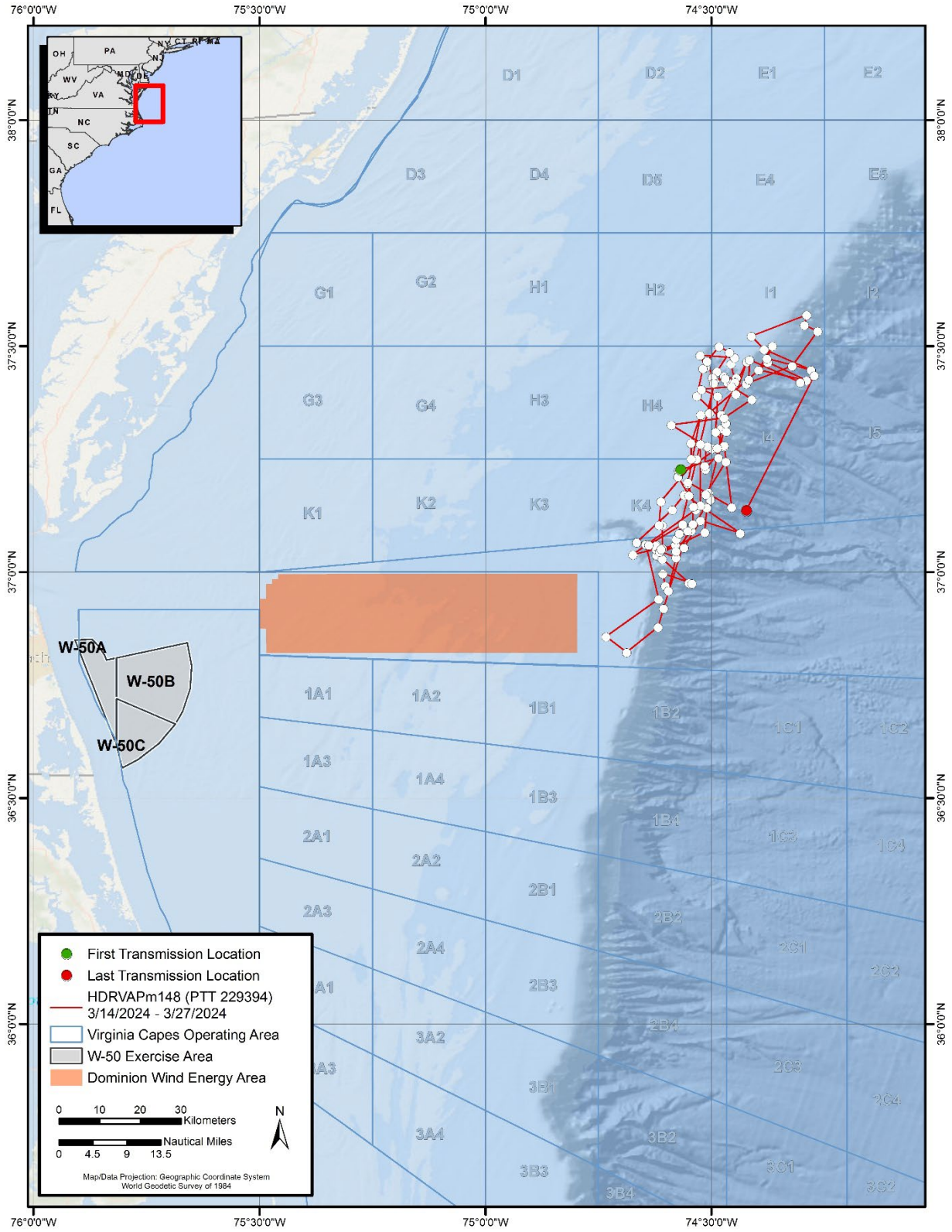

Figure 12. Filtered Argos locations (white dots) and track of sperm whale HDRVAPm148 over 13.0 days.

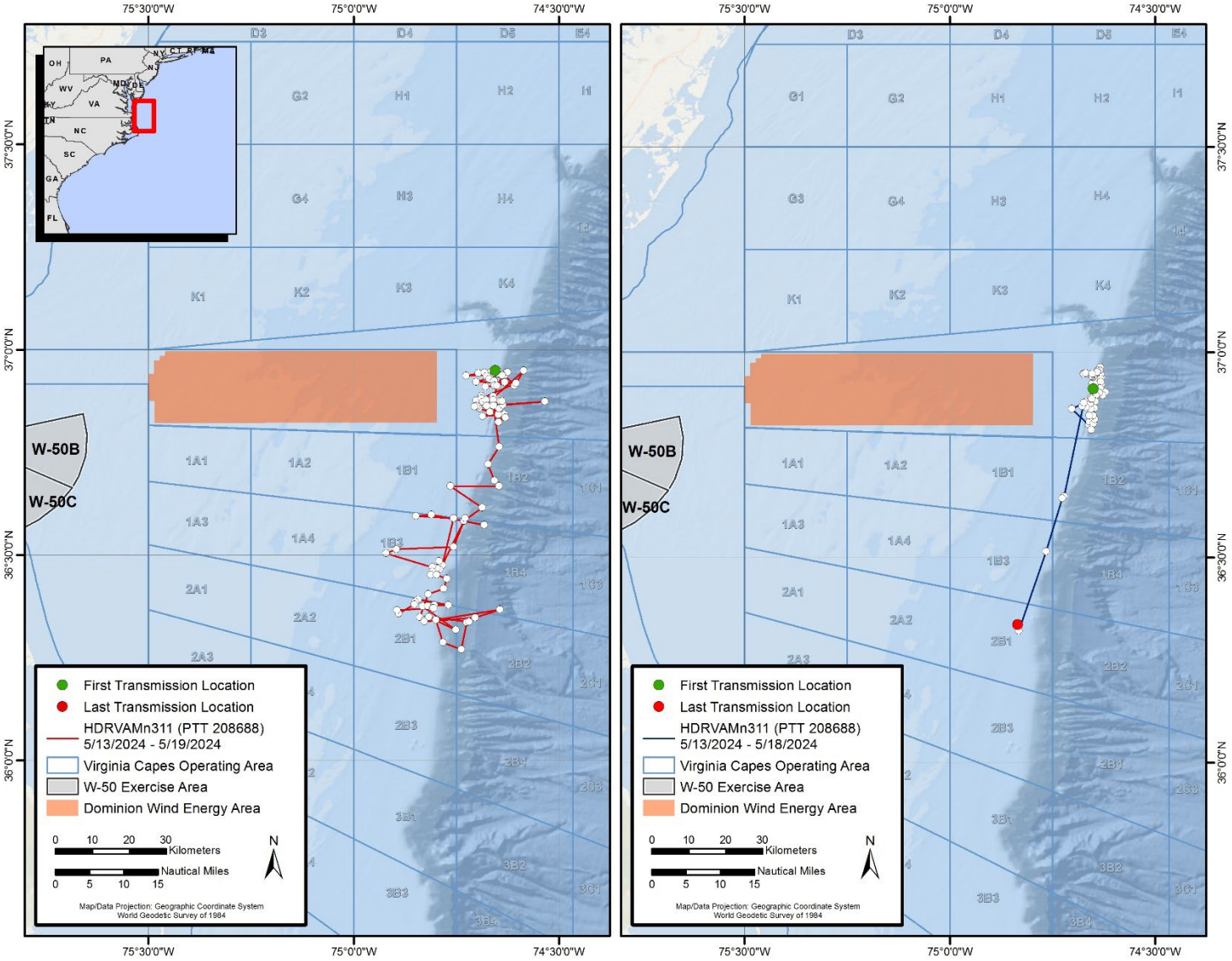

Figure 13. Filtered Argos locations (white dots) and track (red) and GPS locations (white dots) and track (blue) of humpback whale HDRVAMn311 over 5.5 days.

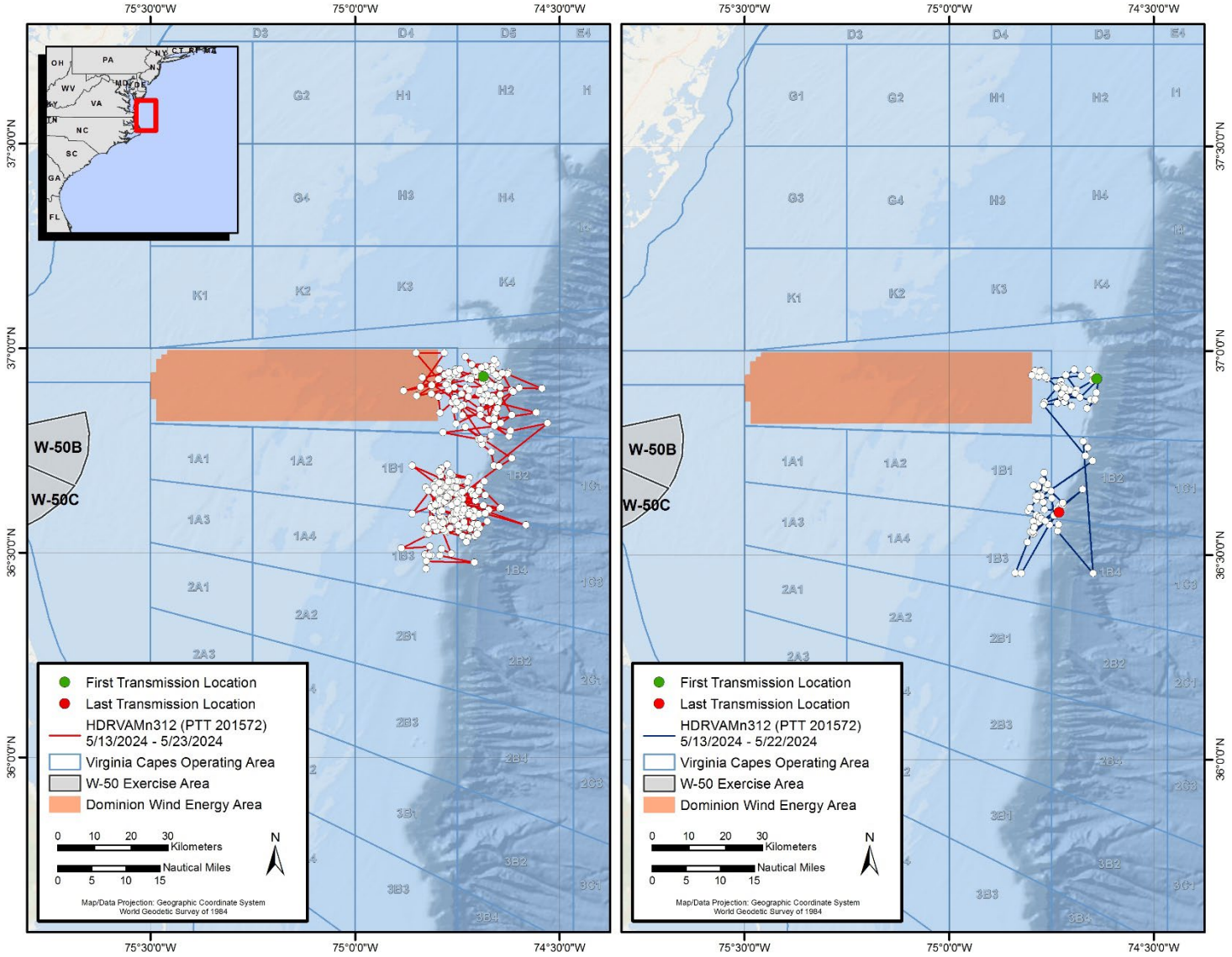

Figure 14. Filtered Argos locations (white dots) and track (red) and GPS locations (white dots) and track (blue) of humpback whale HDRVAMn312 over 10.1 days.

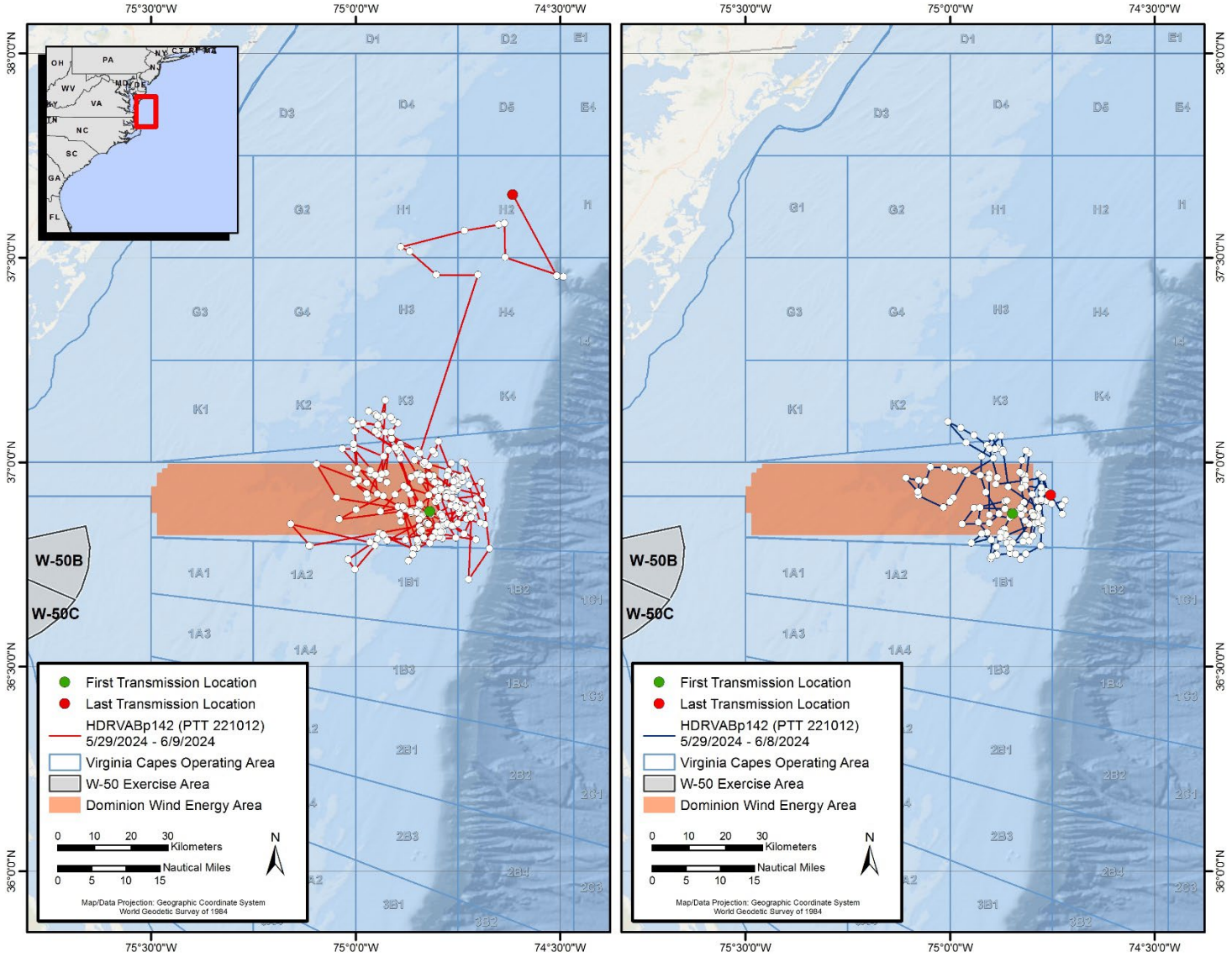

Figure 15. Filtered Argos locations (white dots) and track (red) and GPS locations (white dots) and track (blue) of fin whale HDRVABp142 over 10.9 days.

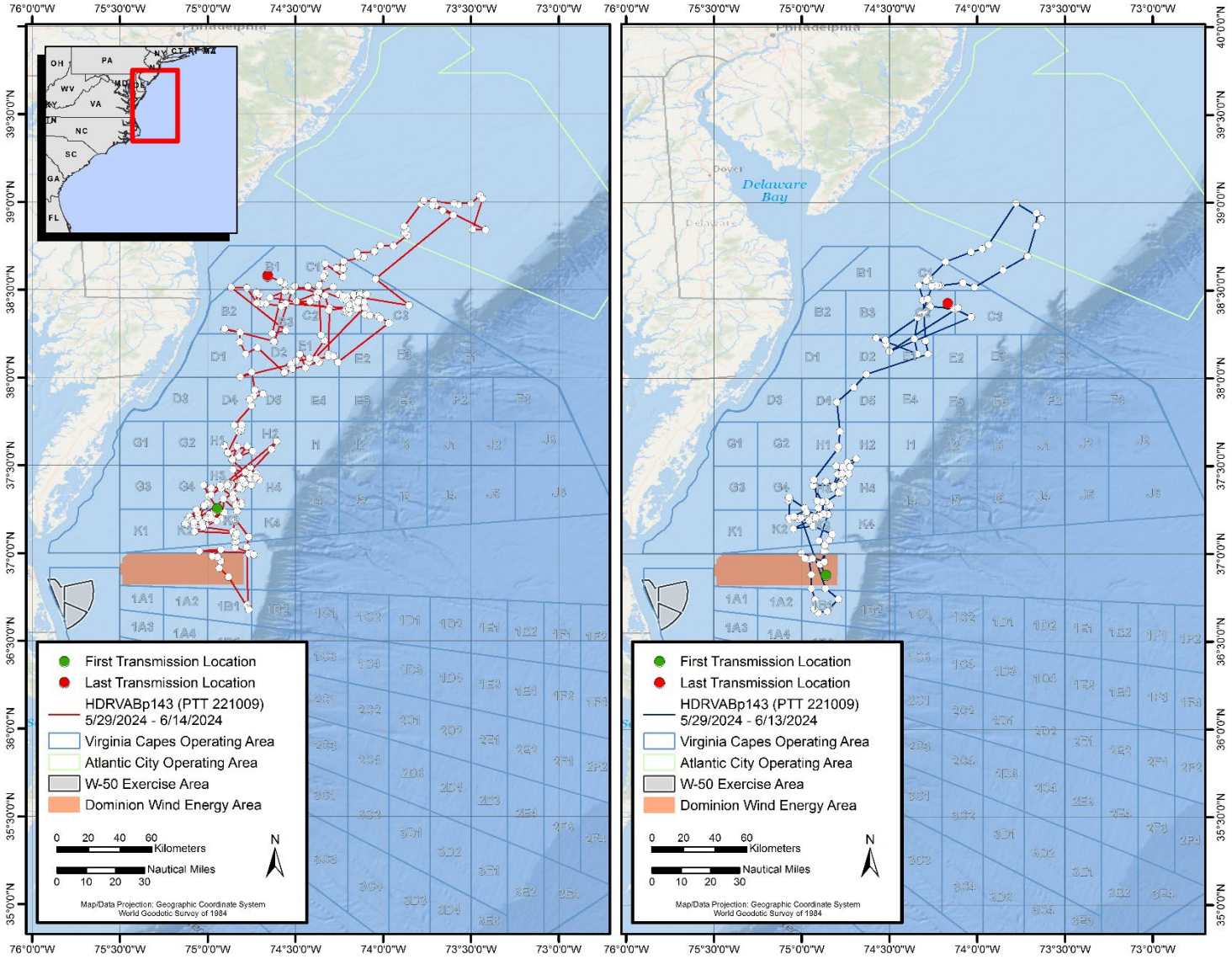

Figure 16. Filtered Argos locations (white dots) and track (red) and GPS locations (white dots) and track (blue) of fin whale HDRVABp143 over 15.2 days.

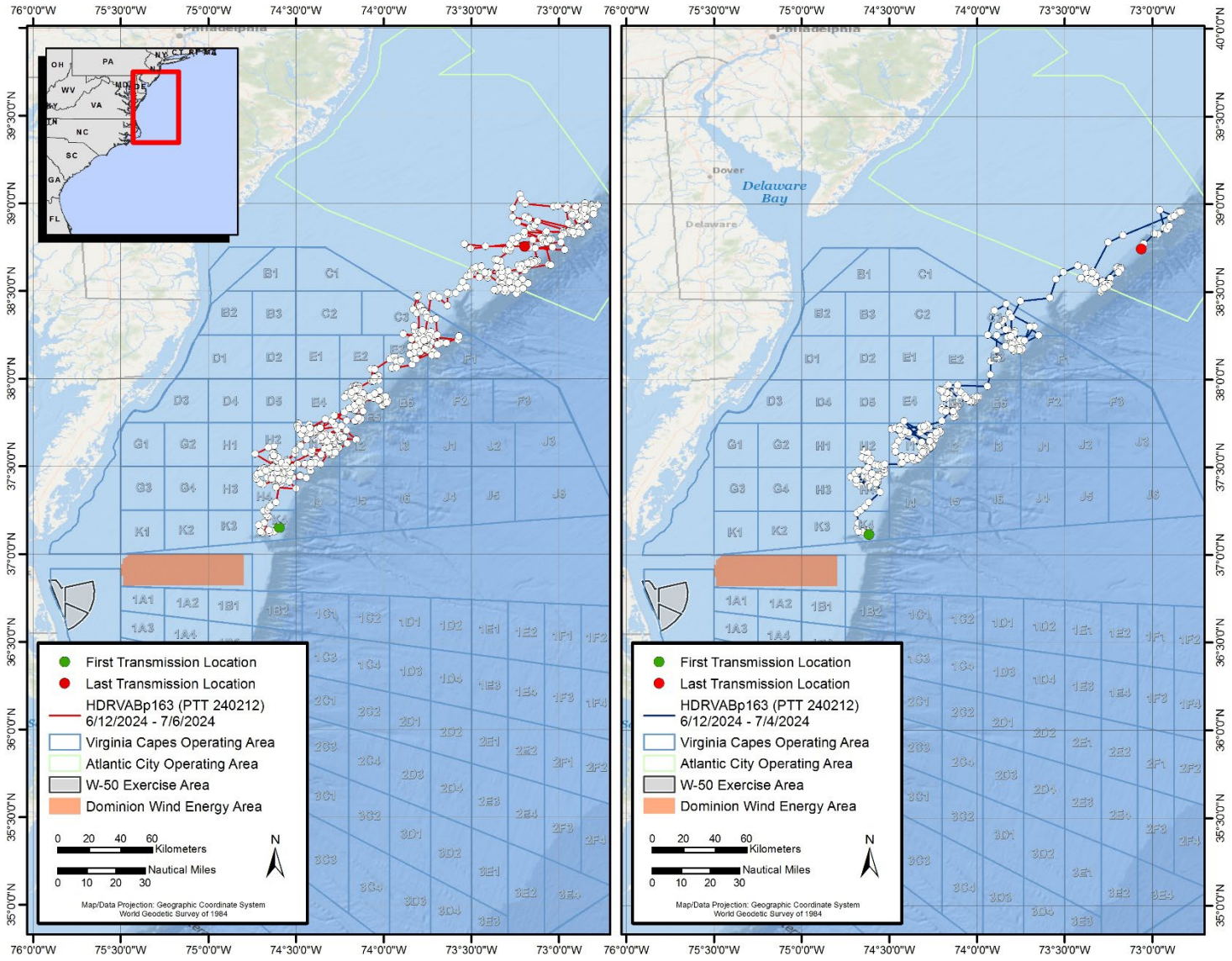

Figure 17. Filtered Argos locations (white dots) and track (red) and GPS locations (white dots) and track (blue) of fin whale HDRVABp163 over 23.5 days.

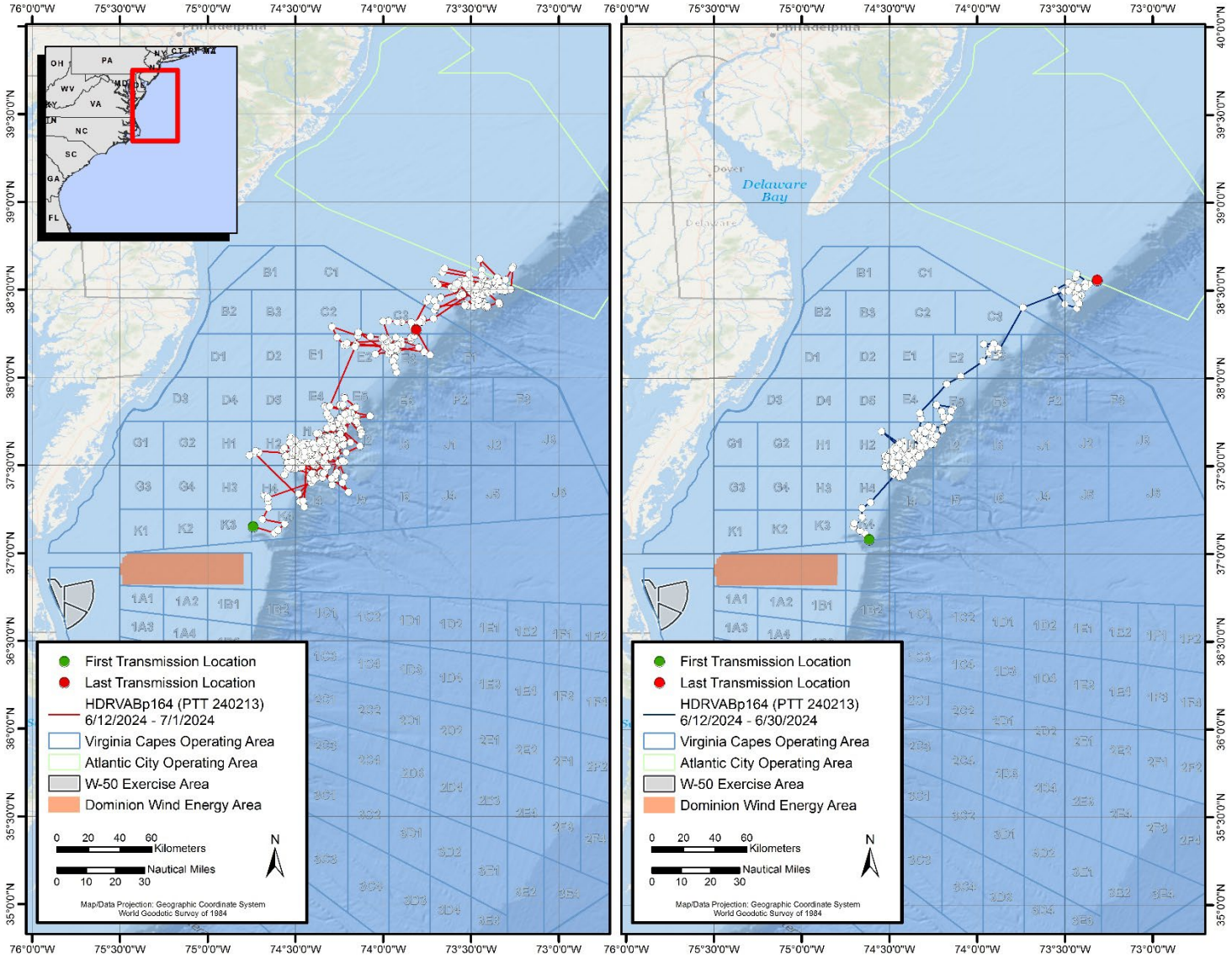

Figure 18. Filtered Argos locations (white dots) and track (red) and GPS locations (white dots) and track (blue) of fin whale HDRVABp164 over 18.6 days.

3.4 Digital Archival Tag Results

Four successful DTAG deployments and two successful CATS tag deployments occurred during 2024 on three species (**Table 11** and **Table 12)**. One of the individuals, HDRVAPm149 was also satellite tagged and biopsied. An acoustic audit was completed for this individual and is shown with dive profile in **Figure 19**, displaying consistent foraging dives throughout the 20-hour deployment. Maximum dive depth ranged from 347 to 547 m, with the exception of one dive to greater than 800 m. Bottom depth at the tagging location was 783 m and ranged between approximately 350 and 900 m throughout the deployment. This individual was seen for 2 days as part of a loose aggregation of five to seven sperm whales.

Results from the four suction-cup-tagged NARWs are reported in the *Mid-Atlantic Nearshore and Mid-Shelf Baleen Whale Monitoring Report* (Aschettino et al. 2025b).

HDRVABp133 was tagged during an unusual sighting event from late May into June, when a large number of cetaceans, including aggregations of baleen whales, were repeatedly sighted inside just the continental shelf break. 113 dives were logged, ranging in depth from 3 to 81 m. Mean dive depth was 54.2 m, and median dive depth was 64.8 m. The dive profile, shown in **Figure 20**, indicates a change in dive behavior before and after sunset. The dive depth during the daylight hours in the 40- to 80-m range drops to shallower dives and time spent at the surface after sunset.

Table 11. Successful DTAG deployment details.

Animal ID	Species	DTAG No./ Deployment ID	Deployment (GMT)	Depth at Tagging (m)	Tag Off Animal (GMT)	Tag Duration (min)	SPLASH Tag No.	Gender
HDRVAPm149	Sperm whale	345/ pm24_073a	2024-Mar-13 18:03	783	2024-Mar-14, 14:54	1,251	202812	Unknown
HDRVABp133	Fin whale	340/ bp24_146a	2024-May-25 12:45	93	2024-May-26, 10:44[a]	1,319[a]	N/A	Unknown
NARW 3908	North Atlantic right whale	345/ eg24_146a	2024-May-25 17:26	97	2024-May-25, 19:55[a]	149[a]	N/A	Female
NARW 3101	North Atlantic right whale	340/ eg24_150a	2024-May-29 18:12	103	2024-May-30, 09:30[a]	918[a]	N/A	Female

Key: ID = Identification Number; N/A = not applicable; No. = number; GMT = Greenwich Mean Time

[a] Research team was not present during tag release; the tag-off time and tag duration are estimated

Table 12. Successful CATS tag deployment details.

Animal ID	Species	CATS Tag No./ Deployment ID	Deployment (GMT)	Depth at Tagging (m)	Tag Off Animal (GMT)	Tag Duration (min)	SPLASH Tag No.	Gender
NARW 3241	North Atlantic right whale	CATS 01/ eg052524-01	2024-May-25 10:52	97	2024-May-25, 21:51[a]	659[a]	N/A	Male
NARW 3391	North Atlantic right whale	CATS 01/ eg052924-01	2024-May-29 12:47	103	2024-May-29, 13:36	49	N/A	Male

Key: ID = Identification Number; N/A = not applicable; No. = number; GMT = Greenwich Mean Time

[a] Research team was not present during tag release; the tag-off time and tag duration are estimated

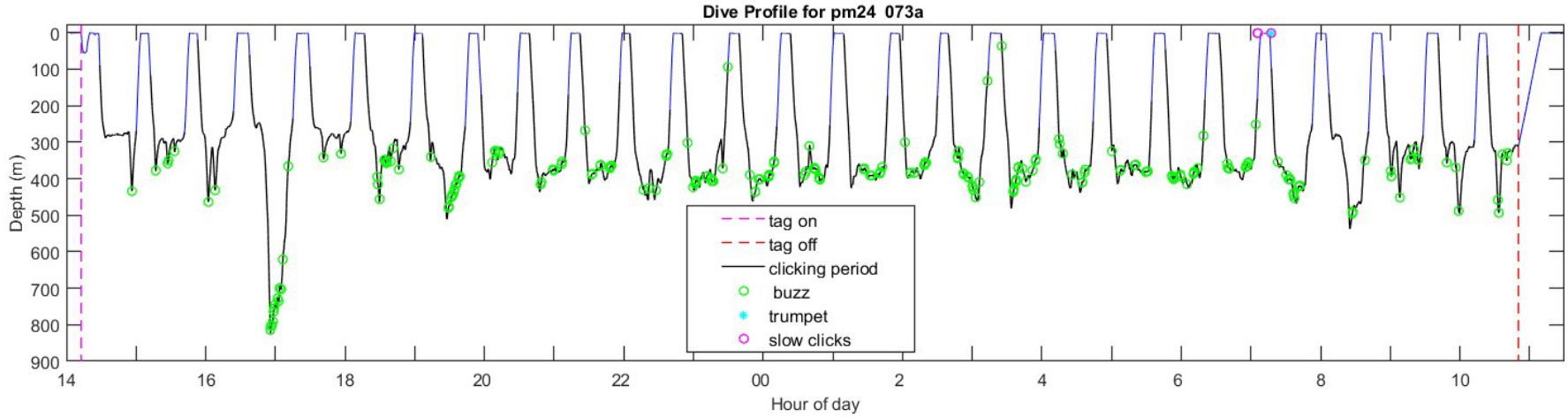

Figure 19. Acoustic audit results for DTAG dataset pm24_073a plotted with the dive profile. The black lines indicate clicking, and green circles indicate buzzing from the tagged animal. Slow clicks are indicated by pink circles, and trumpeting is indicated by blue stars. The pink dashed line marks the tag on animal time, and the red dashed line marks the tag off animal time.

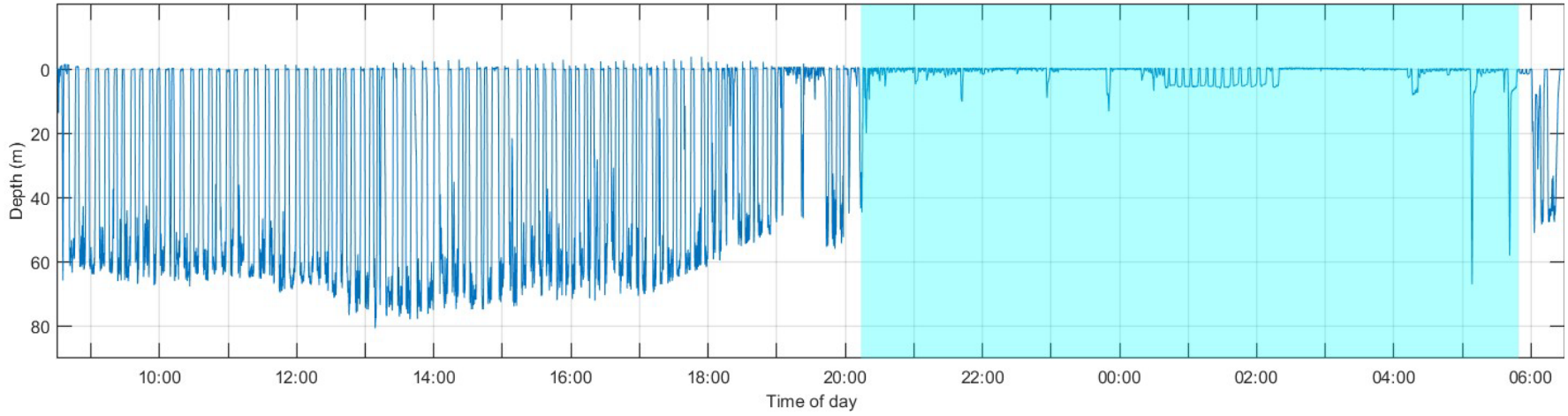

Figure 200. Dive-depth profile (in meters) for HDRVABp133 (DTAG bp24_146a) with hours between sunset and sunrise shaded blue.

4. Discussion

This ongoing project continues to provide evidence of the high degree of marine mammal diversity within the study area, with notable habitat use by important ESA-listed species: sperm, fin, blue, and sei whales, and NARWs. Surveys conducted March through July 2024 continued coverage east of Norfolk Canyon and to the southern extent of the study area, surveying waters deeper than 1,500 m to increase chances for detections of deep-diving cetaceans, but also adjusting coverage of the outer continental shelf, inside the shelf break, when environmental conditions shifted and an increase in baleen whale presence was detected. Sightings of 11 species of marine mammals and one species of sea turtle were made over 15 surveys, showing a wide distribution throughout the study area. All species encountered during 2024 had previously been sighted during this study, keeping the total number of marine mammal species encountered within the study area over the project duration to 20. Previous aerial survey and passive acoustic monitoring data from the region show similar species diversity (McAlarney et al. 2018a, 2018b; Rafter et al. 2018; Cotter 2019).

Sightings of deep-diving species, including sperm and pilot whales, were concentrated beyond the shelf break and into deeper offshore waters during the 2024 surveys, similar to previous years. Baleen whales were encountered both over the shelf and past the shelf break, but in larger numbers than in previous seasons, and with a notable increase in sightings near the continental shelf break. Dolphin species were sighted throughout the core study and transit areas, and all sea turtle sightings were over the shelf.

A relatively unusual density and diversity of cetaceans including aggregations of multiple species of baleen whales was first noted during early May, when sei whales, which are rarely seen within the study area, and a large number of fin whales were documented. The sea surface temperature was carefully monitored with available images from satellite data collected by Rutgers University, and further effort was directed toward areas of relatively cold temperatures for the season. A mid-May survey also documented sei and fin whales, and on 22 May 2024, a large feeding aggregation of sei, fin, and NARWs was encountered near the outer edge of the continental shelf. Effort was focused within this area for the remainder of May and into early June with repeated encounters of multiple species of baleen whales and most notably aggregations of NARW. When the sea surface temperature increased, the number of baleen whales detected returned to levels consistent with previous years. During the event, 11 vessel surveys were completed, covering more than 3,000 km within the study area. A total of 97 sightings of baleen whales consisting of 297 individuals was recorded, including 114 humpback, 112 fin, 50 NARW, and 21 sei whales. Four biopsies were collected (2 humpback and 2 fin whale), 6 satellite tags were successfully deployed (2 humpback and 4 fin whale), and 5 archival tags were successfully deployed and recovered with full datasets (4 NARW and 1 fin whale). These data were partially analyzed and presented at the North Atlantic Right Whale Consortium Meeting in October 2024 (Aschettino et al. 2024b). Further analysis, still in progress, includes the tag data shown in **Figure 13** through **Figure 18** and **Figure 20,** as well as **Table 5** through **Table 12** for humpback and fin whales. Discussion of the NARW archival tag results and sightings can be found in the *Mid-Atlantic Nearshore and Mid-Shelf Baleen Whale Monitoring Report* (Aschettino et al. 2025b).

Locations from satellite-tagged humpback whales remained near the shelf break and generally south of the initial tag location (**Figure 13** and **Figure 14**). Locations of the two fin whales tagged over the shelf on 29 May 2024 remained mainly over the shelf (**Figure 15** and **Figure 16**), while locations of the two fin whales tagged near the shelf break stayed close to the break, though traveling in opposite directions (**Figure 17** and **Figure 18**). High-resolution archival tag data showed dives at or near the sea floor for the fin whale during daylight hours, and shallower dives and shorter surface intervals more often at nighttime or the hours approaching sunset (**Figure 20**).

Future work on these data include acoustic audits of archival tag data, trackplot visualization of pitch-roll-heading archival tag data, modeling sighting data and satellite tag location data with environmental data. Further collaboration with Rutgers University has been initiated to monitor the available environmental condition models to alert if and when a possible event occurs during future seasons, allowing for a similar increase in survey and tagging efforts. Photo-ID results for 54 unique fin, 27 NARW, and 45 humpback individuals photographed during 2024 OCS surveys are included in HDR's catalogs, which to date include a total of 164 fin, 98 NARW, and 342 humpback whale individuals. Refer to the *Mid-Atlantic Baleen Whale Photo-Identification Efforts: 2023/24 Annual Progress Report* for those results (Aschettino et al. 2025a).

The importance of the Norfolk Canyon area to ESA-listed sperm whales has continued to be demonstrated through re-sightings and tagged whale movements. Seasonal residency within the study for at least some individuals is becoming increasingly evident, with 17.7 percent (26 of 147) of cataloged sperm whale individuals being re-sighted up to nearly 6 years (2,185 days) after the initial encounter.

Satellite-tagged sperm whales again showed movements through the VACAPES OPAREA along the continental slope **(Figure 8, Figure 11,** and **Figure 12**), but one individual, HDRVAPm146, traveled more than 1,500 km from initial tag location to the east and away from the slope (**Figure 9**). This individual had been double-tagged; unfortunately, the DTAG did not release the day following as programmed, and GPS locations from both tags did not separate before the DTAG battery died, leading the study team to believe the suction cups never released before the whale was out of range for recovery. The tag and data were unfortunately lost. Aside from this individual, sperm whales tagged this year showed a high percentage of locations within the VACAPES OPAREA (**Table 3**). Dive data collected were as expected for immature male or mature female sperm whales, with maximum dive depth in the 1,000- to 1,100-m range and lasting approximately 40-60 min (**Table 4**).

Acoustic audit results plotted on the dive profile for the overnight sperm whale DTAG shows consistent foraging dives to depths between 350 and 550 m, where regular clicking and buzzes are detected (**Figure 19**). The single deeper dive to 823 m is interesting given the numerous shorter dives that followed, slightly before sunset that day (17:11).

The combination of methods over time, including length estimates from drone images (Engelhaupt et al. 2024), genetic sexing from biopsies (Engelhaupt et al. 2023), re-sightings discovered though photo-ID, and acoustic and movement behavior recorded by satellite and archival tags, has begun to show the study area as an important habitat for juvenile male sperm whales. The need for communication and social interaction of these individuals that return to the

area in subsequent years or seasons is an important consideration when addressing potential of exposure and consequence within an area of crucial U.S. Navy use.

Capability to respond to reports and changing environmental conditions has allowed for increased success in data collection for multiple priority species. The addition of digital archival tag deployments on deep-diving species and ESA-listed baleen whale species will allow researchers to better detail fine-scale movement, dive patterns, foraging behavior, and acoustic activity to add to the existing medium-duration telemetry dataset. Understanding fine-scale baseline data and recording subtle changes in behavior (including acoustic activity) will provide valuable insights on animal behavior and potential impacts from anthropogenic stressors. The results of this multi-year effort are expected to provide the U.S. Navy with the level of detailed information required to make informed decisions regarding future training and testing planning and mitigation measures within the survey area to minimize potential impacts on protected marine species.

5. References

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Marine Mammal Sightings, 2024

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Date	Sighting Time (local)	Scientific Name	Common Name	Est. Group Size	Latitude (°N)	Longitude (°W)
01-Mar-24	9:26	*Delphinus delphis*	Common dolphin	60	37.0408	74.5477
01-Mar-24	9:43	*Delphinus delphis*	Common dolphin	15	37.0442	74.5304
01-Mar-24	10:20	*Delphinus delphis*	Common dolphin	25	36.9837	74.5580
01-Mar-24	11:08	*Megaptera novaeangliae*	Humpback whale	2	36.8630	74.6701
01-Mar-24	11:56	*Balaenoptera physalus*	Fin whale	2	36.8805	74.6300
01-Mar-24	12:22	*Megaptera novaeangliae*	Humpback whale	3	36.8130	74.6808
13-Mar-24	8:53	*Balaenoptera physalus*	Fin whale	1	36.9799	74.7418
13-Mar-24	9:49	*Delphinus delphis*	Common dolphin	10	37.0312	74.5672
13-Mar-24	10:03	*Delphinus delphis*	Common dolphin	100	37.0278	74.5278
13-Mar-24	11:23	*Physeter macrocephalus*	Sperm whale	1	37.0013	74.3679
13-Mar-24	13:23	*Tursiops truncatus*	Common bottlenose dolphin	7	36.9395	74.5706
13-Mar-24	13:27	*Delphinus delphis*	Common dolphin	250	36.9410	74.5724
13-Mar-24	13:35	*Physeter macrocephalus*	Sperm whale	1	36.9045	74.5873
13-Mar-24	13:44	*Physeter macrocephalus*	Sperm whale	2	36.8816	74.5943
13-Mar-24	13:44	*Physeter macrocephalus*	Sperm whale	1	36.8852	74.5913
13-Mar-24	13:53	*Delphinus delphis*	Common dolphin	126	36.8810	74.5863
13-Mar-24	15:27	*Megaptera novaeangliae*	Humpback whale	2	36.8508	74.6580
14-Mar-24	7:23	*Delphinus delphis*	Common dolphin	18	36.8910	75.4978
14-Mar-24	8:43	*Delphinus delphis*	Common dolphin	18	36.9529	74.8783
14-Mar-24	9:10	*Megaptera novaeangliae*	Humpback whale	3	36.9791	74.6464
14-Mar-24	9:28	*Delphinus delphis*	Common dolphin	125	36.9797	74.5649
14-Mar-24	9:36	*Physeter macrocephalus*	Sperm whale	7	36.9975	74.5651
14-Mar-24	12:09	*Balaenoptera borealis*	Sei whale	1	37.0666	74.5227
14-Mar-24	13:27	*Balaenoptera borealis*	Sei whale	2	37.1122	74.5273
14-Mar-24	14:28	*Balaenoptera physalus*	Fin whale	1	37.1344	74.4883
14-Mar-24	15:03	*Grampus griseus*	Risso's dolphin	5	37.1483	74.5216
14-Mar-24	15:10	*Megaptera novaeangliae*	Humpback whale	2	37.1457	74.5335
02-May-24	7:37	*Tursiops truncatus*	Common bottlenose dolphin	4	36.8303	75.8432
02-May-24	10:00	*Balaenoptera borealis*	Sei whale	3	36.9579	74.7732
02-May-24	12:02	*Balaenoptera physalus*	Fin whale	6	36.9785	74.6552
02-May-24	12:06	*Balaenoptera physalus*	Fin whale	3	36.9862	74.6281
02-May-24	12:19	*Balaenoptera physalus*	Fin whale	1	36.9910	74.6398
02-May-24	13:00	*Balaenoptera physalus*	Fin whale	2	37.0135	74.6512
02-May-24	13:14	*Globicephala* sp.	Unidentified pilot whale	15	37.0192	74.6243
02-May-24	14:24	*Megaptera novaeangliae*	Humpback whale	2	36.9905	74.6650
02-May-24	15:45	*Balaenoptera borealis*	Sei whale	3	36.9416	74.7668
02-May-24	17:07	*Balaenoptera physalus*	Fin whale	3	36.9321	75.0127
02-May-24	17:20	*Balaenoptera physalus*	Fin whale	1	36.9333	75.0466
02-May-24	17:54	*Megaptera novaeangliae*	Humpback whale	3	36.9042	75.3233
13-May-24	7:41	*Balaenoptera borealis*	Sei whale	1	37.0689	74.8644

Date	Sighting Time (local)	Scientific Name	Common Name	Est. Group Size	Latitude (°N)	Longitude (°W)
13-May-24	8:32	*Balaenoptera physalus*	Fin whale	1	37.0906	74.7959
13-May-24	9:54	*Balaenoptera physalus*	Fin whale	1	37.0720	74.7393
13-May-24	10:21	*Grampus griseus*	Risso's dolphin	10	37.0529	74.6983
13-May-24	10:52	*Tursiops truncatus*	Common bottlenose dolphin	60	37.0577	74.6578
13-May-24	11:02	*Balaenoptera physalus*	Fin whale	2	37.0379	74.6143
13-May-24	11:45	*Grampus griseus*	Risso's dolphin	20	37.0689	74.6422
13-May-24	11:59	*Balaenoptera physalus*	Fin whale	1	37.0547	74.6239
13-May-24	13:07	*Balaenoptera physalus*	Fin whale	1	36.9685	74.6406
13-May-24	13:10	*Balaenoptera physalus*	Fin whale	2	36.9304	74.6442
13-May-24	13:40	*Megaptera novaeangliae*	Humpback whale	6	36.9220	74.6406
13-May-24	13:41	*Balaenoptera physalus*	Fin whale	1	36.9181	74.6391
13-May-24	14:43	*Megaptera novaeangliae*	Humpback whale	7	36.9250	74.6370
13-May-24	15:57	*Balaenoptera borealis*	Sei whale	1	36.9272	74.7511
22-May-24	8:44	*Delphinus delphis*	Common dolphin	25	36.6771	74.6900
22-May-24	9:50	*Globicephala* sp.	Unidentified pilot whale	20	36.7583	74.5747
22-May-24	10:45	*Globicephala* sp.	Unidentified pilot whale	25	36.8931	74.5169
22-May-24	11:01	*Grampus griseus*	Risso's dolphin	12	36.9202	74.5043
22-May-24	11:11	*Balaenoptera physalus*	Fin whale	1	36.9420	74.5094
22-May-24	11:39	*Globicephala* sp.	Unidentified pilot whale	7	36.9536	74.5037
22-May-24	12:42	*Tursiops truncatus*	Common bottlenose dolphin	4	37.0312	74.5810
22-May-24	13:51	*Eubalaena glacialis*	North Atlantic right whale	7	36.9224	74.6971
22-May-24	14:29	*Balaenoptera borealis*	Sei whale	12	36.9077	74.7031
22-May-24	17:08	*Balaenoptera physalus*	Fin whale	1	36.8669	74.6903
25-May-24	8:06	*Balaenoptera physalus*	Fin whale	8	36.8368	74.6941
25-May-24	9:31	*Eubalaena glacialis*	North Atlantic right whale	10	36.8065	74.6859
25-May-24	13:11	*Megaptera novaeangliae*	Humpback whale	12	36.7987	74.6751
25-May-24	16:03	*Grampus griseus*	Risso's dolphin	10	36.8076	74.6636
25-May-24	17:07	*Balaenoptera physalus*	Fin whale	1	36.8014	74.7230
25-May-24	17:16	*Balaenoptera physalus*	Fin whale	1	36.7857	74.7698
25-May-24	17:27	*Balaenoptera physalus*	Fin whale	1	36.8006	74.8236
26-May-24	8:58	*Delphinus delphis*	Common dolphin	25	36.7371	74.7034
26-May-24	10:46	*Delphinus delphis*	Common dolphin	50	36.6614	74.6441
26-May-24	11:22	*Balaenoptera physalus*	Fin whale	1	36.7241	74.7679
26-May-24	12:27	*Delphinus delphis*	Common dolphin	30	36.7648	74.6719
26-May-24	12:47	*Megaptera novaeangliae*	Humpback whale	10	36.7900	74.6761
26-May-24	13:52	*Balaenoptera physalus*	Fin whale	5	36.8219	74.6683
26-May-24	15:06	*Tursiops truncatus*	Common bottlenose dolphin	30	36.8342	74.9281
29-May-24	7:05	*Balaenoptera physalus*	Fin whale	2	36.8930	74.8985
29-May-24	7:08	*Balaenoptera physalus*	Fin whale	1	36.8871	74.8816
29-May-24	7:14	*Delphinus delphis*	Common dolphin	80	36.8929	74.8802

Date	Sighting Time (local)	Scientific Name	Common Name	Est. Group Size	Latitude (°N)	Longitude (°W)
29-May-24	7:19	*Balaenoptera physalus*	Fin whale	8	36.8692	74.8545
29-May-24	10:38	*Balaenoptera physalus*	Fin whale	4	36.8299	74.7271
29-May-24	11:18	*Eubalaena glacialis*	North Atlantic right whale	14	36.7462	74.6927
29-May-24	11:19	*Balaenoptera physalus*	Fin whale	3	36.7315	74.6854
29-May-24	11:37	*Megaptera novaeangliae*	Humpback whale	3	36.7323	74.7270
30-May-24	8:52	*Eubalaena glacialis*	North Atlantic right whale	2	36.7507	74.7925
30-May-24	9:11	*Balaenoptera borealis*	Sei whale	1	36.7469	74.7884
30-May-24	10:12	*Balaenoptera physalus*	Fin whale	1	36.7416	74.7405
30-May-24	10:27	*Balaenoptera physalus*	Fin whale	1	36.7560	74.7224
30-May-24	10:42	*Balaenoptera physalus*	Fin whale	1	36.7680	74.7384
30-May-24	11:03	*Eubalaena glacialis*	North Atlantic right whale	1	36.7749	74.7598
30-May-24	11:05	*Balaenoptera physalus*	Fin whale	1	36.7839	74.7517
30-May-24	11:30	*Balaenoptera physalus*	Fin whale	1	36.7756	74.7629
30-May-24	11:34	*Megaptera novaeangliae*	Humpback whale	1	36.7680	74.7535
30-May-24	11:51	*Megaptera novaeangliae*	Humpback whale	1	36.7426	74.7384
30-May-24	11:51	*Eubalaena glacialis*	North Atlantic right whale	2	36.7340	74.7395
30-May-24	12:49	*Eubalaena glacialis*	North Atlantic right whale	2	36.6833	74.7192
30-May-24	12:58	*Eubalaena glacialis*	North Atlantic right whale	3	36.6741	74.6988
30-May-24	13:29	*Megaptera novaeangliae*	Humpback whale	16	36.6419	74.7226
30-May-24	13:34	*Eubalaena glacialis*	North Atlantic right whale	5	36.6311	74.7166
30-May-24	14:40	*Eubalaena glacialis*	North Atlantic right whale	2	36.6331	74.7517
01-Jun-24	8:23	*Balaenoptera physalus*	Fin whale	1	36.6268	74.9781
01-Jun-24	8:45	*Balaenoptera physalus*	Fin whale	2	36.6058	74.8424
01-Jun-24	9:05	*Megaptera novaeangliae*	Humpback whale	10	36.5657	74.7714
01-Jun-24	9:32	*Megaptera novaeangliae*	Humpback whale	1	36.5290	74.7454
01-Jun-24	9:34	*Balaenoptera physalus*	Fin whale	2	36.5457	74.7449
01-Jun-24	9:40	*Megaptera novaeangliae*	Humpback whale	4	36.5397	74.7426
01-Jun-24	9:54	*Megaptera novaeangliae*	Humpback whale	4	36.5573	74.7457
01-Jun-24	9:59	*Eubalaena glacialis*	North Atlantic right whale	2	36.5697	74.7352
01-Jun-24	10:40	*Balaenoptera physalus*	Fin whale	4	36.5667	74.7321
01-Jun-24	10:40	*Megaptera novaeangliae*	Humpback whale	6	36.5692	74.7312
01-Jun-24	11:05	*Balaenoptera physalus*	Fin whale	2	36.5950	74.7349
01-Jun-24	11:12	*Balaenoptera physalus*	Fin whale	1	36.6133	74.7203
01-Jun-24	12:11	*Tursiops truncatus*	Common bottlenose dolphin	12	36.7058	74.7054
01-Jun-24	13:01	*Balaenoptera physalus*	Fin whale	1	36.7972	74.6962
01-Jun-24	13:25	*Tursiops truncatus*	Common bottlenose dolphin	25	36.8478	74.6645
01-Jun-24	13:35	*Delphinus delphis*	Common dolphin	150	36.8733	74.6489
01-Jun-24	14:18	*Grampus griseus*	Risso's dolphin	20	37.0340	74.6575
01-Jun-24	14:51	*Balaenoptera physalus*	Fin whale	1	37.0378	74.8254
01-Jun-24	15:14	*Delphinus delphis*	Common dolphin	40	37.0435	74.8520

Date	Sighting Time (local)	Scientific Name	Common Name	Est. Group Size	Latitude (°N)	Longitude (°W)
01-Jun-24	15:17	*Balaenoptera physalus*	Fin whale	2	37.0382	74.8869
01-Jun-24	15:22	*Balaenoptera physalus*	Fin whale	1	37.0337	74.9060
01-Jun-24	16:26	*Balaenoptera physalus*	Fin whale	2	36.9878	75.0736
01-Jun-24	16:35	*Delphinus delphis*	Common dolphin	40	36.9837	75.1096
01-Jun-24	17:13	*Delphinus delphis*	Common dolphin	30	36.9335	75.3983
04-Jun-24	7:12	*Delphinus delphis*	Common dolphin	16	37.0113	75.0864
04-Jun-24	7:39	*Megaptera novaeangliae*	Humpback whale	1	37.0547	74.8705
04-Jun-24	8:41	*Tursiops truncatus*	Common bottlenose dolphin	25	37.0356	74.6425
04-Jun-24	8:45	*Globicephala* sp.	Unidentified pilot whale	21	37.0369	74.6129
04-Jun-24	9:41	*Delphinus delphis*	Common dolphin	40	36.9096	74.7001
04-Jun-24	10:11	*Megaptera novaeangliae*	Humpback whale	3	36.7937	74.6656
04-Jun-24	10:16	*Megaptera novaeangliae*	Humpback whale	1	36.7554	74.6659
04-Jun-24	10:54	*Megaptera novaeangliae*	Humpback whale	2	36.7421	74.6677
04-Jun-24	12:28	*Delphinus delphis*	Common dolphin	33	36.5823	74.7629
04-Jun-24	13:05	*Stenella frontalis*	Atlantic spotted dolphin	2	36.7176	74.8370
04-Jun-24	13:44	*Balaenoptera physalus*	Fin whale	1	36.7939	75.0026
04-Jun-24	14:52	*Balaenoptera physalus*	Fin whale	1	36.8021	75.2172
10-Jun-24	7:37	*Balaenoptera physalus*	Fin whale	1	36.8594	74.9173
10-Jun-24	7:55	*Balaenoptera physalus*	Fin whale	2	36.8140	74.8398
10-Jun-24	9:53	*Tursiops truncatus*	Common bottlenose dolphin	25	36.8002	74.5108
10-Jun-24	10:56	*Globicephala* sp.	Unidentified pilot whale	6	36.9518	74.4547
10-Jun-24	11:17	*Globicephala* sp.	Unidentified pilot whale	2	37.0013	74.4647
10-Jun-24	11:20	*Globicephala* sp.	Unidentified pilot whale	10	37.0227	74.4605
10-Jun-24	11:49	*Globicephala* sp.	Unidentified pilot whale	20	37.0408	74.5056
10-Jun-24	12:12	*Globicephala* sp.	Unidentified pilot whale	20	37.0440	74.5680
10-Jun-24	12:24	*Tursiops truncatus*	Common bottlenose dolphin	5	37.0439	74.5692
10-Jun-24	12:28	*Globicephala* sp.	Unidentified pilot whale	50	37.0372	74.5945
10-Jun-24	12:45	*Megaptera novaeangliae*	Humpback whale	12	36.9997	74.6431
10-Jun-24	12:53	*Megaptera novaeangliae*	Humpback whale	2	36.9788	74.6559
10-Jun-24	13:39	*Balaenoptera physalus*	Fin whale	5	37.0097	74.6686
10-Jun-24	14:53	*Balaenoptera physalus*	Fin whale	6	37.0189	74.6631
10-Jun-24	15:05	*Tursiops truncatus*	Common bottlenose dolphin	7	37.0249	74.6695
12-Jun-24	7:55	*Balaenoptera physalus*	Fin whale	5	36.9695	74.7763
12-Jun-24	8:17	*Delphinus delphis*	Common dolphin	70	36.9526	74.7506
12-Jun-24	9:08	*Balaenoptera physalus*	Fin whale	1	37.0285	74.6451
12-Jun-24	9:28	*Grampus griseus*	Risso's dolphin	12	37.0360	74.6664
12-Jun-24	9:48	*Megaptera novaeangliae*	Humpback whale	1	37.0833	74.7882
12-Jun-24	10:40	*Megaptera novaeangliae*	Humpback whale	1	37.1479	74.7327
12-Jun-24	11:09	*Balaenoptera physalus*	Fin whale	1	37.1433	74.6384
12-Jun-24	11:13	*Megaptera novaeangliae*	Humpback whale	2	37.1354	74.6348

Date	Sighting Time (local)	Scientific Name	Common Name	Est. Group Size	Latitude (°N)	Longitude (°W)
12-Jun-24	12:04	*Tursiops truncatus*	Common bottlenose dolphin	25	37.1353	74.6242
12-Jun-24	12:13	*Balaenoptera physalus*	Fin whale	1	37.1137	74.6090
12-Jun-24	12:13	*Balaenoptera physalus*	Fin whale	2	37.0966	74.6233
12-Jun-24	12:15	*Megaptera novaeangliae*	Humpback whale	2	37.0902	74.5986
12-Jun-24	13:05	*Megaptera novaeangliae*	Humpback whale	1	37.0976	74.6195
12-Jun-24	13:36	*Balaenoptera physalus*	Fin whale	2	37.0861	74.5871
12-Jun-24	15:54	*Tursiops truncatus*	Common bottlenose dolphin	10	36.9472	75.3691
03-Jul-24	8:24	*Globicephala* sp.	Unidentified pilot whale	5	36.6196	74.6850
03-Jul-24	10:34	*Tursiops truncatus*	Common bottlenose dolphin	10	36.7596	74.3702

Key: Est. = Estimated; °N = degrees North; °W = degrees West

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B

Sea Turtle Sightings, 2024

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Date	Sighting Time (local)	Scientific Name	Common Name	Est. Group Size	Latitude (°N)	Longitude (°W)
29-May-24	10:54	*Caretta caretta*	Loggerhead turtle	1	36.8223	74.7399
29-May-24	17:04	*Caretta caretta*	Loggerhead turtle	1	36.7437	74.9098
01-Jun-24	17:12	*Caretta caretta*	Loggerhead turtle	1	36.9332	75.3888
04-Jun-24	13:32	*Caretta caretta*	Loggerhead turtle	1	36.7738	74.8827
04-Jun-24	13:50	*Caretta caretta*	Loggerhead turtle	2	36.7934	75.0124
12-Jun-24	14:57	*Caretta caretta*	Loggerhead turtle	2	37.0360	74.9425
12-Jun-24	15:08	*Caretta caretta*	Loggerhead turtle	3	37.0218	75.0295
12-Jun-24	15:38	*Caretta caretta*	Loggerhead turtle	4	36.9727	75.2460
12-Jun-24	15:47	*Caretta caretta*	Loggerhead turtle	2	36.9636	75.3074

Key: Est. = Estimated; °N = degrees North; °W = degrees West

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C

Photo-identified Individuals, Deep-Diving Species, 2024

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HDR ID	Species	Sighting Date	Biopsy?	Satellite Tag?/Argos ID
HDRVAPm145	*Physeter macrocephalus*	13-Mar-24	No	No
HDRVAPm146	*Physeter macrocephalus*	13-Mar-24	No	SPLASH10/202814
HDRVAPm146	*Physeter macrocephalus*	14-Mar-24	Yes	No
HDRVAPm147	*Physeter macrocephalus*	13-Mar-24	No	No
HDRVAPm147	*Physeter macrocephalus*	14-Mar-24	No	SPLASH10/204341
HDRVAPm148	*Physeter macrocephalus*	13-Mar-24	No	No
HDRVAPm148	*Physeter macrocephalus*	14-Mar-24	No	SPOT6/229394
HDRVAPm149	*Physeter macrocephalus*	13-Mar-24	Yes	SPLASH10/202812
HDRVAPm149	*Physeter macrocephalus*	14-Mar-24	No	No

Key: ID = Identification

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