2024 Whale Research Report

Documenting the distribution of marine life near

Jeffreys Ledge in the Gulf of Maine

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Abstract

Jeffreys Ledge is a rocky feature in the western Gulf of Maine, approximately 32 km off the coasts of Maine, New Hampshire, and Massachusetts. It is a productive and important habitat for a variety of marine life, including federally protected marine mammals under the Marine Mammal Protection Act and Endangered Species Act. Although several whale-watching boats visit Jeffreys Ledge during the feeding season for whales, Blue Ocean Society for Marine Conservation is the only organization to collect detailed data on several factors to study the area and has been doing so since 1996. This report documents and summarizes the data collected during the 2024 season, including whale distribution and habitat usage, combined with perceived threats and behaviors. One hundred fifty-eight trips were taken to the Jeffreys Ledge area from April 25, 2024, until October 13, 2024. Four of these trips were full-day research cruises (under NMFS Permit No. 26594), one was a full-day bird-watching trip, one was a crew trip, while the rest were half-day public whale-watching trips (n=152). Two trips were conducted daily on 59 days, while single trips (including the four research cruises, one birding trip and one crew trip) were conducted on the remainder of the days (n=40). The area observed included water from the coastline east to -070.07188W, between the latitudes of 43.17013N and 42.63363N. A minimum of 8291 animals were observed. Twenty-three species were documented, including 4 species of baleen whales, 5 species of toothed whales, 5 species of shark, 3 species of large fish, 4 species of sea turtles and 2 species of seals. One hundred four individual humpback whales (*Megaptera novaeangliae*) were identified. Six of these were calves. Sightings of note include nine individual humpback whales that were only sighted during full-day research, birding or crew trips, making for 9% of all humpback whales (not including calves) identified. Additionally, several rare species were documented including a blue whale, pilot whales, common and bottlenose dolphins, a swordfish and a hammerhead shark. A total of 913 pelagic marine debris items were documented, and 114 of these items were seen near whales or other marine life. Of the identifiable debris items, balloons (n=211), plastic wrappers (n=202), and plastic bags (n=97) were the top three items recorded.

Introduction

Jeffreys Ledge is a productive marine habitat due to the upwelling currents surrounding the Ledge. This productivity makes it an important habitat for a variety of marine life, including federally protected marine mammals under the Marine Mammal Protection Act and Endangered Species Act. Animals are attracted to the area due to the abundant fish and plankton resources. Large whales face human threats, including collisions with ships of all sizes, entanglements in fishing gear and injesting marine debris. By monitoring the whale population annually, injuries can be documented and brought to the attention of management agencies, including the National Oceanic and Atmospheric Administration (NOAA).

Commercial whale-watching vessels regularly transit the area from May through October, the known feeding season for migratory whales. Data collected from these platforms of opportunity assist in understanding the habitat, populations, and threats.

Methods

Study Area

Jeffreys Ledge (Figure 1) is a rocky feature in the western Gulf of Maine, approximately 32 km off the coasts of Maine, New Hampshire, and Massachusetts. The southern end of Jeffreys Ledge is included in Stellwagen Bank National Marine Sanctuary (SBNMS) boundaries. The Ledge is approximately 54 km long by 9 km wide. The water depth above the Ledge is 45-60 m, while the depth surrounding it is 90-150 m. Upwelling currents stir nutrients from the seafloor, making for a more productive environment. Jeffreys Ledge is not regularly surveyed by other organizations. Whale-watching boats from Kennebunk, Maine; Rye, Hampton, and Seabrook, New Hampshire; Newburyport and Gloucester, Massachusetts regularly visit this area, but not all vessels collect detailed data on marine life sightings and behaviors.

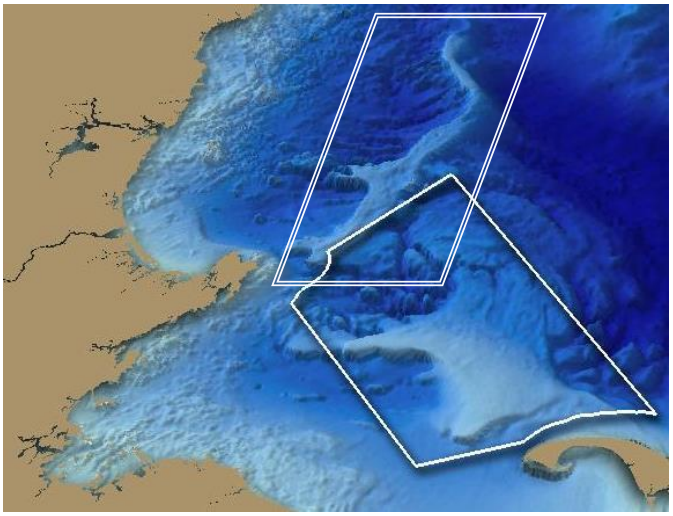

Figure 1. Jeffreys Ledge is outlined in a double line. Stellwagen Bank National Marine Sanctuary is outlined in a solid line. Image credit www.stellwagen.noaa.gov

Opportunistic Surveys

One commercial whale-watching vessel based in Rye Harbor, NH, was used for opportunistic surveys (whale watch trips) in 2024. The average cruising speed of the 21m vessel, *Granite State*, was 14 knots. Whale watch trips were generally 4-5 hours long and were usually conducted once daily in May-June and Sept-October, and twice daily in July-August, weather permitting.

In 2024, standard half-day trip lengths ranged from 47.1 km to 115.7 km, with the average trip length being 86.7 km. Trips were generally conducted in conditions of Beaufort 0-4. Visibility ranged from 0-32km. Trip routes and destinations were usually dependent on recent sightings as well as on information from other vessels. For example, if sightings were good in one area for the past few days, the vessel would likely return to that area. If sightings in that area began to drop, the vessel would choose a different area, often based on reports from fishing boats or other recreational boats. Since the vessel was working as a commercial whale-watching vessel and not as a dedicated research boat, standardized track line surveys were not possible.

The whale watch vessel crew consisted of a captain, a naturalist, two mates, and two interns, with at least two people on watch at all times. After receiving extensive hands-on training in the classroom and the field, interns collected data using the program Mysticetus (Figure 2).

Research Cruises

Four full-day research cruises were conducted in collaboration with Cetos Research Organization (https://cetosresearch.org) under NMFS Permit No.26594 prior to the start of the commercial whale watching season. Cruises departed from Seabrook, NH on April 25 and May 7, 2024, and from Rye Harbor, NH on May 17 and 21, 2024. Pre-season cruises allow researchers to better understand the usage of the habitat by marine mammals and other marine life prior to the tourism season. They are also able to cover more area than the average half-day whale watch trip. The research cruise crew consisted of one captain, one-two mates and four-six dedicated observers. Thirteen unique humpback whales were documented on these pre-season cruises, six of whom were only seen on these trips and not during the regular season.

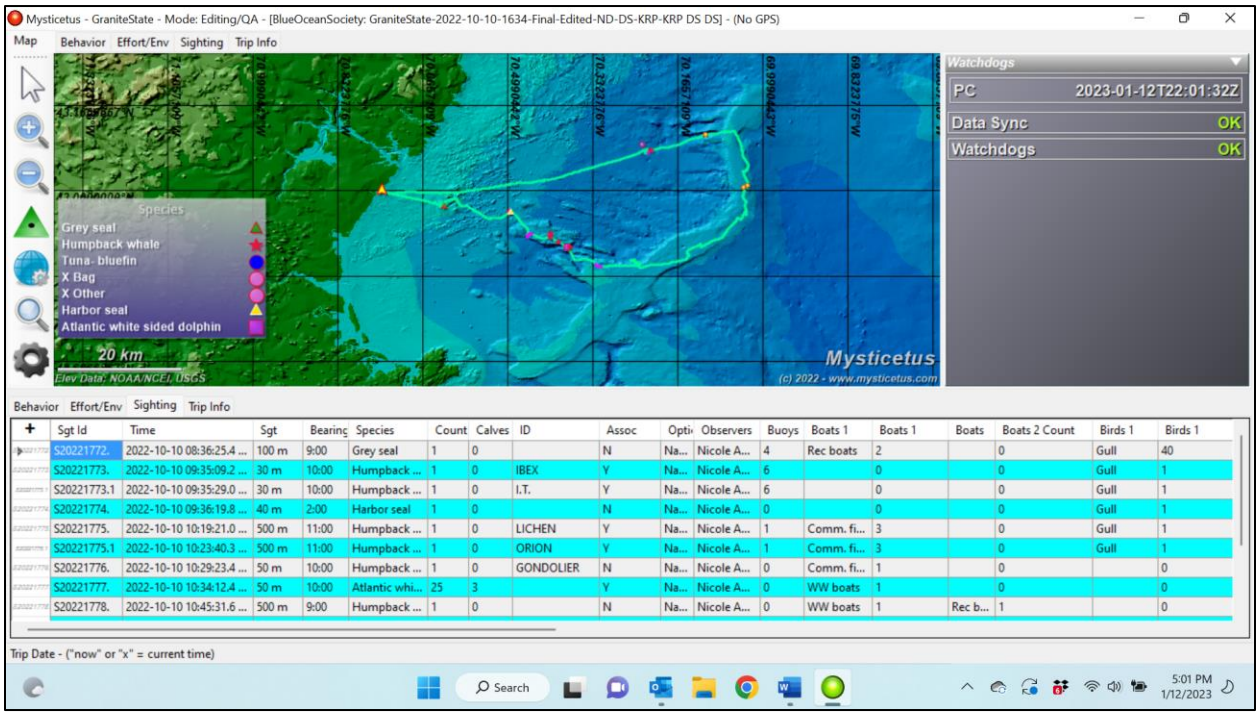

Figure 2. Screenshot of *Mysticetus* interface

Data collectors also recorded potential threats (vessels, fishing gear, and marine debris) to marine life with each sighting. Ship strikes and entanglements in fishing gear are two of the leading causes of injury and mortality for large whale species (Henry et al., 2012). The number of boats of each type (whale watching, fishing, recreational) seen within 1 km of a sighting was recorded. By documenting the vessels of each kind near a sighting, the potential for collision can be determined. If a newly injured whale was observed, it was reported to the Northeast Fisheries Science Center and the National Oceanic and Atmospheric Administration (NOAA). If the strike itself was observed, the United States Coast Guard

(USCG) and NOAA were contacted immediately while also obtaining vessel registration numbers and images.

By documenting the amount of fixed and active fishing gear near a sighting, the potential for entanglement can be determined. Each fishing buoy marks a vertical line in the water column that is attached to a set of fixed fishing gear (gear that is left unattended for one or more days). The type of gear is not always apparent based on the surface buoy system. However, the most prevalent fixed gear types in the region are lobster trawls and gill nets. Large whales are known to get tangled in the vertical buoy line from both types of gear, while smaller marine mammals (dolphins, porpoises, seals) are known to get tangled in gill net panels (Reeves et al., 2013). If an entangled whale is observed, USCG, NOAA, and or Center for Coastal Studies (CCS) are contacted immediately to launch a disentanglement rescue. If the entanglement is not evident in the field and later noticed in image post-processing, it will be submitted to NOAA and CCS.

By using digital images, injuries over time can be documented and monitored to determine the survival rates of the afflicted individuals. These images are also used to determine the trend of injuries in the populations (increasing or decreasing) as well as the severity of each event.

Marine debris items (plastics, in particular) have been found historically in at least 9 deceased baleen whale species (Baulch & Perry, 2014). By documenting the amount of pelagic marine debris near whales, the potential for ingestion can be determined.

Photographic Identification

Digital images of marine life were collected by the naturalist using digital SLR cameras outfitted with 70-300mm or 150-600mm lenses to identify the species and the individual whale. Images were often examined in the field but were also downloaded daily for a more thorough analysis. Detailed photo analysis continued into the fall months. Humpback whales were identified by the unique pigmentation markings on their flukes (Katona & Whitehead, 1981). Fin whales and minke whales were identified by the unique pigmentation markings on their backs (chevron and blaze) as well as their dorsal fin shape (Agler et al., 1992).

Results

Surveys

One hundred and fifty-eight whale-watching trips (surveys) were conducted over 172 days during the 2024 season (April 25, 2024 to October 13, 2024). This range was similar to last season because we began our season with the four scouting trips occurring before the beginning of the regular season (mid to late May). Six trips were full-day trips lasting 6.5-10 hours (four research cruises, one birding trip and one crew trip). Days with no trips were primarily due to unacceptable weather conditions or a lack of passengers to make the trip financially feasible for the whale watch company. The survey range extended from the coastline eastward to -070.07188 W, northward to 43.17013 N, and southward to 42.63363 N.

Sightings

A minimum of 8291 animals were observed during the 2024 season. Some individuals were observed multiple times throughout the study period. Twenty-three species were documented including four species of baleen whales, five species of toothed whales, five species of shark, three species of large fish (non-shark), four species of sea turtles, and 2 species of pinnipeds (Figure 3).

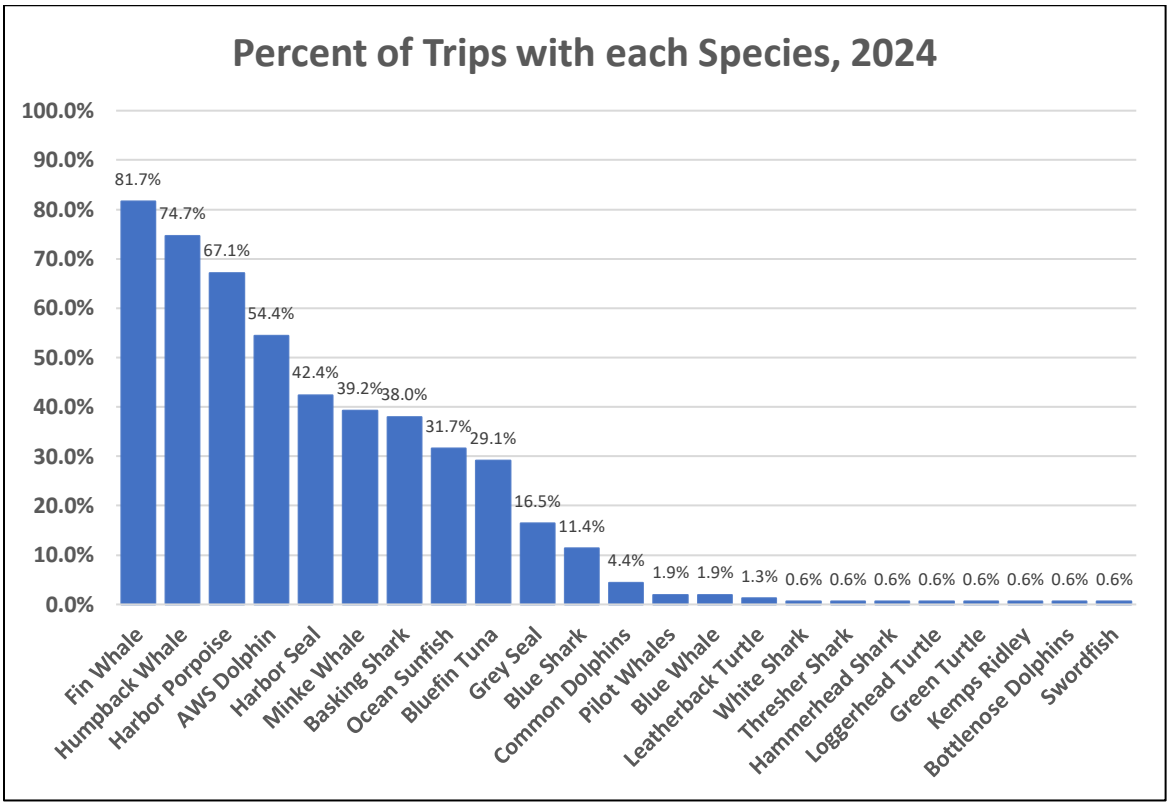

Figure 3. Percentage of trips with each species, 2024.

Sightings of Note

Twelve species of marine life were documented this year that were not documented last year.

- Blue Whale (last documented sighting: 2016)
- Pilot Whale (last documented sighting: 2013)
- Common Dolphin
- Bottlenose Dolphin
- Hammerhead Shark
- Thresher Shark
- White Shark
- Swordfish
- Green Turtle
- Kemps Ridley Turtle
- Leatherback Turtle
- Loggerhead Turtle

Additionally, an influx of krill was noted, primarily on the southern part of Jeffreys Ledge. Krill is typically not seen in such high densities in this area, and even turned patches of the ocean red (Figures 4 and 5).

Figure 4. Gulls feeding on krill

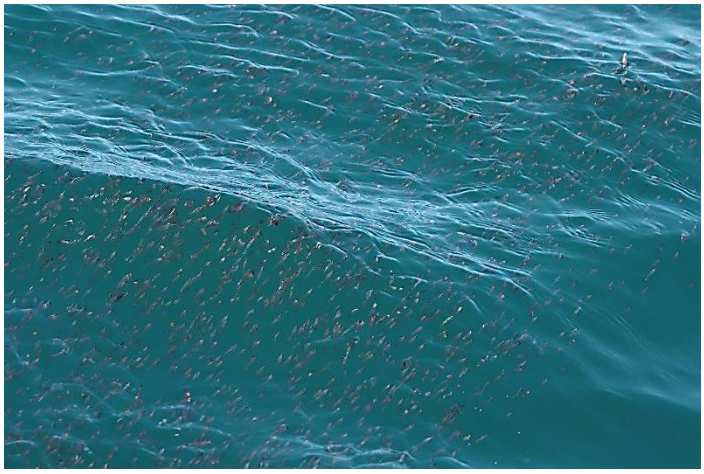

Figure 5. Close up of krill

Locations and details of sightings

The following maps depict the locations of the four most historically encountered species of *Cetacea*. A sighting is defined as the location where one or more whales of a particular species were seen. Sightings may represent multiple sightings of the same individual whales over the season.

Humpback whales:

A total of 419 humpback whales were seen (Figure 6), accounting for at least 104 individuals. Mother/calf pairs were seen 33 times (accounting for six individual pairs). Associations with Atlantic white-sided dolphins occurred five times.

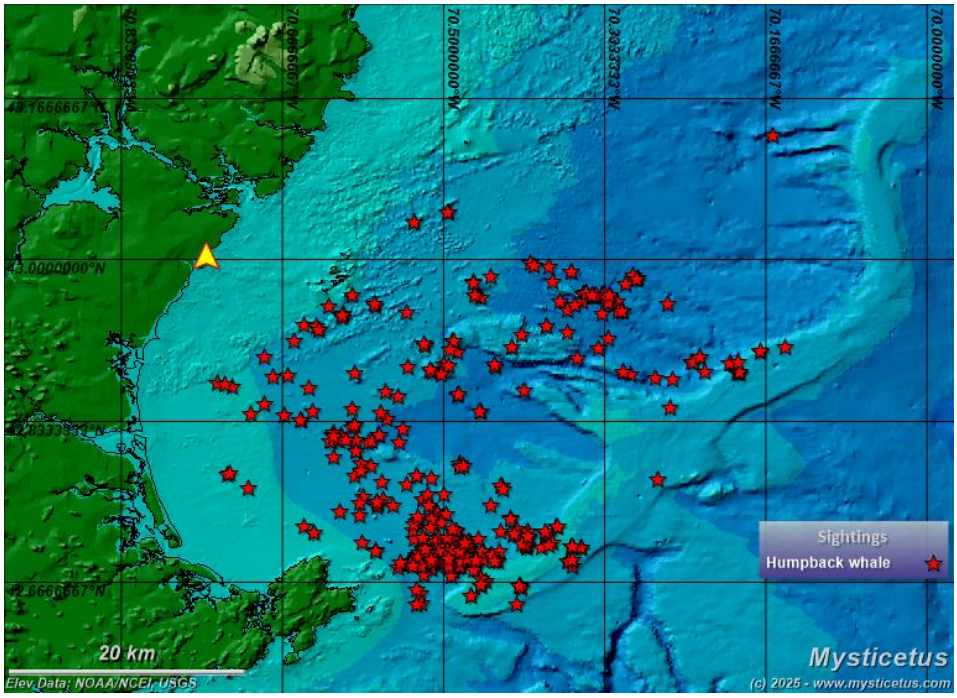

Figure 6. Humpback whale sightings near Jeffreys Ledge, 2024. The yellow arrow icon is Rye Harbor.

Fin whales:

A total of 545 fin whales were seen (Figure 7). Associations of fin whales occurred during 91 sightings, including 3 quartets, 19 trios, 63 adult pairs, and two mother and calf pairs. Associations with Atlantic white-sided dolphins were observed three times and a brief association with a humpback whale occurred once.

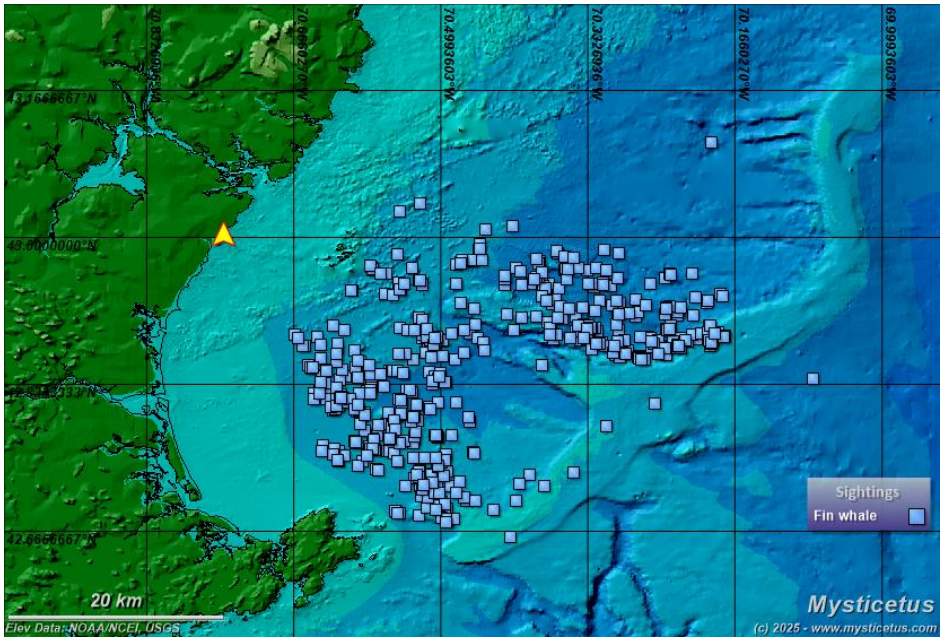

Figure 7. Fin whale sightings near Jeffreys Ledge, 2024. The yellow arrow icon is Rye Harbor.

Minke whales:

Minke whales were seen at 108 locations, with a total of 108 minke whales seen (Figure 8). No associations of minke whales were observed. Minke whales were not observed to be associated with Atlantic white-sided dolphins.

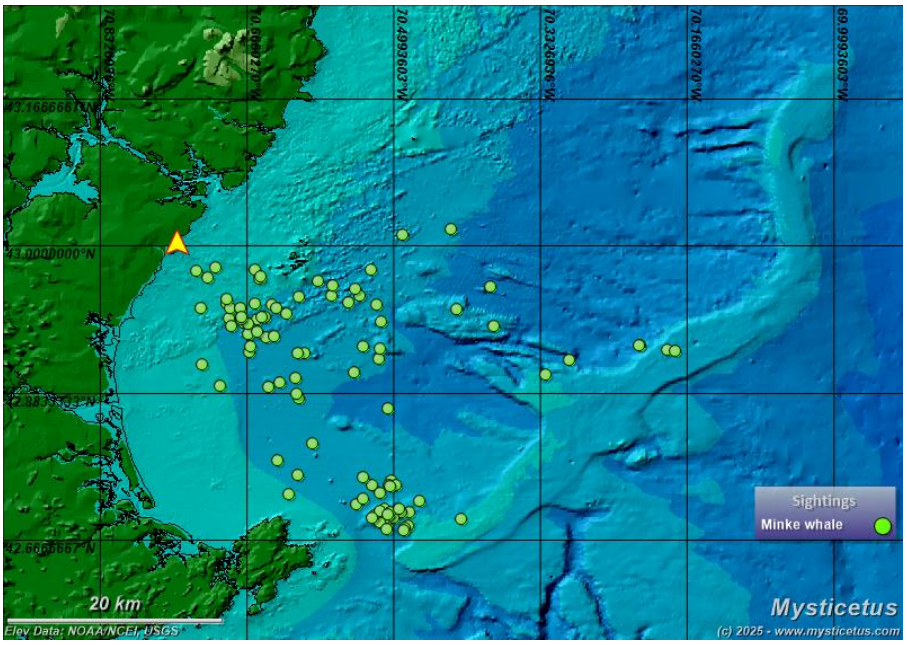

Figure 8. Minke whale sightings near Jeffreys Ledge, 2024. The yellow arrow icon is Rye Harbor.

Atlantic white-sided dolphins:

Atlantic white-sided dolphins were seen at 149 locations, and a total of 5286 Atlantic white-sided dolphins were seen (Figure 9). Pod size ranged from 1-300 individuals, with the average pod size being 35 individuals. Associations with other species occurred 10 times, including three sightings with fin whales, five sightings with humpback whales and two sightings with common dolphins.

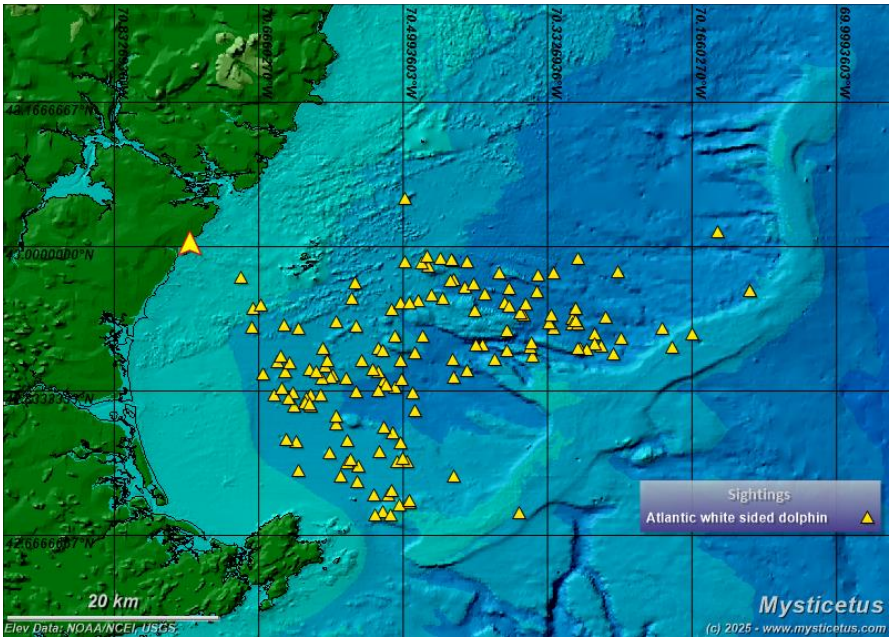

Figure 9. Atlantic white-sided dolphin sightings near Jeffreys Ledge, 2024. The yellow arrow icon is Rye Harbor.

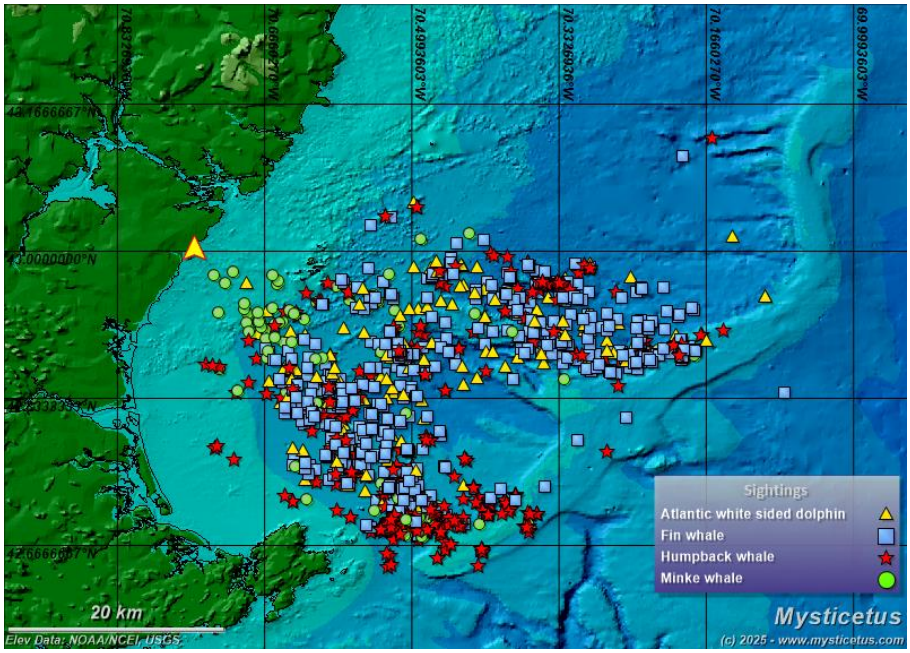

Figure 10. All sightings of common species combined, 2024. The yellow arrow icon is Rye Harbor.

Identification of individual whales

Humpback whales are individually identified by unique natural pigmentation markings on their flukes. Additionally, humpback whales that feed in the Gulf of Maine (GOM) are assigned names by GOM whale researchers and whale watch naturalists. The names generally refer to a specific marking or overall pattern on the flukes. Ninety-eight individual humpback whales, plus six new calves, were observed in 2024. Ten humpbacks have not been cataloged yet hence this is the first year they have been documented

by any group in the Gulf of Maine. Table 1 lists the individuals that have been identified so far. The majority (77, or 79%) of these individuals were adults (seven or more years old). Five juveniles were observed, and 16 individuals were of unknown age but presumed to be juveniles (Figure 11). More female humpback whales were seen than males, 38 to 32 respectively; however, 28 were of unknown gender, not including the six calves (Figure 12).

Table 1: Identifications of cataloged humpback whales seen in 2024.

Agent	Dashdot	Ghostship	Measles	Pina	Scylla 2024 calf
Banyan	Decimal	Grackle	Miracle	Pinball	Seadog
Bayou	Diablo	Grand Manan	Mogul	Pipette	Sedge
Bayou 2024 calf	Dome	Grommet	Mostaza	Pitcher	Shuffleboard
Boathook	Doric	Gunpowder	Mudskipper	Pixar	Signal
Bounce 2023 calf	Dross	Gunslinger	Mudskipper 2024 calf	Pluma	Solo
Bowline	Dross 2023 calf	Halloween	NewJersey	Polaris	Springboard
Buzzard	Duck 2022 calf	Harrow	Nike	Quote	Spoon
Cantilever	Dyad	Hawksbill	Nile	Ravine	Valley
Chablis	Ebony	Jabiru	Noche	Ravine 2023 calf	Victim
Chromosome	Elephant	Joy	Owl	Reflection	Whirlwind
Clamp	Entropy	Kappa	Paddleboard	Reflection 2024 calf	Wish
Clamp 2024 calf	Evolution	Lighter	Partition	Repeat	Zeppelin 2022 calf
Cotter	Fleck	Limpet	Patches	Satula	Zodiac
Crossbeam	Footfall	Lobo	Pharos	Scorpio	
Cupid	GOM 1827	Lobo 2024 calf	Picket	Scylla	

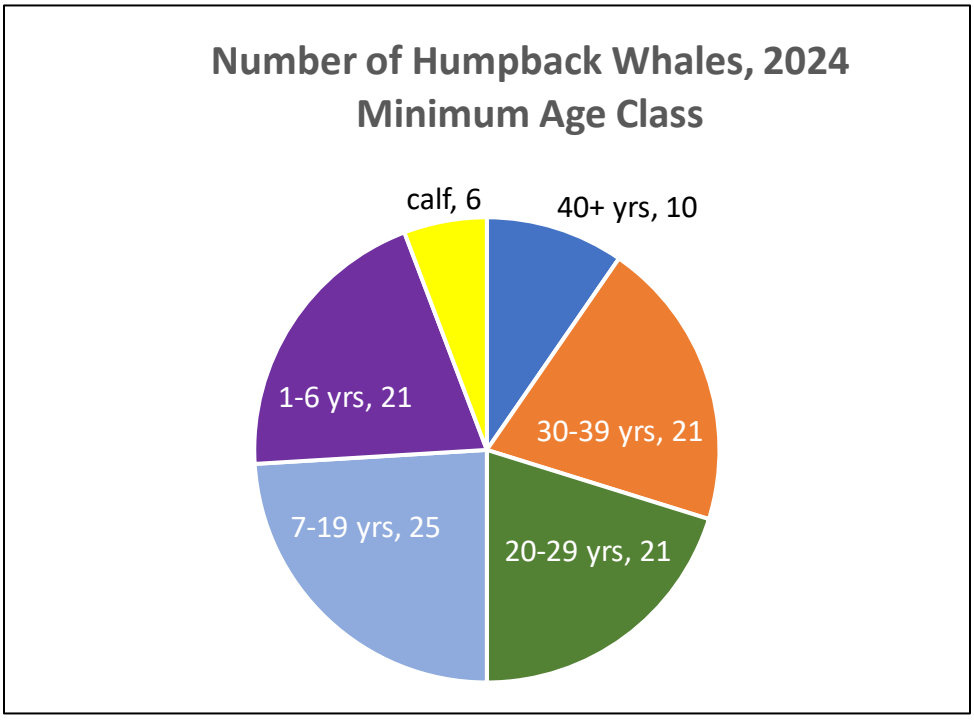

Figure 11. Age or minimum age of humpback whales seen in 2024.
(Data provided by Center for Coastal Studies)

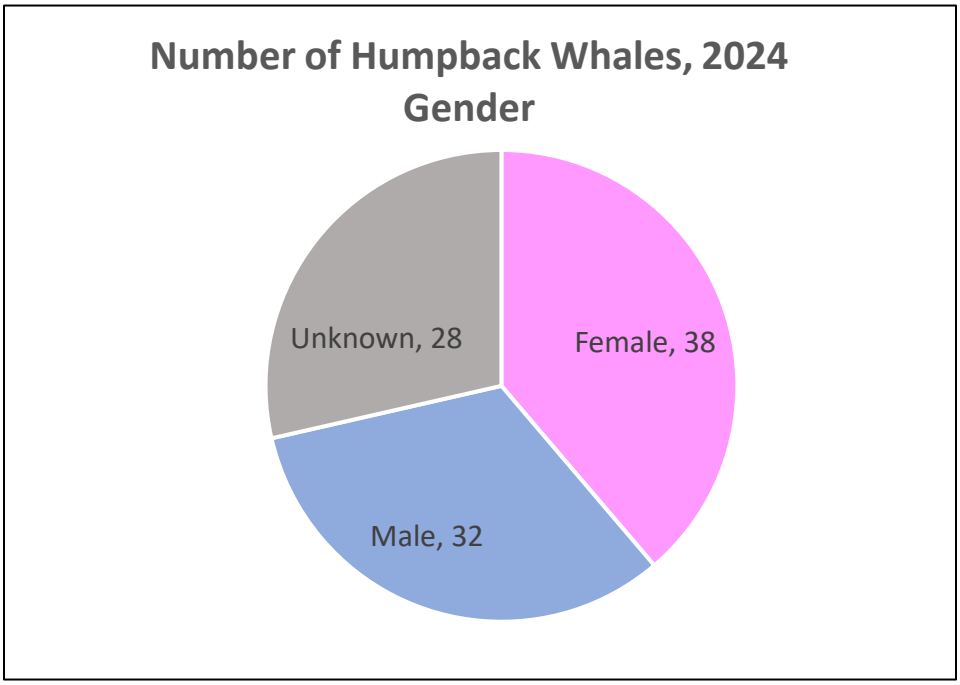

Figure 12. Gender of humpback whales seen in 2024.
(Data provided by Center for Coastal Studies)

Fin whales are individually identified by the shape of their dorsal fin as well as the pigmentation patterns on their back, called the chevron and blaze markings. Five previously identified individual fin whales were observed in 2024: Crow, Dylan, Golden Gate, Bp 0402 and Bp 0518. Individual identification is still in progress and will be summarized in a later report after our fin whale catalog is up to date.

North Atlantic right whales were not seen in 2024.

Documented Threats

Ship Strikes

No ship strikes or recent injuries caused by ship strikes were detected.

Entanglements

On August 16, 2024, the 2023 calf of humpback whale, Dross, was observed with fresh injuries to its peduncle and flukes as well as a small amount of blue monofilament netting still attached to the right fluke tip (Fig. 13). The Marine Animal Entanglement Response Team from the Center for Coastal Studies (CCS) was notified the following day and network members were asked to keep an eye out for this whale to better assess the entanglement status. Blue Ocean Society did not see this whale again and it is unclear if other groups in the area saw this whale either.

Figure 13. Dross' 2023 calf with raw entanglement injuries and remnant of blue monofilament on fluke tip

Throughout the season, several humpback whales were documented as being entangled with rope/buoys and/or monofilament line in our study area. However, Blue Ocean Society did not witness any of these events. Several were seen by our staff before and/or after the entanglement event including Clamp's 2024 calf, Mudskipper, and Scylla and her calf. We continued to monitor these individuals and report out sightings to the Marine Animal Entanglement Response Team from the Center for Coastal Studies (CCS).

Other Injuries

No other injuries were detected in 2024.

Healing

The minke whale nicknamed Finke was seen again this year. This whale was documented in 2011 with a fresh injury to its dorsal area that had removed the whale's dorsal fin. Small propeller cuts were also documented on this whale suggesting that a boat had struck the whale which led to the loss of its dorsal fin. Finke has been seen nearly every year since, and the healing of the wound has been documented (Figures 14 and 15).

Figure 14. Finke in 2011

Figure 15. Finke in 2024

Potential Threats

Fixed Fishing Gear

A total of 12050 buoys were recorded within 30 meters of marine life sightings. Of the 1500 cetacean sightings, 1046 had buoys associated (range 1-100 buoys). When buoys were seen near cetaceans, the average number of buoys present was 8. Baleen whales are more likely to become entangled in the vertical line between the surface buoy and the fixed fishing gear than other marine species. Baleen whales accounted for 720 of the sightings where cetaceans and buoys co-occurred. The number of buoys near baleen whales was 4491, with an average of 6 buoys per baleen whale sighted.

Marine Debris

Pelagic marine debris items were recorded throughout all trips (Figure 16). Debris items within 30 meters of a whale were flagged in the database (Figure 17).

- 913 pieces documented in total (Figure 18)
- 114 pieces recorded near whales (12.5%) (Figure 19)

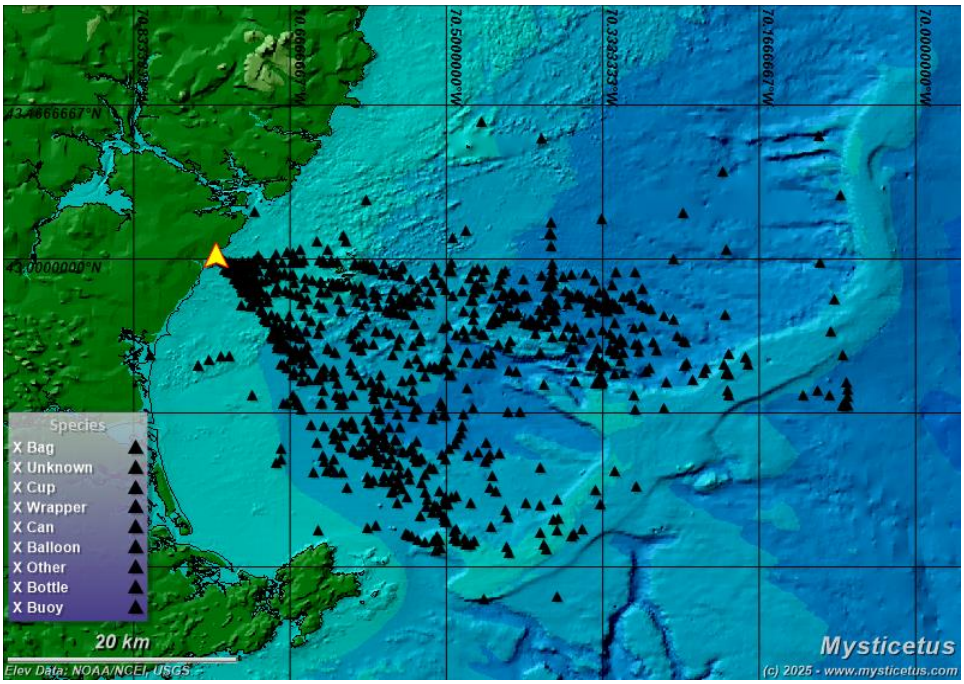

Figure 16. Pelagic marine debris sightings, 2024. The yellow arrow icon is Rye Harbor.

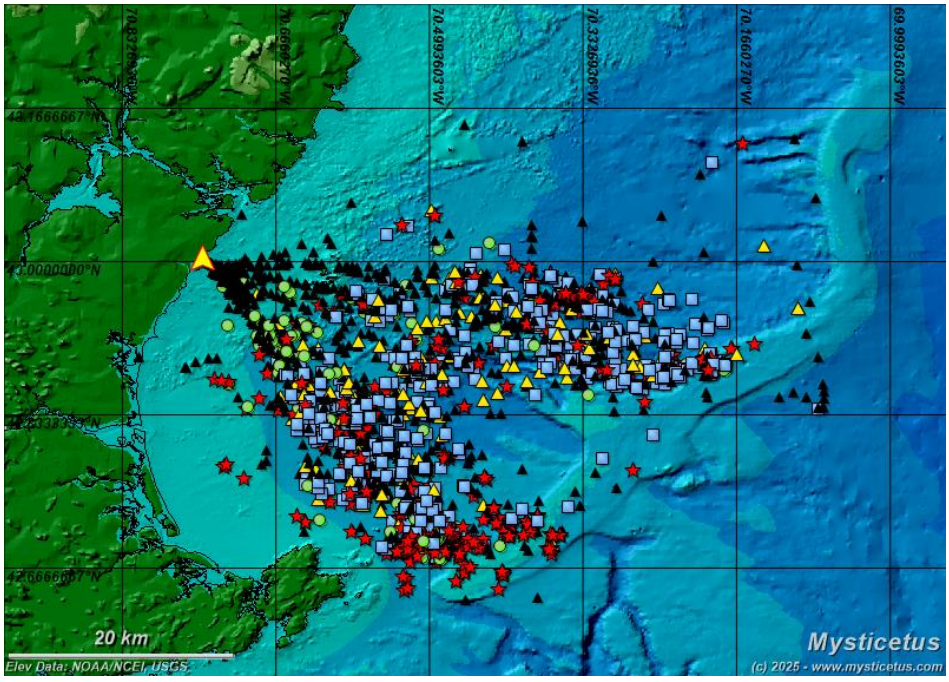

Figure 17. Pelagic marine debris and common species sightings combined, 2024. The yellow arrow icon is Rye Harbor. Black triangle icons are marine debris.

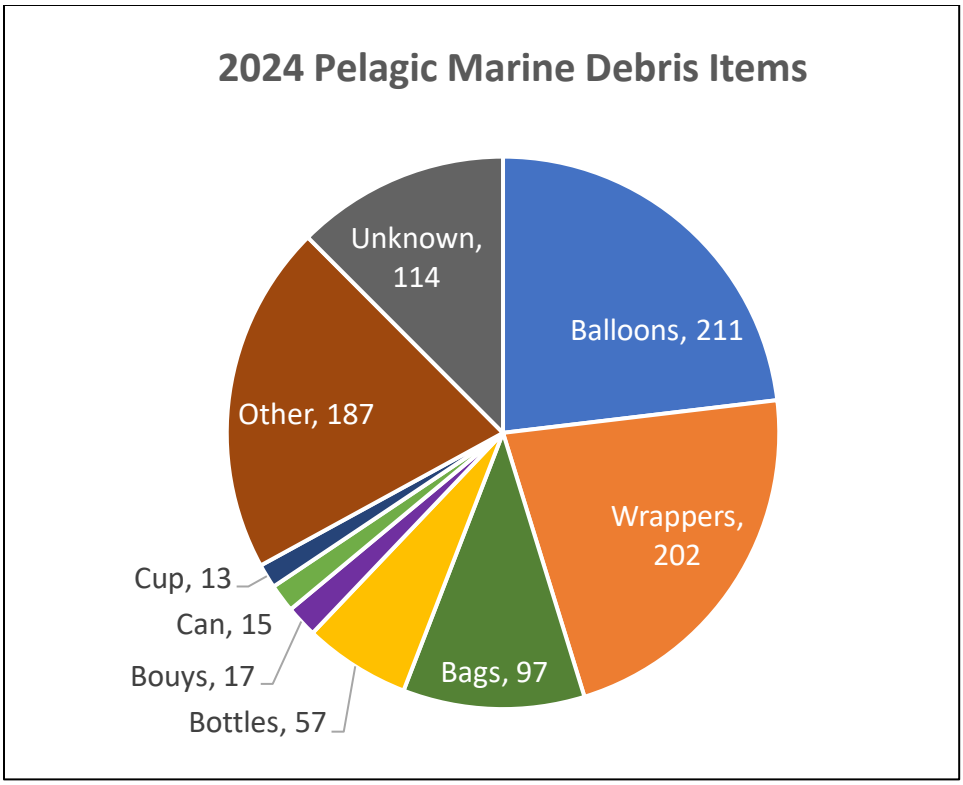

Figure 18. Number of all pelagic debris items recorded during whale watching trips, 2024.

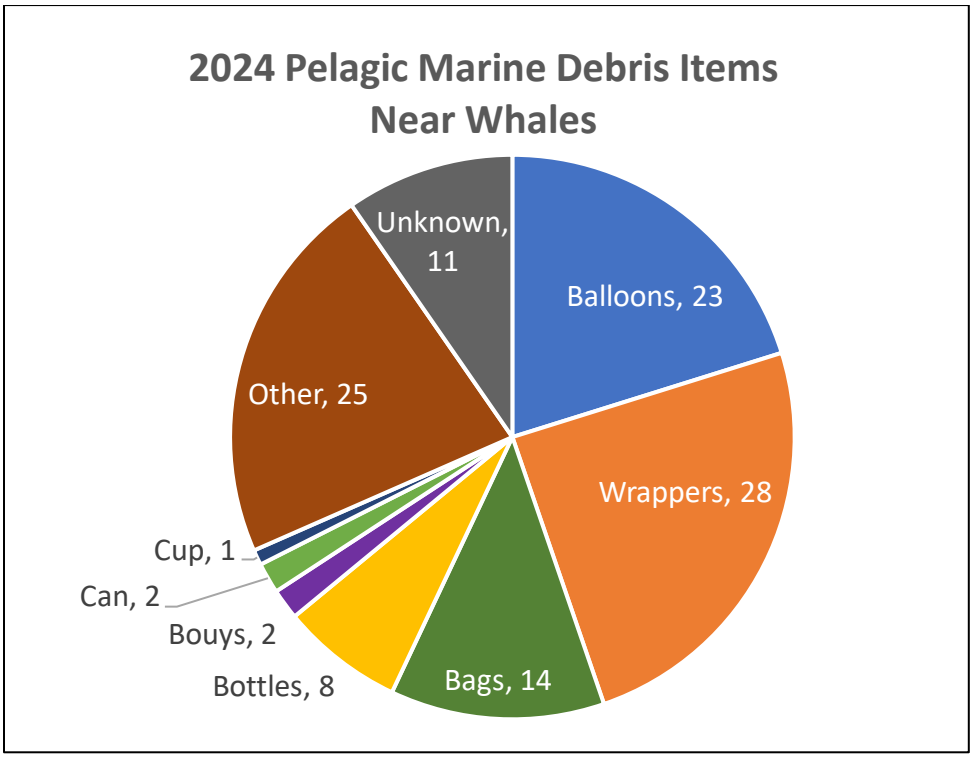

Figure 19. Number of debris items found near whales, 2024.

Summary and Recommendations

During the 2024 whale-watching field season (April 25-October 13), a minimum of 8291 animals were observed during 158 whale-watching trips/surveys. Twenty-three species of marine life were documented, including 4 species of baleen whales (blue, fin, humpback, minke), 5 species of toothed whales (Atlantic white-sided dolphin, bottlenose dolphin, common dolphin, harbor porpoise, pilot whale), 5 species of shark (basking, blue, great white, hammerhead, thresher), 3 species of large fish (bluefin tuna, ocean sunfish, swordfish), and 2 species of pinnipeds (harbor and grey seals). Sightings of note include 12 species of marine life that were not documented in 2023, including a blue whale and pilot whales. The last blue whale sighting in this area was in 2016, while the last pilot whale sighting in this area was in 2013. Additionally, the amount of krill observed at the surface on southern Jeffreys Ledge was incredible, and is rarely seen in such a density that it turns the water red.

The northernmost and easternmost areas of Jeffreys Ledge were not surveyed as consistently as the rest of the Ledge due to the limitations of working from a commercial whale watch vessel, which restricted the ability to complete coverage spatially and temporally. Plans are underway to charter a vessel(s) to allow more consistent coverage of these under-surveyed areas, at least in the shoulder seasons.

Although potential threats to marine mammals were documented, this aspect of the data collection should be more detailed in the future to guide authorities properly. For example, additional data would include the vessels' actions (underway or anchored, holding course or variable course), size, speed, and the number of lines in the water when appropriate. Additionally, AIS data can be incorporated into sightings maps to better understand the potential impact of large ship (65+ feet) traffic.

Trends involving potential threats in this area should also be investigated. Further research will be done to examine the behaviors of whales in proximity to fishing gear and marine debris to analyze the potential risk for entanglement or debris ingestion.

Conservationists, researchers, and managers have speculated that the current boundaries of the Stellwagen Bank National Marine Sanctuary (SBNMS) habitat, established in 1992, may not accurately delineate the areas needing management measures to allow these species to thrive and reduce anthropogenic mortality.

Acknowledgements

We want to thank Granite State Whale Watch for allowing us to bring interns aboard to collect opportunistic data and be willing to maneuver the vessel to achieve maximum photo-ID opportunities. Our captains, Peter Reynolds and Jonathan Gwalthney, were critical in obtaining the information necessary to provide this report. Thank you to Todd Herderhurst and his vessel, *Seacoast Lady*, for taking us out in the spring to conduct research cruises. Thank you to our research affiliates and staff naturalists, Melanie White, Matt Mitchell and Jen Kennedy, for overseeing the data collection and obtaining digital images of all animals when possible. Thank you to our Data Coordinator, Kaela Preston, for diligently managing data files in a timely manner. Most notably, thank you to our interns who worked tirelessly to collect the data aboard the whale watching trips: Breanna Butland, David Hoppe, Nathalie Pare, Lulu Pumayalli, and Summer Shifflett. Also, thank you to the Center for Coastal Studies for assistance with identifications and demographics.

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