Final

Mid-Atlantic Humpback Whale Monitoring, Virginia Beach, VA: Annual Progress Report

Submitted to:

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Cover Photo Credit:

Cover photo by Brian Lockwood.

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Acronyms and Abbreviations

MINEX	Mine neutralization exercise
U.S.	United States

1. Introduction and Background

The endangered North Atlantic humpback whale (*Megaptera novaeangliae*) migrates from six northern feeding grounds in the Gulf of Maine, the Gulf of St. Lawrence, Newfoundland/ Labrador, western Greenland, Iceland, and Norway to Caribbean Sea waters during the winter months (Waring et al. 2013). Understanding the occurrence and behavior of humpback whales in the vicinity of United States (U.S.) Navy training and vessel transiting activities off the coast of Virginia is important in mitigating potentially harmful impacts on the species.

Humpback whale sighting information off the Virginia Beach area has previously been collected with various methods and sporadic field effort, with shore-based counts in 1991 and vessel-based photo-identification efforts in 1992 (Swingle et al. 1993), and further cataloging efforts using photographs taken on whale-watching excursions and from stranded whales (Barco et al. 2002). Data have shown some individuals returning in subsequent years, and it is suggested that the area may act as a supplemental winter feeding ground for the returning whales (Barco et al. 2002). Photographs of whales sighted off Virginia have been matched to cataloged whales from the Gulf of Maine, Newfoundland, and the Gulf of St. Lawrence regions (Barco et al. 2002). Information on the movements of individuals within this region is very limited, and these data are important to assess the potential for disturbance to humpback whales found in U.S. Navy training operations and high-traffic areas in the Chesapeake Bay and coastal waters.

The objective of this project under the U.S. Navy's Marine Species Monitoring Program is to establish baseline occurrence and behavior data for humpback whales in the Hampton Roads mid-Atlantic region by addressing the following questions:

- *What age classes (juveniles, sub-adults, adults) are utilizing the waters within and adjacent to the mouth of the Chesapeake Bay?*
- *Do humpback whales exhibit site-fidelity over periods of days to years?*
- *Do humpback whales congregate in specific high-traffic and/or high-use U.S. Navy training areas?*
- *Do humpback whales spend significant time within or move through areas of U.S. Navy live-fire and MINEX training (Year 2)?*
- *What are the relative sound levels humpback whales are exposed to from vessel traffic and/or U.S. Navy training exercises (Year 3)?*

The proposed first year of the project consisted of 20 days of nearshore surveys (**Figure 1**) and 5 days of offshore surveys (**Figure 2**) performing non-random, non-systematic surveys with the following objectives:

1. Obtain identification photographs of humpback whales (and other high priority species of baleen whales, e.g., North Atlantic right whales) for inclusion in regional and local catalogs.

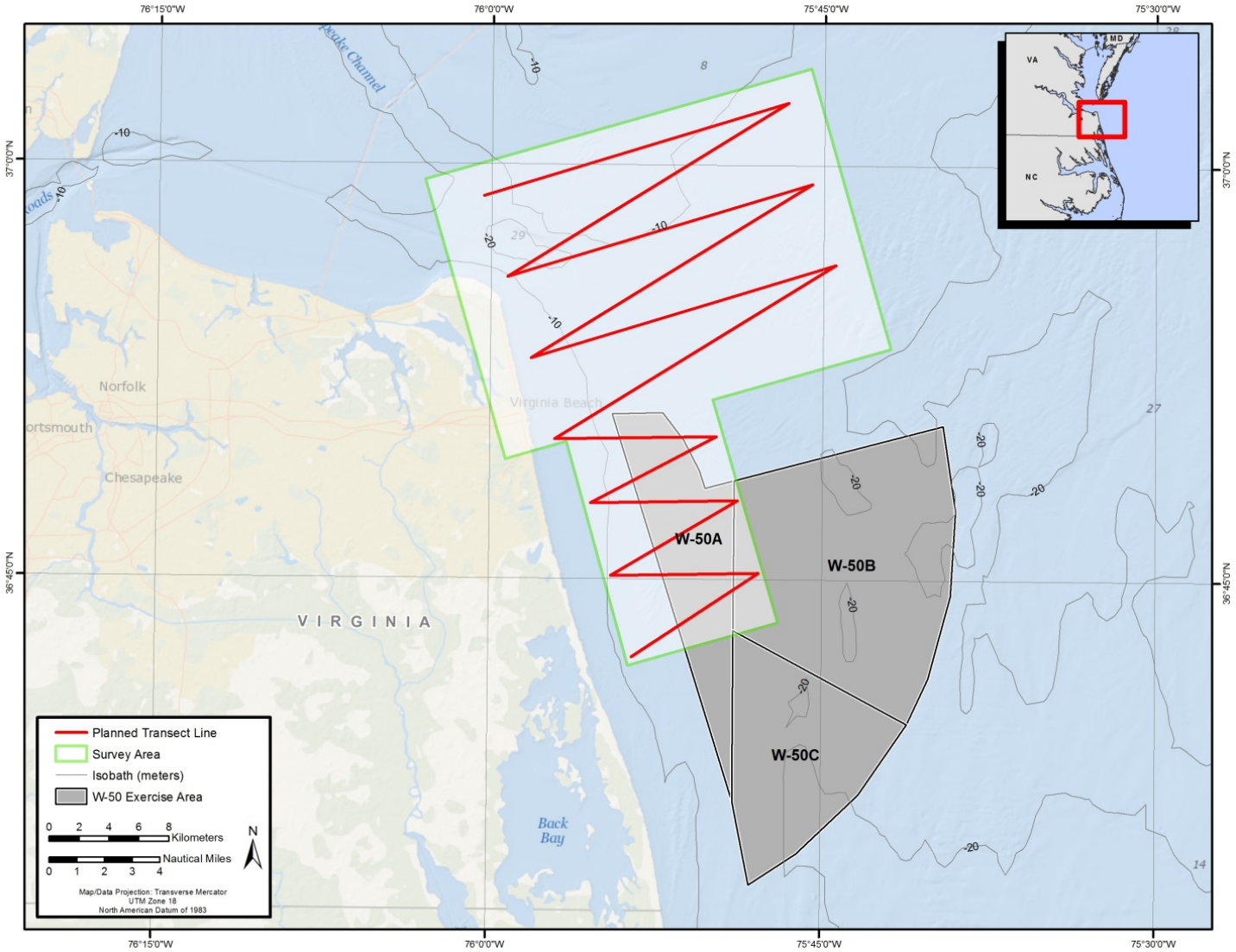

Figure 1. Map of the nearshore study area, which includes waters in and around the mouth of the Chesapeake Bay as well as the W-50A MINEX region off Virginia Beach. Red lines indicate proposed transect lines that will be run when there are no reports of humpback whales in the area.

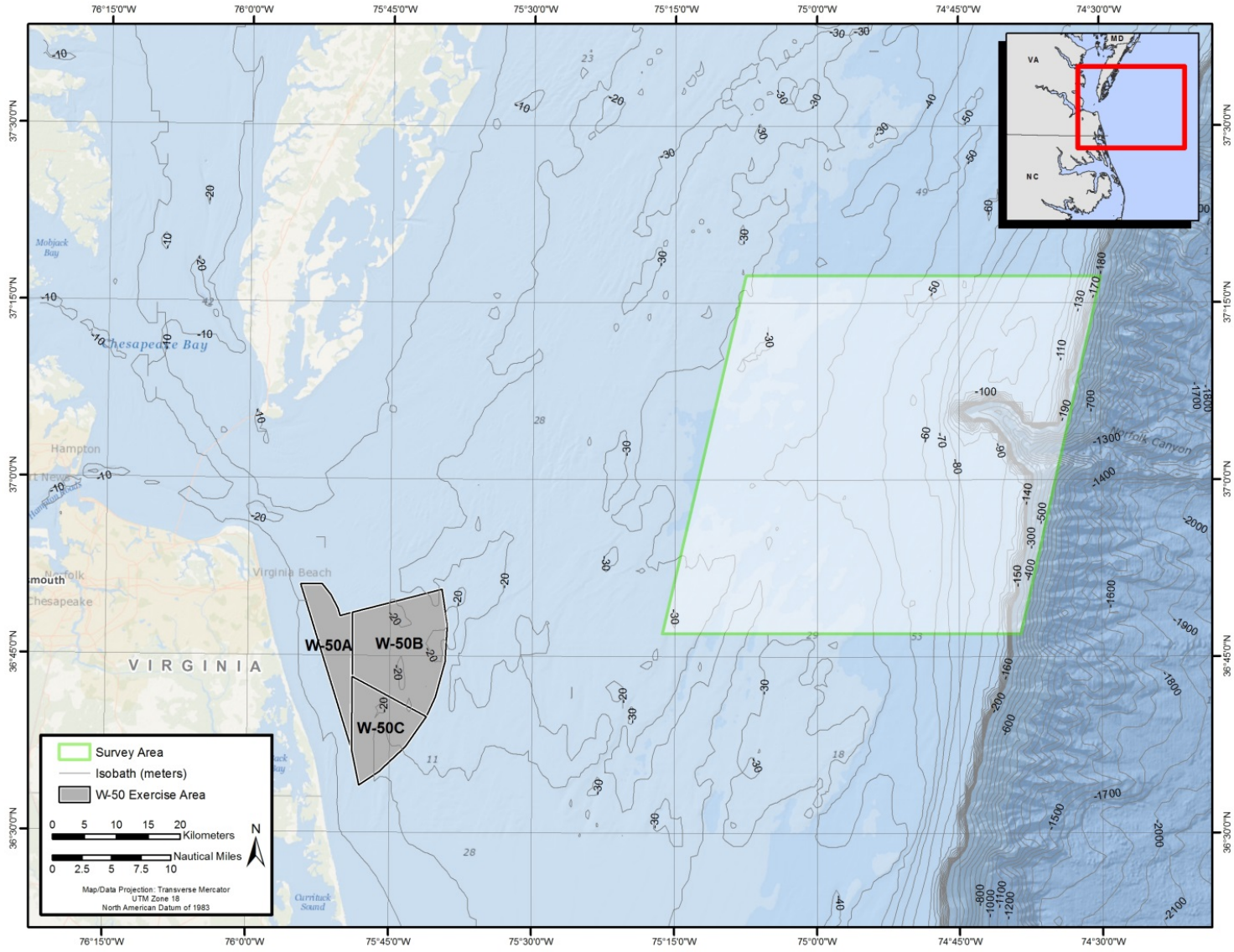

Figure 2. Map of the offshore study area that extends out to the continental shelf and includes Norfolk Canyon. Survey efforts will be focused in this region during the 5 days of offshore surveys.

2. Conduct focal follows of humpback whales (and other high priority species of baleen whales, e.g., North Atlantic right whales) with an emphasis on priority U.S. Navy training areas, such as the W-50 mine neutralization exercise (MINEX) zone, and shipping channels.
3. Collect biopsy samples of humpback whales for sex determination and mitochondrial control region sequencing as well as microsatellite genotyping of the tissue samples by University of Groningen and stable isotope analysis by Duke University.

2. Methods

The nearshore survey vessel is the 23-foot fiberglass hybrid foam collar boat, *Whale Research*. For offshore surveys, charter fishing vessels ranging in size from 52 to 57 feet and fully licensed and insured for operation in offshore waters were used.

Vessel operations for nearshore survey days depart from Marina Shores Marina, off Lynnhaven Inlet. Offshore survey days will depart from Rudee Inlet. Efforts are coordinated with the W-50 MINEX range so that as often as possible the vessel will have clearance on the range. However, due to limited weather windows and the frequent lack of range clearance, it will not always be possible to conduct surveys when the range is open. After the initial offshore survey was completed as proposed, with an aerial team flying in coordination with the vessel team to facilitate sighting and localization of humpback whales or other high priority species, it was determined to be logistically inefficient. Funds for the aerial component of the project were converted to additional offshore survey days.

In order to maximize achieving the project objectives, surveys commence as close as is practical to sunrise. If sea states reach a Beaufort 4, or visibility is reduced to less than 1 nautical mile due to rain or fog, the survey vessel may call off effort. Every effort is made to avoid such circumstances by following weather conditions closely before commencing a survey day.

The scientific crew consists of 3 to 5 marine mammal scientists, which includes the boat driver on the nearshore surveys. The scientific crew will consist of 3 to 5 marine mammal scientists, not including the charter boat driver on the offshore surveys. Opportunistic observations of marine species are conducted using a primary observation team of three individuals - two dedicated observers searching either naked eye or with 7 × 50 hand-held reticle binoculars or 10 x 30 hand-held image-stabilizing binoculars and the third observer (boat driver) with unaided eyes. Once a sighting commences, one observer focuses on data recording while the other focuses on obtaining photo identification images of the individual(s).

Priority is given to reports of whales in the survey area whenever available and the research vessel surveys areas where known sightings have occurred. When no recent reports are available, the research team has the option to follow the pre-determined transects to survey for whales until a report comes through (**Figures 1** and **2**).

During a marine mammal sighting, the research vessel attempts to approach the animal(s) in a manner to minimize disturbance to the animal(s) and to maximize the scientific crew's abilities to

confirm species, obtain group size estimates, and obtain photo-identifications and high definition video. Focal follows are attempted based on the known sighting history of individual humpback whales and the presence or absence of other baleen whales in the study area.

3. Results

Between 02 January and 15 May, HDR was able to conduct 15 inshore surveys for humpback whales. During these 15 surveys, there were 46 sightings of humpback whales totaling 61 individual whales, as well as 3 sightings of fin whales (*Balaenoptera physalus*) totaling four individual whales (**Figure 3**). Of the 61 individual humpback whales seen, 35 (57.4 percent) were presumed to be juveniles based on their estimated size. Focal follows were performed on 24 humpback whales and on 1 fin whale (**Figure 4**), totaling 1,628 minutes of focal follow effort (**Table 1** and **Figure 4**). Twelve biopsy samples were collected from humpback whales and enough skin was collected on nine of those samples for stable isotope analysis (**Table 1**).

Information was compiled for each humpback whale sighting—including those made during associated surveys for another Navy-funded monitoring project—since December 2014. The HDR photo-ID catalog includes 31 unique humpback whales as of June 2015. Of the 31 unique whales, 24 whales include fluke identification photos as well as dorsal images. Images of flukes were submitted to Allied Whale on 3 February 2015 and to the Virginia Aquarium on 21 May 2015 for matching. Although matching for these images is still underway, preliminary results from Allied Whale indicate at least two known matches to Gulf of Maine individuals (GOM67 and GOM73), as well as one match to a Newfoundland animal (HWC#7799) and one match to a St. Pierre and Miquelon animal (HWC#7621/ WBR#958).

Of the 31 unique whales in the HDR 2014/2015 catalog, 15 individuals have been seen on only one occasion while the remaining 16 have been seen on multiple occasions. The most frequently sighted animal has been re-sighted on 12 occasions between 21 December 2014 and 12 February 2015. This individual, temporarily known as HDRVA013, has been seen within the MINEX W-50 area as well as inshore waters off Virginia Beach (**Figure 5**) and sighted during associated MINEX and inshore line-transect surveys as well as the inshore humpback surveys. Four focal-follows were completed on HDRVA013 during the humpback whale inshore surveys.

4. Discussion

While analysis for the 2014-2015 season is still underway, preliminary results show site fidelity in the study area for some individuals and a high level of occurrence within the shipping channels—an important high-use area by both the U.S. Navy and commercial traffic. Some individuals are also spending time very close to the MINEX W-50 box and are presumably within hearing range of underwater detonation training exercises. Over half of the humpback whales seen during this effort appear to be juveniles, based on size estimates.

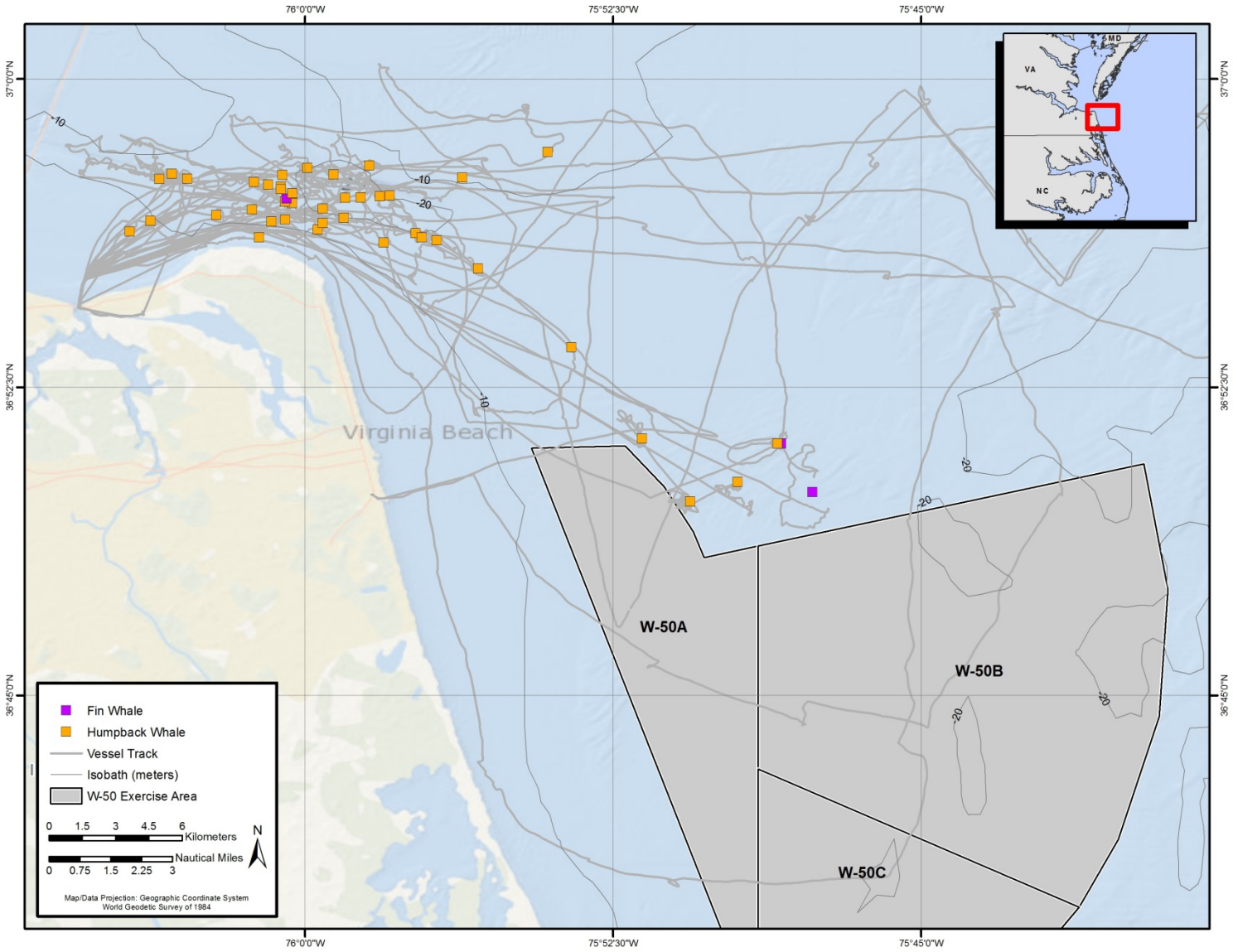

Figure 3. Locations of all whale sightings and vessel track from 01 January through 15 May 2015 during HDR's humpback whale inshore survey efforts.

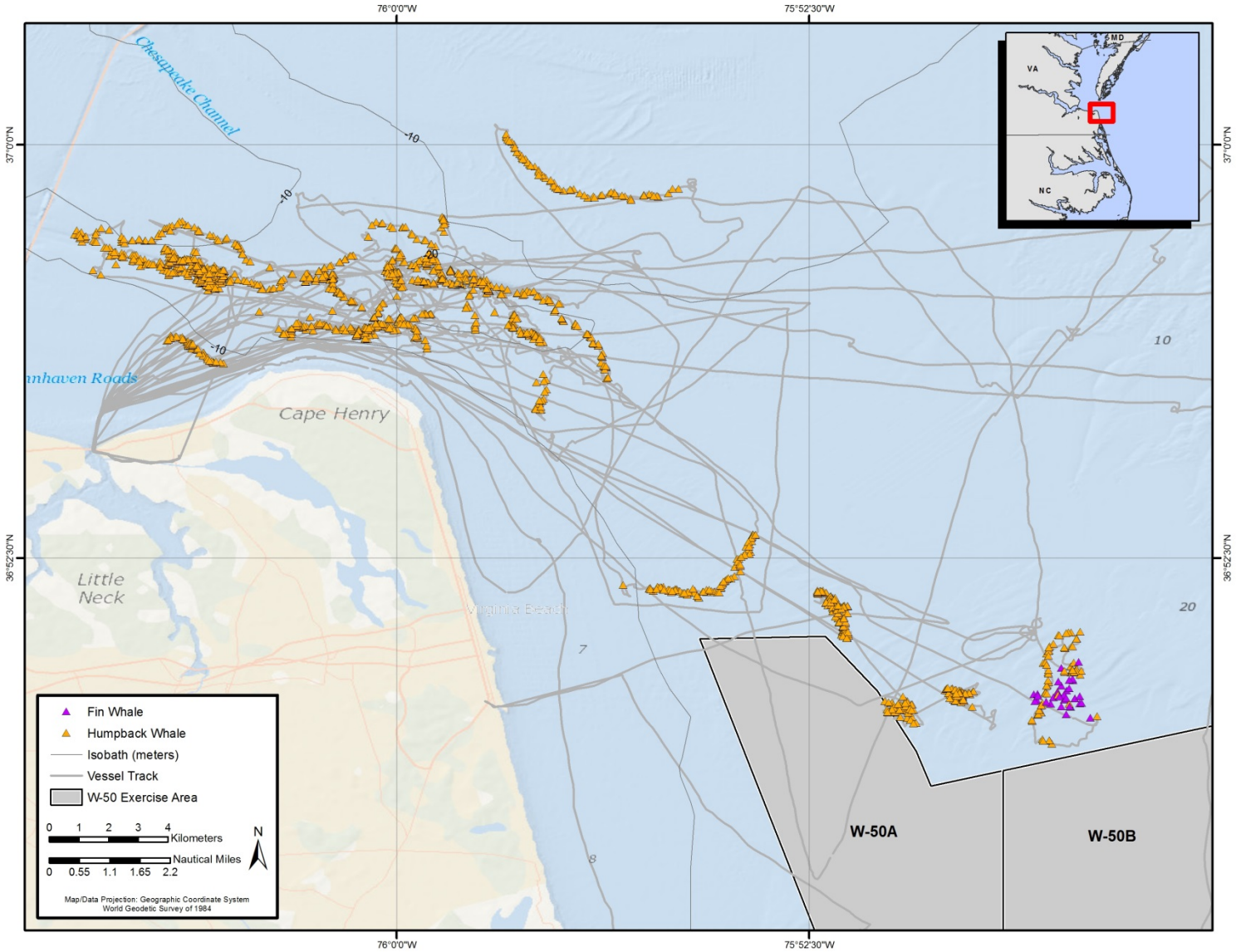

Figure 4. Focal follow data point locations and vessel trackline of all followed whales from 01 January through 15 May 2015 of HDR's humpback whale inshore survey efforts.

Table 1. Summary of HDR's humpback whale inshore survey efforts off Virginia Beach, Virginia, between 02 January and 15 May 2015.

Date	Survey Time (mins)	# Sightings	Total # Individuals	HDR Photo IDs	Focal Follows, ID	Focal Follow (mins)	Biopsies (DNA/Stable Isotope), ID
02 January	339	2	2	HDRVA008 HDRVA009	2 HDRVA008 HDRVA009	120	(1/1) HDRVA009
06 January	492	6	6	HDRVA008 HDRVA010 HDRVA011	3 HDRVA008 HDRVA010 HDRVA011	227	(2/1) HDRVA010 HDRVA011
11 January	544	5	8	HDRVA012 HDRVA013 HDRVA014 HDRVA015 HDRVA016	3 HDRVA013 HDRVA014 HDRVA015	170	(3/2) HDRVA013 HDRVA014 HDRVA015
15 January	427	3	6	HDRVA008 HDRVA009 HDRVA011 HDRVA021 HDRVA022	2 HDRVA009 HDRVA011	147	(0/0)
20 January	563	7	10	HDRVA009 HDRVA013 HDRVA023 HDRVA024	4 HDRVA009 HDRVA013 HDRVA023 HDRBp001	262	(1/0) HDRVA023
22 January	510	6	6	HDRVA009 HDRVA012 HDRVA013 HDRVA024 HDRVA025	3 HDRVA012 HDRVA024 HDRVA025	154	(2/2) HDRVA024 HDRVA025
25 January	441	7	11	HDRVA006 HDRVA007 HDRVA008 HDRVA011 HDRVA013 HDRVA014 HDRVA021	2 HDRVA006 HDRVA021	145	(0/0)
29 January	512	5	7	HDRVA005 HDRVA013 HDRVA014 HDRVA022 HDRVA027 HDRVA028	2 HDRVA005 HDRVA027	125	(2/2) HDRVA005 HDRVA027
06 February	311	0	0	-	0	0	(0/0)
09 February	292	2	3	HDRVA007 HDRVA013 HDRVA029	1 HDRVA029	63	(1/1) HDRVA029

Date	Survey Time (mins)	# Sightings	Total # Individuals	HDR Photo IDs	Focal Follows, ID	Focal Follow (mins)	Biopsies (DNA/Stable Isotope), ID
12 February	415	3	2	HDRVA012 HDRVA013	3 HDRVA012 HDRVA013 (x2)	215	(0/0)
22 February	378	0	0	-	0	0	(0/0)
5 April	416	0	0	-	0	0	(0/0)
17 April	480	0	0	-	0	0	(0/0)
15 May	519	0	0	-	0	0	(0/0)
TOTAL	**6,639**	**46**	**61**		**25**	**1,628**	**(12/9)**

in the field, and further interpretation of the full data set will reveal whether juveniles appear to be spending more time in the study area than larger animals, presumed to be adults. A laser photogrammetry system will be incorporated into future efforts to add quantitative data to support age class identification in the field.

HDR will use the remaining five inshore days at the start of the next field season, commencing in December 2015. Offshore days have been converted into part of a new project to study cetaceans using the outer continental shelf and Norfolk Canyon, and results will be reported in that projects' report. Continued efforts to coordinate data sharing will be made with other local and regional agencies, such as the Provincetown Center for Coastal Studies. Biopsy samples will be analyzed at the end of the next field season once all budgeted (30) samples have been collected. Focal follow data will be examined for any emerging patterns of habitat utilization and primary behaviors.

The number of sightings of humpback whales and other species and the level of interaction between whales and vessel traffic seen in the short duration of surveys to date supports the previously recommend continuation of the study for subsequent years, with the addition of tagging efforts to the objectives. Adding satellite and other short-term, high-resolution data logging tags will better document the whales' movements within the study area (as well as when they leave the study area). Such information will better document the occurrence and behavior of humpback whales in this area and provide a baseline for behavioral response studies in the future.

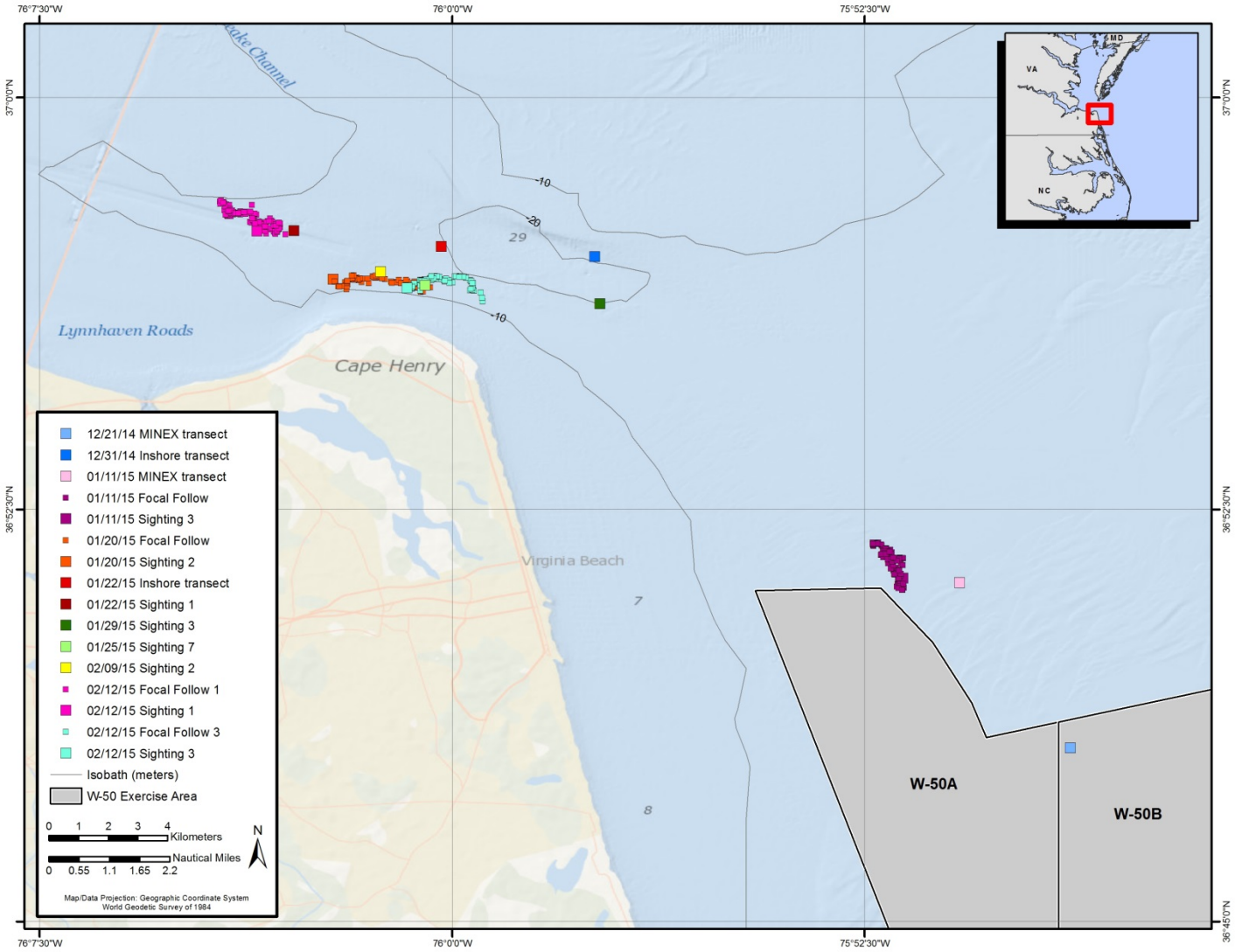

Figure 5. All sightings of individual humpback whale with catalog ID "HDRVA013" between 21 December 2014 and 15 May 2015 surveys. This individual was seen on each of the December and January inshore density surveys (under Task Order CTO43) as well as 7 of the 15 humpback whale inshore surveys. Four focal follows were completed on this individual during the 2015 inshore humpback surveys.

5. References

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