Species Status Assessment

Common Name: North Atlantic right whale **Date Updated:** June 3, 2025

Scientific Name: *Eubalaena glacialis* **Updated by:** Meghan Rickard

Class: Mammalia

Family: Balaenidae

Species Synopsis *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The North Atlantic right whale (*Eubalaena glacialis*) is considered one of the most critically endangered whale species in the world (Clapham et al. 1999, Cooke 2020, NMFS 2022, Hayes et al. 2024). Three species of right whales are currently recognized: the North Atlantic right whale (*E. glacialis*), found primarily in the western North Atlantic Ocean; the North Pacific right whale (*E. japonica*), native to Japan, Russia, and the U.S.; and the southern right whale (*E. australis*), which ranges throughout the Southern Hemisphere (Cooke 2020, Committee on Taxonomy 2024). The distribution of right whales is partially determined by the presence of its prey, which consists of copepods and krill (Baumgartner et al. 2003). Most of the North Atlantic right whale population migrates in the winter to calving grounds from in low latitudes from high latitude feeding grounds in the spring and summer. A portion of the population does not migrate to the calving grounds during the winter and it is unknown where they occur during that season (NMFS 2025c).

North Atlantic right whales are now known to inhabit the New York Bight year-round (Tetra Tech and LGL 2020, Estabrook et al. 2021). Right whales can be found in shallow, coastal waters off the south shore of Long Island and within the Long Island Sound, but they have also been recently recorded as far offshore as the shelf break, where recent feeding and aggregations have occurred (Tetra Tech and LGL 2020, New England Aquarium 2024b). Mother/calf pairs can be seen each year, primarily from February to May (Sadove and Cardinale 1993).

Since 2010, North Atlantic right whale distribution and patterns of habitat use have shifted spatially and temporally, and in some cases, dramatically (Pettis and Hamilton 2025). An Unusual Mortality Event (UME) was declared in 2017 following a dramatic shift in habitat use linked to climate change and remains ongoing (Meyer-Gutbrod et al. 2021, NMFS 2025b). To date, the UME includes 157 whales and 41 confirmed mortalities. Sublethal impacts of entanglements and vessel interactions, the two primary threats to right whales, and the effect of stress on individual health have had a significant negative effect on calving rates. Female North Atlantic right whales are especially susceptible; they are now giving birth to their first calf later in life, experience longer calving intervals, and less females are making the transition to the reproductive state thereby producing fewer calves (Christiansen et al. 2020, Moore et al. 2021, Reed et al. 2022). Poor body condition is increasing; for example, North Atlantic right whales are 4 feet shorter than they used to be, which has been shown to impact calf production (Stewart et al. 2021, Stewart et al. 2022). The threats of entanglement and vessel strikes, coupled with declining health, have limited their recovery (Corkeron et al. 2018). When climate change impacts are also considered, the cumulative effects are suppressing the species' survival (Meyer-Gutbrod et al. 2021, 2023). Swift and robust monitoring programs and regulatory actions are needed; at the current rate of mortality and calving, the North Atlantic right whale is projected to be functionally extinct by 2035 (Linden 2024).

I. Status

a. Current legal protected Status

i. **Federal:** Endangered **Candidate:** No

ii. New York: Endangered

b. Natural Heritage Program

i. Global: G1

ii. New York: SNA **Tracked by NYNHP?:** Yes

Other Ranks:

-New York 2025 SGCN status: High Priority Species of Greatest Conservation Need

-IUCN Red List: Critically endangered

-CITES: Appendix I; IWC Protection Stock

-Northeast Regional SGCN: Very high conservation concern

-Canada Species at Risk Act (SARA): Endangered

-Marine Mammal Protection Act (MMPA): Strategic

-COSEWIC: Endangered

Status Discussion:

The IUCN Red List assessment was last completed in January 2020 where it was elevated to Critically Endangered with a Decreasing population (Cooke et al. 2020). This designation is made when a species is considered at high risk for global extinction; the North Atlantic right whale is one of only two large whale species on the Red List (Cooke et al. 2020, Pettis and Hamilton 2025). As the species' two native countries, Canada and the U.S. have long histories of conserving and managing North Atlantic right whales. In Canada, the North Atlantic right whale has been listed as endangered under the Species at Risk Act (SARA) since its proclamation in 2003 (DFO 2025). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) last assessed the species in 2013 and retained the endangered designation (DFO 2025).

In the U.S., right whales were first listed under the Endangered Species Conservation Act in June 1970 (35 FR 18319). When the Endangered Species Act was enacted in 1973, they were subsequently listed as endangered and as depleted under the Marine Mammal Protection Act (MMPA). The original listing was for "northern right whales", which included right whales from both the North Atlantic and North Pacific oceans. In 2008, the northern right whale was separated into two distinct species, the North Atlantic right whale and the North Pacific right whale (73 FR 12024). The stock is also listed as Strategic under the MMPA because anthropogenic mortality exceeds Potential Biological Removal (PBR; 0.73 for North Atlantic right whales) and the species is listed under the ESA (Hayes et al. 2025). The stock size is extremely low relative to the Optimum Sustainable Population (OSP) and is still declining. A recovery plan for the North Atlantic right whale was enacted in 1991 and revised in 2005 (70 FR 32293). The most recent 5-year review was published in 2022 (NMFS 2022). Critical habitat was designated for the North Atlantic right whale in 1994 (59 FR 28805) and revised in 2016 (81 FR 4838) to include two areas: one feeding area in the Gulf of Maine and Georges Bank region and one calving area off the Southeast U.S.

The most recent Report Card, produced annually by the North Atlantic Right Whale Consortium, was published in 2025 (Pettis and Hamilton 2025). The population estimate for 2023, which uses data through September 3, 2024, was 372 individuals. During the 2024 calving season, 20 mother/calf pairs, including four first time mothers, were recorded – an increase from 11 in 2023. However, despite the increase in calves, detected mortalities were the highest since 2019. Of the 20 calves born in 2025, five are known or presumed to be dead. In addition, at least 15 new entanglements events were documented: 10 whales with attached gear and five with new scarring.

There were also six documented vessel strikes, three of which were fatal. One of the vessel strike mortalities was a mom of the year and her calf is presumed to be dead.

An Unusual Mortality Event (UME) was declared in 2017 and remains active. Per the MMPA, an unusual mortality event (UME) is defined as “a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response” (NMFS 2025a). These events require increased investigation, as they often signal larger issues in the environment. A significant increase in mortalities and serious injuries along the U.S. and Canada Atlantic coasts prompted the declaration, which currently numbers 157 cases (NMFS 2025b). The cause of mortality, serious injury, and morbidity (sublethal injury and illness) in most of the cases is entanglement or vessel strike.

While the sharp population decline from 2015-2020 appears to have slowed, these human impacts continue to threaten the survival of the species (Pettis and Hamilton 2025). These threats can manifest as physiological factors that also play a role in the lack of recovery: calving frequency remains significantly lower than expected and the inter-birth interval remains high (NMFS 2013, Frasier et al. 2023, Pettis and Hamilton 2025). In addition, the 2024 calving season exemplifies the declining and delayed recruitment of reproductive females, as the average age of the four first time mothers was 17.25 years (Reed et al. 2022, Pettis and Hamilton 2025). Annual mortality levels continue to rise above population recovery thresholds, and with only approximately 70 reproductive females, the species is approaching functional extinction within the next 10 years (Runge et al. 2023).

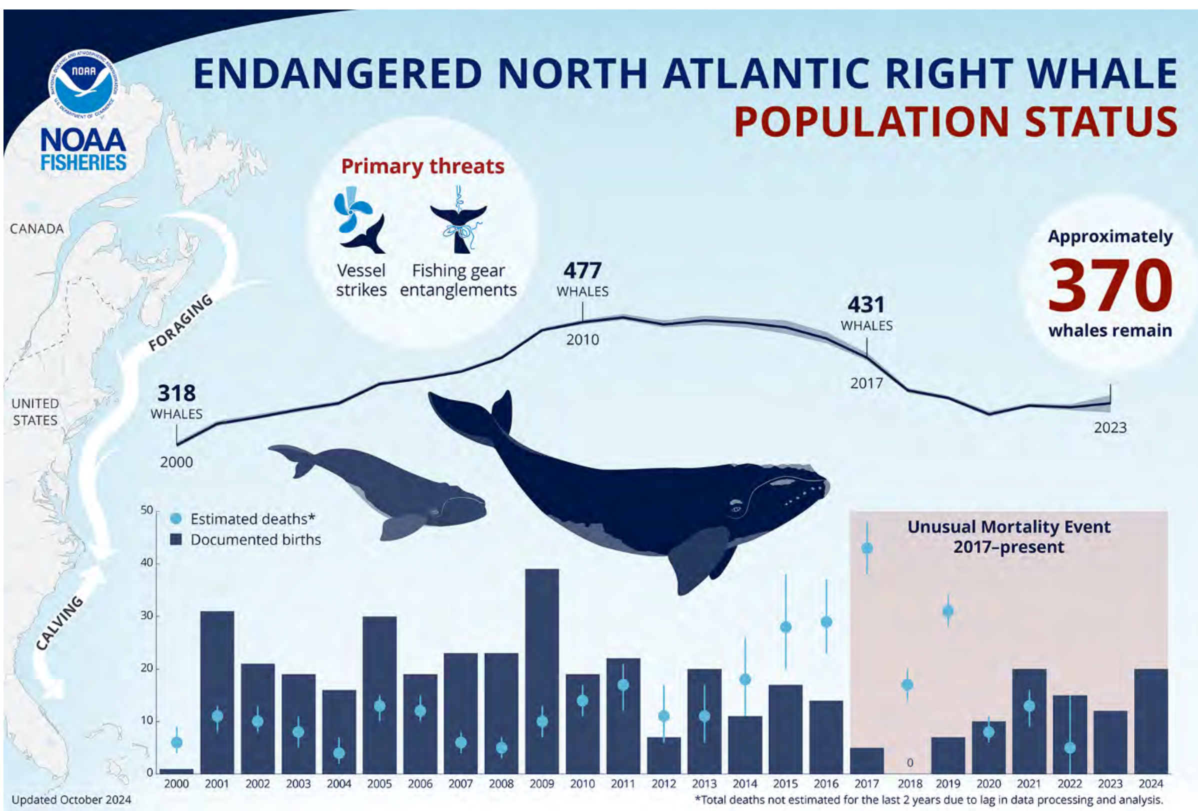

Figure 1. North Atlantic right whale population status as of October 2024 (NMFS 2025b).

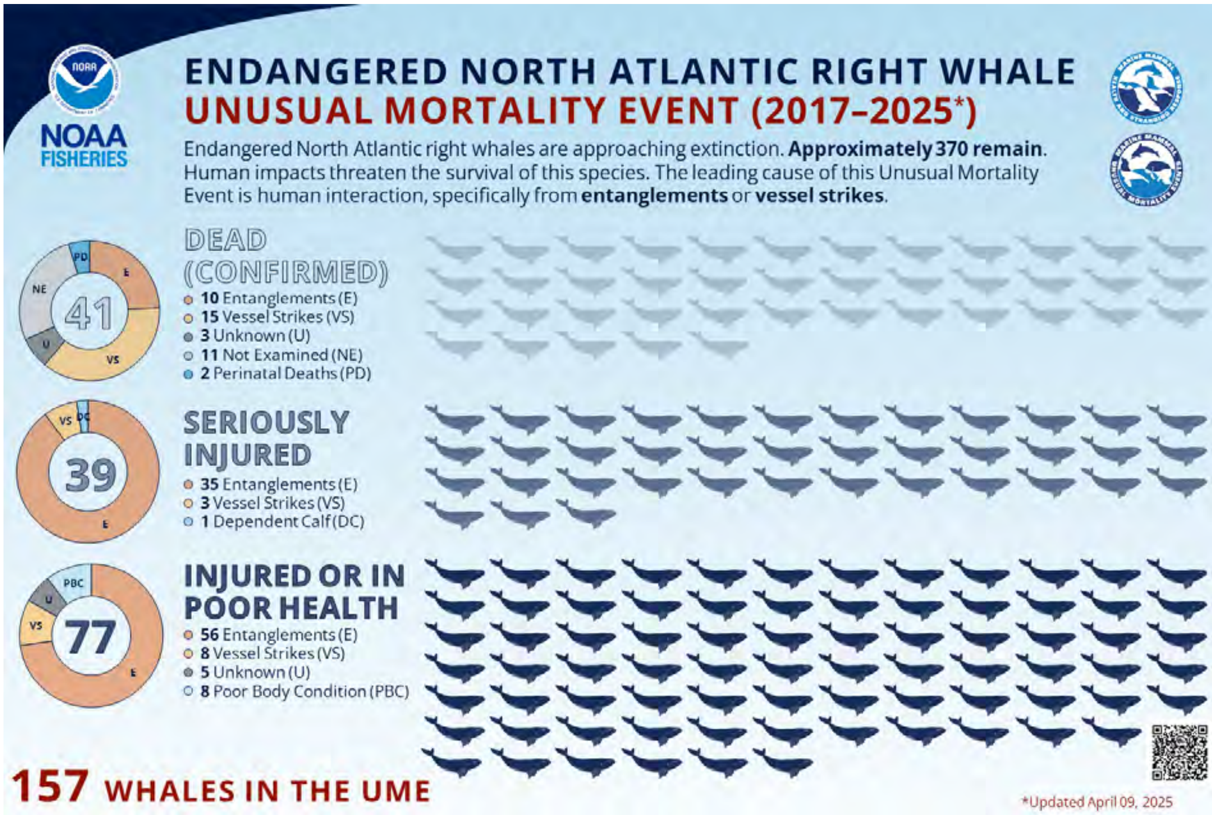

Figure 2. North Atlantic right whale Unusual Mortality Event 2017-2025 case summary (NMFS 2025b).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Declining	Increasing	2010 to present	Endangered	Choose an item.
Northeastern US	Yes	Declining	Increasing			Yes
New York	Yes	Declining	Increasing		Endangered	Yes
Connecticut	Yes	Declining	Increasing		Not listed	Choose an item.
Massachusetts	Yes	Declining	Increasing		Endangered	Yes
Rhode Island	Yes	Declining	Increasing		Endangered	Yes
New Jersey	Yes	Declining	Increasing		Endangered	Yes
Pennsylvania	No	Choose an item.	Choose an item.			Choose an item.
Vermont	No	Choose an item.	Choose an item.			Choose an item.

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
Ontario	No	Choose an item.	Choose an item.			Choose an item.
Quebec	Yes	Declining	Increasing		Endangered	Yes

Column options
Present?: Yes; No; Unknown; No data; (blank) or Choose an Item
Abundance and Distribution: Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
SGCN?: Yes; No; Unknown; (blank) or Choose an item

Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

All species of whales are inherently difficult to study due to their limited availability at the surface and migratory nature. In addition, funding for monitoring, especially visual surveys, is extremely limited. North Atlantic right whales are one of the most well-studied species but until 2016, monitoring of large whales in New York was very narrow in scope. Previous examples of surveys that included the New York area and recorded large whales were done coast-wide, seasonally, and/or focused on multiple taxa and were therefore not carried out at the most appropriate temporal or spatial scale for an assessment of large whale species in the New York Bight (CETAP 1982).

One of the first NYB-focused large whale surveys was a passive acoustic monitoring effort that took place from 2008 to 2009 (Muirhead et al. 2018). The 258-day project included 10 sites, with a line of moored receivers perpendicular to Long Island and 3 sites around the entrance to NY Harbor. The data was analyzed for blue, fin, and North Atlantic right whales only.

In 2010, the Atlantic Marine Assessment for Program for Protected Species (AMAPPS) joint program between the National Oceanic and Atmospheric Administration (NOAA) and the Bureau of Ocean Energy Management (BOEM) began, with the goal of determining the abundance and distribution of protected species along the U.S East Coast. The NOAA Northeast Fisheries Science Center (NEFSC) Protected Species Branch leads the surveys which are conducted by plane and ship and includes both visual and acoustic monitoring methods. AMAPPS is a broadscale survey and therefore does not match the specific needs of New York Bight monitoring in time or space but has, however, recorded sightings of humpback whales in and around New York. AMAPPS II (2015-2019) and AMAPPS III (2019-2024) have both been completed but AMAPPS was not picked up for continued funding by BOEM (NMFS 2025b, 2025c). Instead, the U.S. Navy plans to work with NOAA on similar surveys beginning in 2025 (US Navy 2024).

NOAA conducts regular, year-round monitoring focused on North Atlantic right whales (i.e., the North Atlantic Right Sighting Advisory System) that also collects sightings data on other taxa and whale species (Johnson et al. 2021). In addition, the New England Aquarium also conducts regular aerial surveys, and sometimes shipboard surveys, in the Southern New England area and very commonly records sightings of right whales year-round. Most right whale data is maintained within the North Atlantic Right Whale Consortium in two main datasets: the Sightings Database, maintained and curated by the University of Rhode Island, and the Identification Database (also known as the North Atlantic Right Whale Catalog), maintained and curated by the New England Aquarium (NARWC 2025).

In 2016, to support the state's commitment to offshore wind energy, the New York State Energy Research and Development Authority (NYSERDA) began a seasonal 3-year ultra-high resolution digital aerial survey of all marine taxa within the New York Bight (e.g., the offshore planning area delineated by NY Dept. of State; NYSERDA 2021). All large whale species were observed during the digital aerial survey. Also in 2016, the Woods Hole Oceanographic Institute (WHOI) deployed the first of an ongoing succession of near real-time monitoring buoys, and later gliders, to record the presence of large whales in the New York Bight (WHOI 2025). This effort had first been introduced off the coast of Massachusetts and proved helpful for both data collection and real-time management of vessel speeds to prevent collision with North Atlantic right whales. Currently, the data shared publicly is limited to four large whale species: sei, humpback, fin, and North Atlantic right whales. Right whales are regularly detected throughout the year on the near-real time buoys in New York.

Beginning in 2017, DEC launched the first three years of a monitoring program for large whales (Tetra Tech and LGL 2020, Estabrook et al. 2021). Using monthly visual aerial surveys and 24/7 passive acoustic monitoring over a three-year period, the NYS Whale Monitoring Program gathered enough data to estimate large whale abundance in the NYB. The NYS Whale Monitoring Program will conduct another three years of visual aerial surveys for a total of 18 surveys beginning in November 2024. As of June 2025, two sightings of right whales have been made during the aerial survey – one of a single individual and one of a group of 16 right whales, both in May 2025. Additionally, DEC funds a long-term Indicators of Ocean Health monitoring program. Data collection on whales during the 10-year program has at various times included gliders outfitted with PAM (i.e., the WHOI near real-time system), shipboard line transect surveys, and recording opportunistic sightings. Currently, this effort is set to be completed in 2027.

Marine mammal stranding response is performed by two federally permitted groups in New York: the New York Marine Rescue Center (NYMRC) and the Atlantic Marine Conservation Society (AMSEAS). For all live and dead large whale events, AMSEAS is the lead response team. The DEC has supplied funding for stranding response in New York since the program began in 1980. While right whale stranding response in New York is not common, these events provide valuable data, making stranding response an essential component of monitoring.

Trends Discussion *(insert map of North American/regional distribution and status):*

Basque whaling in the Bay of Biscay was first documented in the 11th century (Rey-Iglesia et al. 2018). Right whales were killed there annually until it became obvious there were few whales left around 1650, and whaling subsequently declined during the following century. Some Basque whalers traveled to Iceland to hunt in the early 1400s and took right whales around Britain and Norway until the 18th century (Aguilar 1986). Right whale hunting essentially disappeared thereafter, but some whalers around Britain and Iceland took at least 120 right whales from 1881 to 1924 (Collett 1909, Brown 1986).

It was originally thought that Basque whalers spread to the western North Atlantic in the 1500s and began hunting right whales in the tens of thousands off Labrador and Newfoundland, but genetic analysis on remains found in the region indicates that mostly bowhead whales were taken (Aguilar 1986, Reeves et al. 2001, Rastogi et al. 2004, McLeod et al. 2008). Because of this finding, it’s possible that North Atlantic right whales were already reduced in number by the time whalers from Massachusetts began shore-based hunting in the 1600s (Reeves et al. 2001, 2007). For three centuries right whales were persistently hunted to near extinction along the U.S. East Coast (Reeves et al. 1999). Records include a report of 29 whales killed in one day in Cape Cod Bay in January 1700.

Historical catches, particularly in the northeastern Atlantic, are insufficiently documented to estimate a pre-whaling population size. Based on the ecological carrying capacity of North Pacific right whales, Monsarrat et al. (2016) estimated a North Atlantic pre-whaling abundance of 9,000–21,000 whales. Reeves et al. (2007) calculated that a minimum of 5,500 right whales were taken in the western North Atlantic between 1634 and 1950, with nearly 80% taken in the 50-year period between 1680 and 1730. Based on life history traits, it's possible that the population was less than 100 individuals by 1935 when international protection took effect (Hain 1975, Reeves et al. 1992). Despite protection, the last recorded catch was a cow-calf pair off Madeira in 1967, accompanied by a third individual that escaped.

Photo-identification studies are the most used methods in right whale population assessments. Mark-recapture methods use photographs of individual whales that are identified and tracked over time by the unique pattern of callosities, or patches of rough white skin, on top of each whale's head. Individual identification is now also often conducted through genetic sampling. The population growth rate for 1986-1992 was estimated to be 2.5%, suggesting a slow recovery, though the rate could be reflective of "new" yet existing whales being added to the catalog. The population was then estimated to have been increasing at an average rate of 2.8% per year from 1990 to 2011, peaking at about 480 individuals in 2011 (Hayes et al. 2025). Maximum net productivity rate is unknown.

Table 1. Best and minimum abundance estimates in 2023 for western North Atlantic right whales (*Eubalaena glacialis*) with Maximum Productivity Rate (R_{max}), Recovery Factor (F_r), and PBR (Hayes et al. 2024).

N_{est}	95% Credible Interval	60% Credible Interval	N_{min}	F_r	R_{max}	PBR
372	360-383	367-377	37	0.1	0.04	0.73

Significant changes in the population began in 2011 (Pettis and Hamilton 2024). The population abundance declined 26% from 2011–2020 due to a combination of high mortality rates (from entanglement in fishing gear and vessel strikes) and significantly below average reproductive rates (Hayes et al. 2025). The below average reproductive rate is likely associated with a lower estimated survival rate for females; female morality is entirely anthropogenic and has limited the recovery of NARWs (Corkeron et al. 2018). The female proportion in the population is estimated to be only about 40% despite a birth sex ratio close to 50:50. The most recent population estimate determined the number of females known to have calved that are likely still alive is 70 (Linden 2024).

It's important to note that there has been a considerable change in right whale habitat-use patterns in areas where most of the population had been observed in previous years (e.g., Davies et al. 2017). The change in habitat affected the ability to document individuals – though effort in traditional areas did not change, the chance of photographing individuals decreased (Hayes et al. 2024). The methods currently used to estimate the population size of NARWs account for changes in capture probability, making the estimates robust to these variables. The change in habitat use patterns also exposed the population to new anthropogenic threats which were correlated with the significant decrease in mean survival rates since 2010 (Hayes et al. 2018, Pace 2021).

Calving Rates

Calf counts have been conducted since 1980 and births have fluctuated so much over time that, since 1993, models have been unable to predict calving rates (Hayes et al. 2024). Because of this, overall productivity for the North Atlantic right whale lacks a definitive trend. Evidence suggests that some of the variability in calving rates is related to variability in nutrition (Moore et al. 2001, Fortune et al. 2013, Knowlton et al. 2022). Years of low calf production have been correlated with environmental conditions (Greene et al. 2003) and with poor body condition of adults (Rolland et al. 2016). The level of anthropogenic impacts may also play a role: during 2017–19, only 12 births but 30 deaths were documented. (Pace et al. 2017, Pettis et al. 2020). The multi-state model that estimates reproduction confirms the nutrition factor and suggests that short-term fluctuations in prey availability as well as long-term health declines are responsible for low calving rates (Linden 2024).

Reproduction has declined as reflected in three factors representative of long-term health: calf production, calving interval, and age at first parturition. There were an average 10 calves per year observed during 2012–2019, compared with 24 per year during 2004–2011, and no calves documented in 2018 (Pettis et al. 2020). Longer calving intervals also highlight the decline in reproduction. The mean calving interval, based on 86 records from 1976-1992, was 3.67 years and considered healthy (Kraus et al. 2007, Hayes et al. 2025). Now, on average, the calving interval is between 6 and 10 years, and often found to be longer based on the females that are reproducing (NMFS 2025c; Pettis and Hamilton 2025). While three of the mothers in the 2024-2025 calving season had relatively short calving internals of four years between births, three were 10 or more-year intervals (NEAQ 2025). Scientists believe female right whales reach sexual maturity around nine years of age, but in recent years, right whales are having their first calves even later. During the 2024-2025 season, for example, one mother gave birth to her first calf at age 20 and, as previously mentioned, the average age for the four new mothers was 17.25 (Pettis and Hamilton 2025).

NARWs have a smaller proportion of juvenile whales (26-31%) which may indicate lower recruitment and/or high juvenile mortality (Hamitlon et al. 1998, IWC 2001). Significantly, by 2022, only 14.5% of whales alive were juveniles (Hamilton et al. 2023). Based on the pattern of occurrence in the calving grounds of females at different stages in the calving cycle, Browning et al. (2010) inferred that there is considerable cryptic perinatal mortality in addition to known calf deaths and for the period 1989-2003 estimated perinatal mortality to be between 17 and 45 animals. Sharp et al. (2019) found that 5 of 10 (50%) calf mortalities were from natural causes. The dyer condition of North Atlantic right whales is even more evident when population size and reproduction rates are compared to Southern right whale populations. For example, the calf count from 1990-2016 increased at about 1.98% per year, which is a third of the rate for Southern right whales (5.3-7.2%) during the same period (Corkeron et al. 2018). An increased calving interval was reported for the period 1990 to 1998, at 5.8 years instead of the roughly 3.5 years that it has been, while southern populations experience the 3-to-4-year interval (Kraus et al. 2001, NMFS 2005). NMFS has recognized that the increase in the calving interval “may suggestion the population is under rather unusual biological, energetic, or reproductive stress” (NMFS 2005).

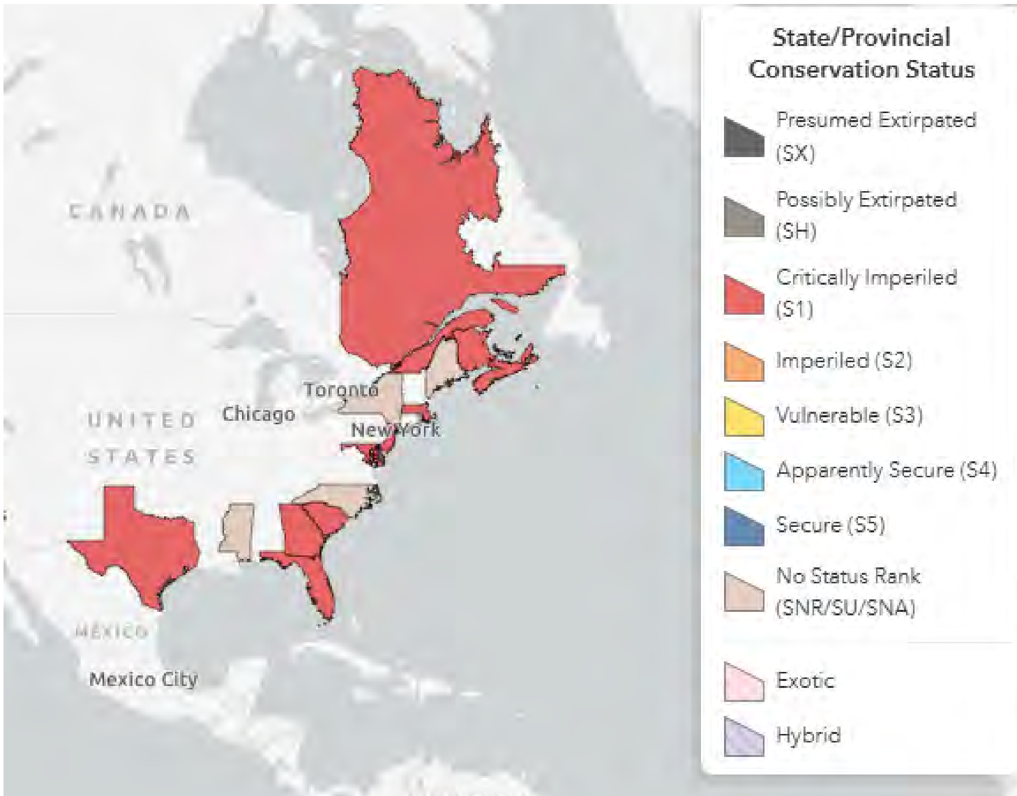

Figure 3. Conservation status of North Atlantic right whale in North America (NatureServe 2025).

Figure 4. Habitat range of the North Atlantic right whale (Cooke et al. 2020).

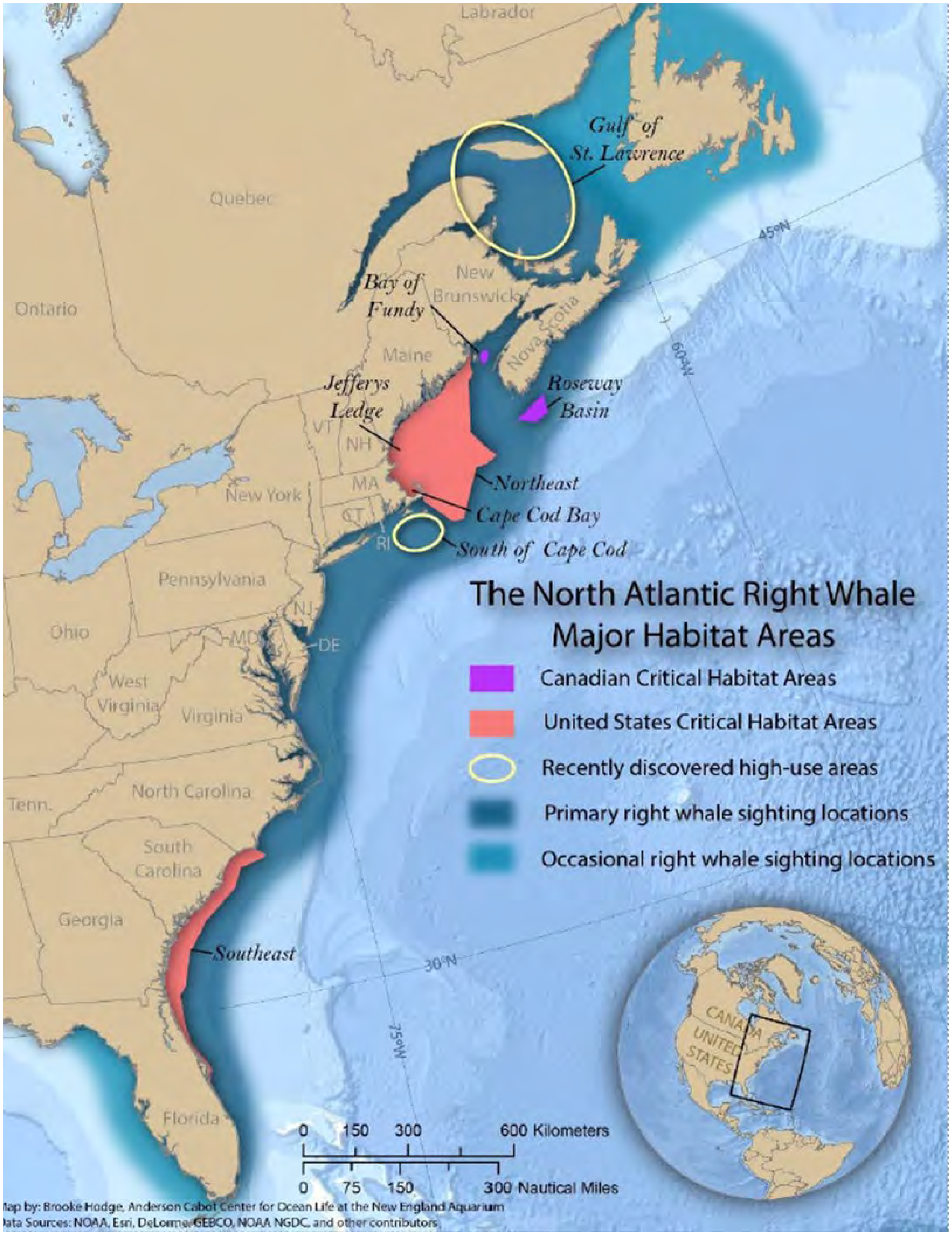

Figure 5. North Atlantic right whale major habitat areas (Runge et al. 2023).

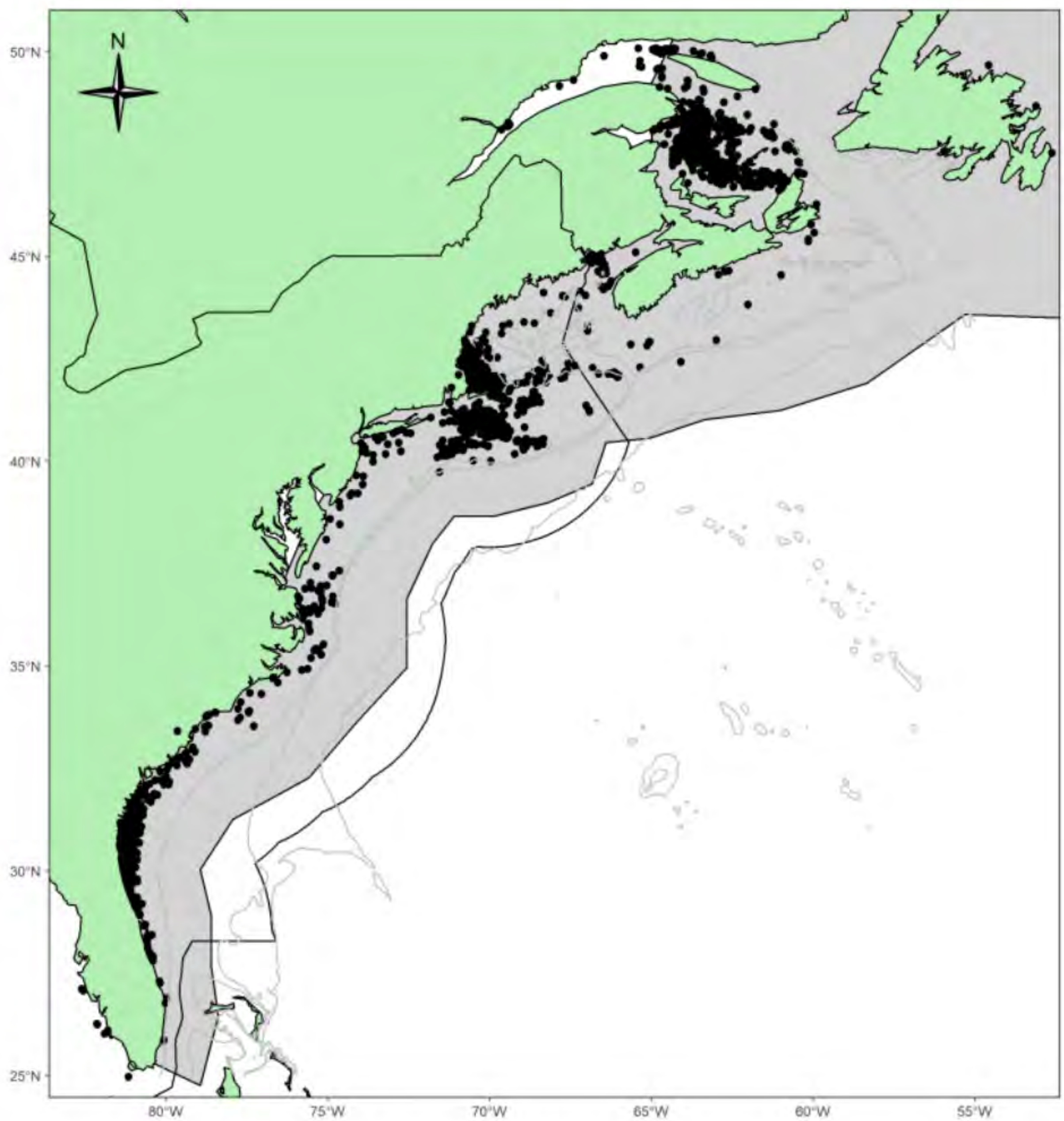

Figure 6. Approximate range (shaded area) and distribution of sightings (dots) of known North Atlantic right whales 2018-2023. Data from North Atlantic Right Whale Consortium database (https://www.narwc.org/narwc-databases.html, accessed 13 September 2024) and NMFS unpublished data (Hayes et al. 2025).

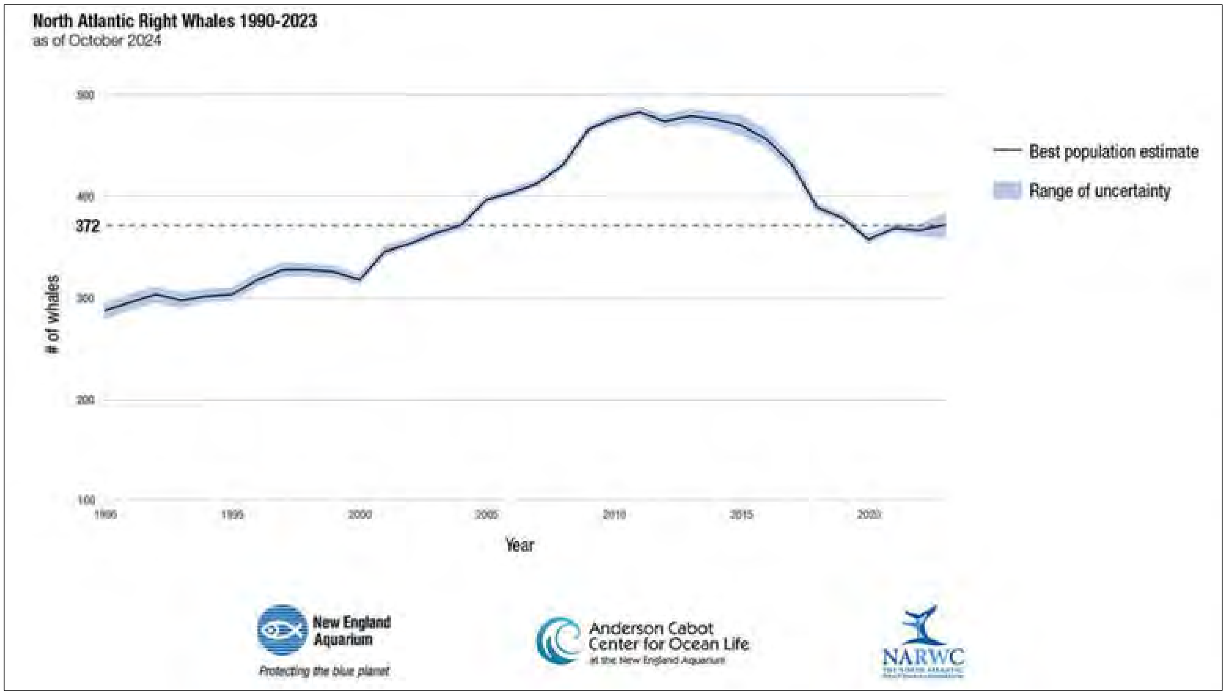

Figure 7. North Atlantic right whale population estimates 1990-2023 (New England Aquarium 2024a).

Table 2. Summary of mother/calf pairs sighted and associated inter-birth interval times for North Atlantic right whales from 2009-2024. The number of available cows, defined as females who have given birth to at least one previous calf, were seen in the last 6 years, have not given birth in previous two years, or gave birth in that year, are followed by the percentage of available cows to successfully calve (Pettis and Hamilton 2025).

Year	Calf Count	Available Cows/ % that calved	Average Interval (yrs)	Median Interval (yrs)	Min/Max Interval (yrs)	First time Moms
2009	39	59/66.1%	4.0	4	2/6	8
2010	19	46/41.3%	3.3	3	2/5	4
2011	22	49/44.9%	3.7	3	2/6	3
2012	7	65/10.8%	5.4	4	4/10	2
2013	20	84/23.8%	4.6	4	2/8	7
2014	11	86/12.8%	4.4	4.5	2/7	1
2015	17	82/20.7%	5.5	6	4/7	4
2016	14*	84/16.7%	6.6	7	4/9	4
2017	5	74/6.8%	10.2	8	7/20	0
2018	0	78/0.0%	-	-	-	-
2019	7	89/7.9%	7	7	3/10	1
2020	10**	80/12.5%	7.6	7	4/11	1
2021	18	72/25.0%	9.2	10	5/11	6
2022	15	56/26.8%	7.7	8	2/13	0
2023	12***	46/26.1%	7.8	7.5	4/12	2
2024	20	55/36.4%	7.3	6.5	2/14	4

*There were 14 mothers seen with calves in the 2015/2016 season, however, due to a three-way calf switch that included the presumed loss of one calf that was never photographed, only 13 calves were photographed.
**There was one lone calf observed on December 22, 2020, off of the Canary Island El Hierro. It was not resighted. As the calf was not observed with a mother and the calf was not genetically sampled, it is not included in the table above.
***There were 11 mother/calf pairs sighted in 2023. Additionally, a lone calf was sighted alive on January 3, 2023, and subsequently dead on January 7, 2023. All 11 known mothers of the year were excluded as the potential mother of this lone calf. Genetic evidence indicates that the mother of this lone calf was #3194 and this would have been her first known calf.

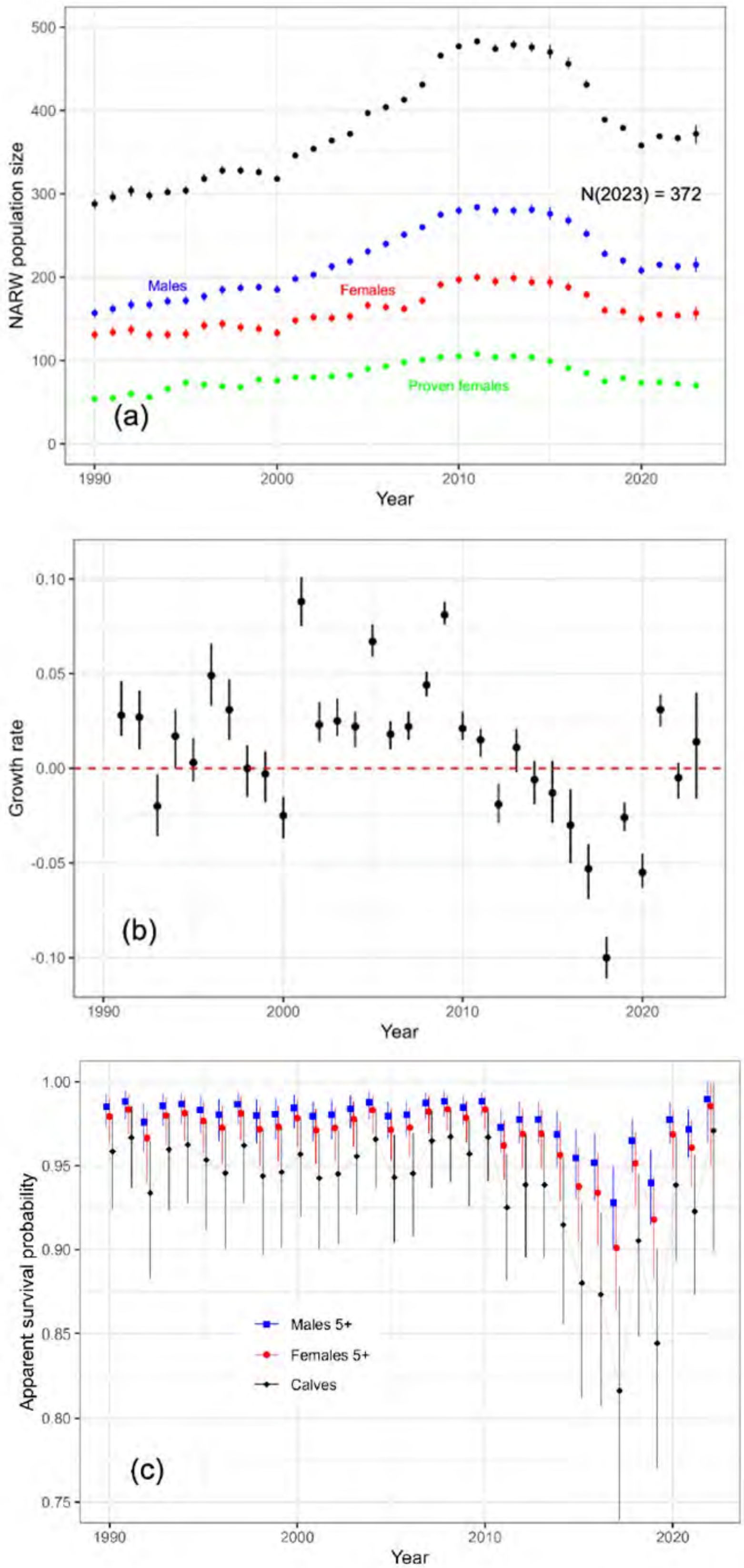

Figure 8. (a) Abundance estimates for North Atlantic right whales. Estimates are the median values of a posterior distribution from modeled capture histories. Also shown are sex-specific abundance estimates, including estimates for both adult females and females of all ages. (b)

Annual population growth rates from the abundance values. (c) Sex-specific survival rate estimates. All graphs show associated 95% credible intervals (Hayes et al. 2025).

III. New York Rarity *(provide map, numbers, and percent of state occupied)*

Details of historic and current occurrence:

Northeast U.S. fisheries for North Atlantic right whale from Massachusetts and New York began in earnest in the 1600s. As Connor (1971) states: "this species was the main object of pursuit by the early North Atlantic shore whalers… because of its slowness, buoyancy when dead, and high yield of oil and whalebone", thus giving the species its name, as the "right" whale to hunt. DeKay (1842) notes that right whales were "captured in great numbers…along our whole coast, chiefly from February to May, although they appeared occasionally at all seasons of the year". The area from Massachusetts to Long Island was an area where right whales were commonly found until the areas with abundance were depleted and "the right whale verged on extinction" (Connor 1971). Shore whaling in New York was most active on the south shore's eastern end but right whales were killed as far west as Brooklyn (Connor 1971). Whaling records indicate that right whales were most numerous from about late February to late May, with a few appearing earlier in the season starting in November, and were most abundant in April, with calves sighted in March, April, and May (Allen 1916). Records from the 1800s report that individuals entered Upper New York Bay and Raritan Bay, near Staten Island (Connor 1971). Connor (1971) noted that in fall, southbound whale passed by New York well out to sea, and Allen (1916) reported that the in the spring, right whales migrated close to shore and followed the coasts of Long Island and Cape Cod.

Historical sources clearly indicate right whales were present year-round in New York (Brown and Wiedenmann 2024). However, survey effort in the New York Bight was not a priority for many years and led to the assumption that right whales simply migrated through. The presumed use of New York waters as a migratory pathway led to the identification of a Biologically Important Area (BIA) for the species – a migratory corridor from Florida to Cape Cod (LaBrecque et al. 2015).

Few sources of data are available prior to 2016 when survey effort increased considerably. During CETAP, the North Atlantic right whale was the fourth most commonly sighted large whale with 380 sightings of 988 individuals, though only seven sightings were recorded in the New York Bight with two additional sightings north of Long Island's south shore within Peconic Bay and Long Island Sound (CETAP 1982).

Sadove and Cardinale (1993) reported sighting right whales every year from the 1970s through 1993. All sightings were either mom/calf pairs or solitary individuals, and the majority did not remain in the area for an extended period, though some did stay longer and there were several observations of feeding when copepod blooms were large. Most sightings were March through June. Additionally, most sightings were off the south shore of Long Island but were sometimes within Long Island Sound, Block Island Sound, Gardiners Bay, or other south shore inlets. This data led the authors to conclude that right whales use New York for migration with some opportunistic feeding (Sadove and Cardinale 1993).

The first fine-scale passive acoustic monitoring (PAM) effort in the New York Bight detected right whales on 53 of 258 days (21%) of monitoring during 2008 and 2009 (BRP 2010). During the recording period, right whale presence was sporadic, in clusters of 1 to 4 days. Of the days the species was detected, 28 days were during spring, 9 days during fall, and 16 days during winter. At the receivers lining the entrance to New York Harbor, right whales were detected 5 days (3 in fall and 2 in winter) while the offshore receivers running perpendicular to Long Island detected right whales on 48 days (28 in spring, 6 in fall, 14 in winter). Based on the data collected, right whales were primarily detected nearshore during fall and winter, and an increase in detections occurred both nearshore and offshore during the spring (Muirhead et al. 2018). Cetacean Biologically Important Areas (BIAs) are being updated for the U.S. East Coast.

Davis et al. (2017) compiled PAM data from sites along the entire east coast and into Canada and found that right whales were present every month from October through July in the New York Bight with a peak November to January. The study also found that right whale presence increased in the mid-Atlantic post-2010 and expanded to near year-round use. The first near-real time moored buoy deployment by WHOI was in 2016, and in 2021 an additional buoy was added in the opposite end of the Empire Wind area (WHOI 2025). In 2023 glider deployments from the DEC Offshore Indicators project began working in coordination with WHOI, adding to the scope of acoustic detections in the New York Bight. Confirmed detections occur regularly during all seasons and particularly in winter and spring. Most deployments show at least one to three days of right whale presence.

NYSERDA's digital aerial survey recorded 7 sightings of right whales, 4 in winter and 3 in spring (NYSERDA 2021). Sighting locations ranged from the continental shelf past the shelf break. NYS DEC's whale monitoring from 2017-2020 showed that right whales are present year-round (TT and LGL 2020, Estabrook et al. 2021). The PAM effort detected right whales during 42% of the recording period and, importantly, during every month of the year. There was a peak during winter, from November to January, and a second peak in spring, from March to May, and the fewest detections were recorded July to October (Estabrook et al. 2025). Recording sites nearer the Harbor recorded more detections November to February, and the sites farther offshore had more detections March to May (Estabrook et al. 2025). Interestingly, the site with the fewest detections was right outside the Harbor, but the next closest site a few kilometers southeast was the site with the most detections (Estabrook et al. 2025).

NYS DEC's aerial survey effort 2017-2020 recorded 15 sightings of 24 individual right whales. All sightings during that period were of 1 or 2 individuals. Sightings were recorded from November through May, with no sightings during the summer. Based on the minimal acoustic presence of right whales in the summer, it's reasonable that the aerial survey would not have detected the few individuals that were likely present. The highest sightings rate was in the spring, followed by winter, and sightings were mostly in the continental shelf zone (25 km offshore to 200 m water depth; Zoidis et al. 2021). Data analysis estimated right whale abundance in March and April to be 25 to 65 individuals and 28 to 52 individuals in November and December (Zoidis et al. 2021). The survey documented one individual skim feeding near the shelf break, and a group of two individuals exhibited socio-sexual behavior nearshore (Rickard et al. 2022). NYS DEC began another three years of aerial surveys in November 2024 and, as of June 2025, have recorded two sightings, both in May 2025 with one group of 16 individuals (DEC 2025).

Data reported to public platforms from various survey efforts (e.g., PACM and WhaleMap) show there have been sightings or detections of right whales all around New York waters, in Long Island Sound, New York Harbor, along the shoreline, and out to the shelf break. Mapping sightings available in OBIS-SEAMAP shows the increase in sightings in the New York Bight since 2015 compared to previous years, including the shift to south of Massachusetts. Observed shifts continued in 2024, including a persistent aggregation of nearly one-quarter of the population south of Long Island, New York at the shelf break east of the Hudson Canyon area (New England Aquarium 2024b).

Roberts et al. (2024) modeled right whale sightings data from surveys conducted from 2003-2020. The data was summarized in different time periods to make comparisons before and after the distribution shift around 2010. The model indicated substantial density differences between the 2003-2009 and 2010-2019 periods, "with strong decreases in the South Atlantic Bight and Gulf of Maine and strong increases in the Mid-Atlantic Bight and Cape Cod Bay". Specifically, the Mid-Atlantic Bight density increase during 2010-2019 was an order or magnitude higher.

Sightings in nearby states such as New Jersey and Virginia also continue to increase. The US Navy's Marine Species Monitoring program has a Nearshore and Mid-Shelf Baleen Whale Monitoring Project which frequently records sightings of right whales, including surface active groups and mom/calf pairs (US Navy 2025a). In December 2024, the effort documented a 12-year-old mom with her first known calf, which is the first time a newborn calf has been spotted off Virginia, particularly that early in the calving season (US Navy 2024). The effort also deploys suction cup tags, which have returned valuable data that shed some light on migrating behavior (US Navy 2025b). Moreover, mom and calf pairs, including pairs that are being documented for the first time, have been seen off New York in multiple years over the past decade. Most recently, a 14-year old mom named Accordion was seen with her first known calf just outside of one of the New York/New Jersey shipping lanes in February 2025 (NMFS 2025a).

New York's Contribution to Species North American Range:

Percent of North American Range in NY	Classification of NY Range	Distance to core population, if not in NY
1-25%	Core	

Column options
Percent of North American Range in NY: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
Classification of NY Range: Core; Peripheral; Disjunct; (blank) or Choose an item

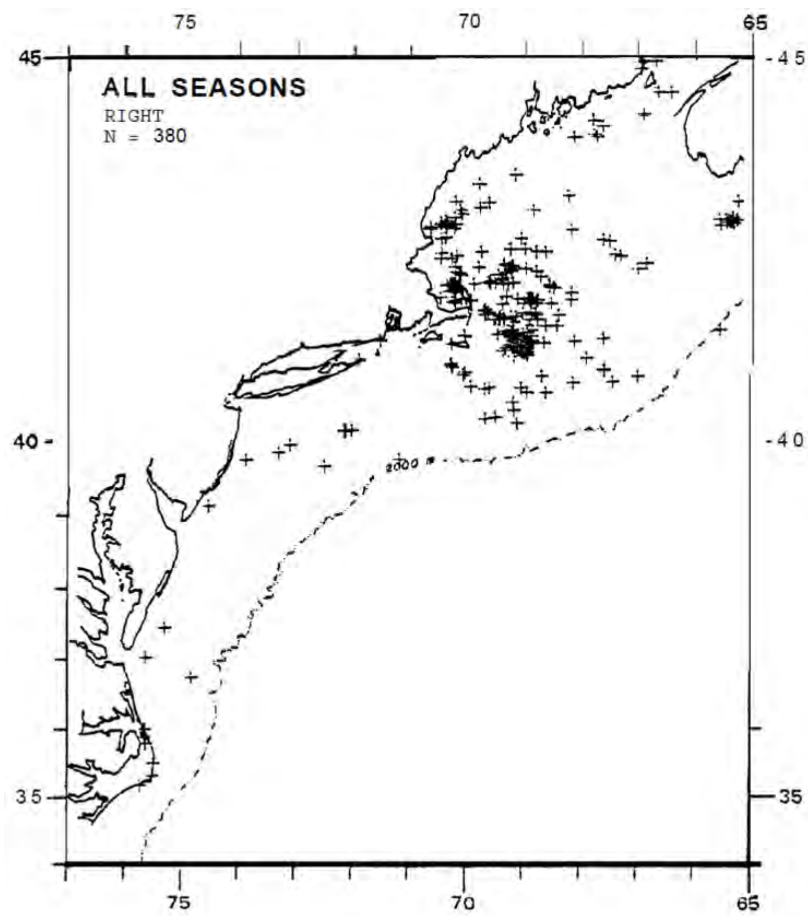

Figure 9. All sightings of the right whale, *Eubalaena glacialis*, for the 39-month period 1 November 1978 through 28 January 1982 (CETAP 1982).

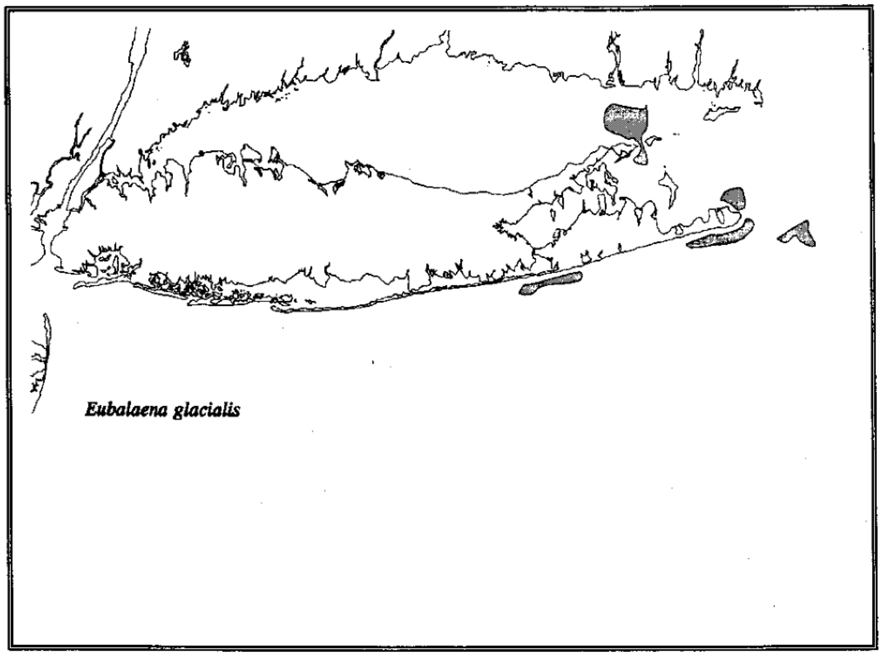

Figure 10. Locations of NARW sightings in New York from 15 years of sighting surveys by Okeanos Foundation from the 1970s to early 1990s. Shaded areas represent areas where right whales were spotted (Sadove and Cardinale 1993).

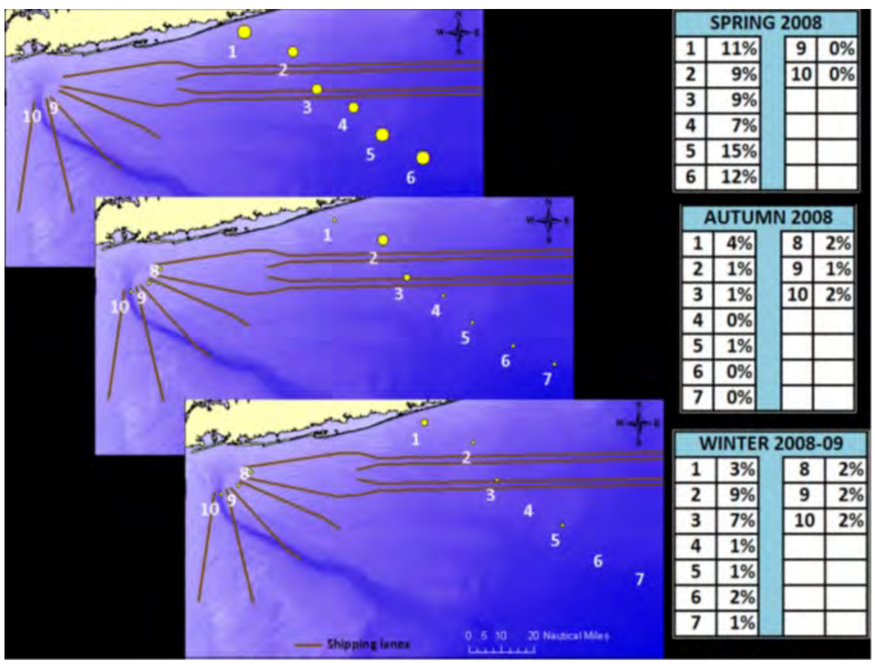

Figure 11. Seasonal presence of right whales in the New York Bight region. A) right whale presence during Spring (1 March – 14 May 2008), B) presence during Autumn (31 August – 2 Dec 2008), and C) presence during Winter (5 December 2008 – 3 March 2009). Tables to the right of each plot show the actual percentages of days with right whale detections during each season (BRP 2010).

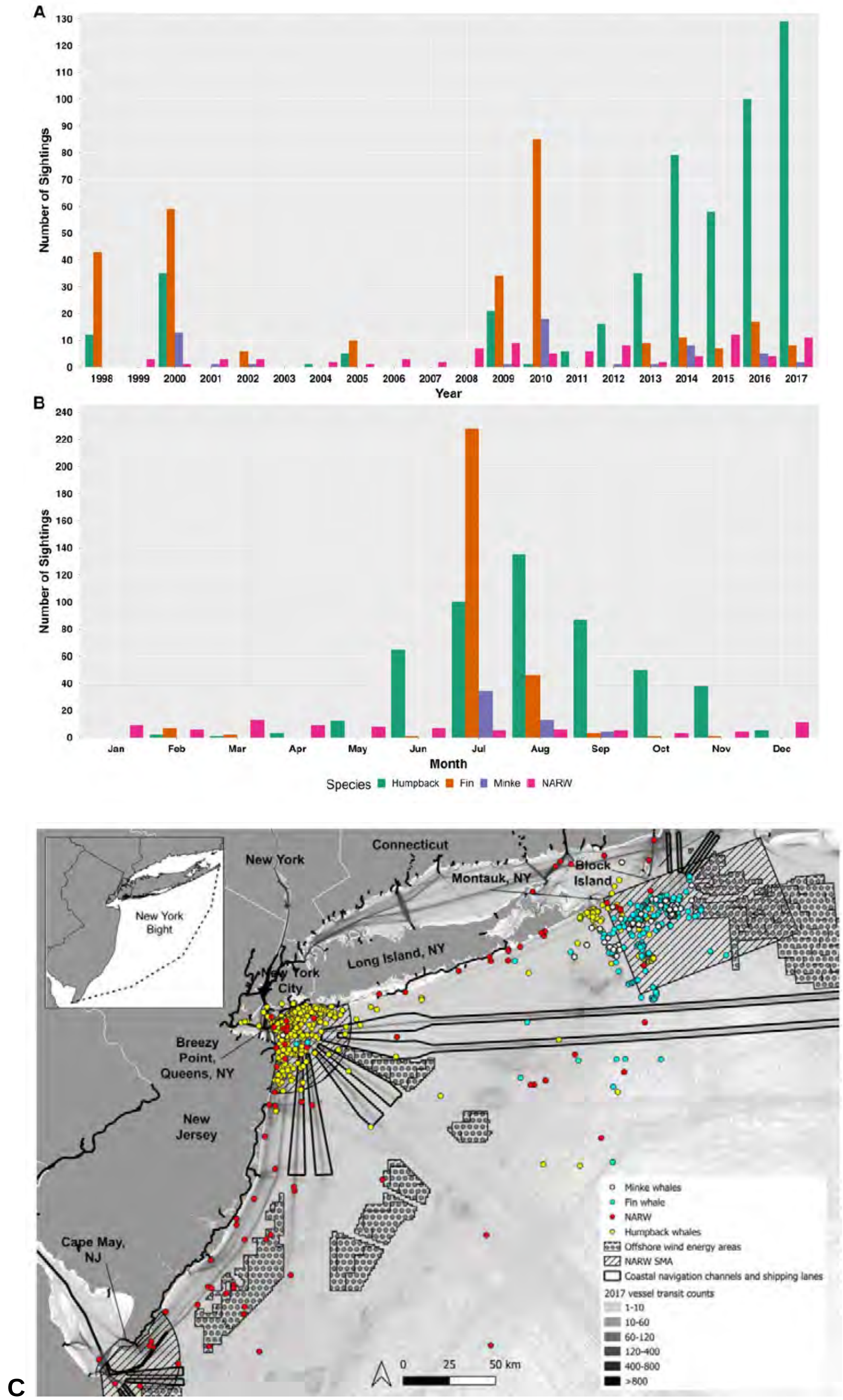

Figure 12. (A) Total number of sightings per year by species from 1998 to 2017 (NARW are pink); (B) Total number of sightings per month across the study period by species; (C) Map of baleen whale sightings from within the New York Bight (Cape May, New Jersey to Montauk, New York) across study period. Red are right whale sightings (Chou et al. 2022).

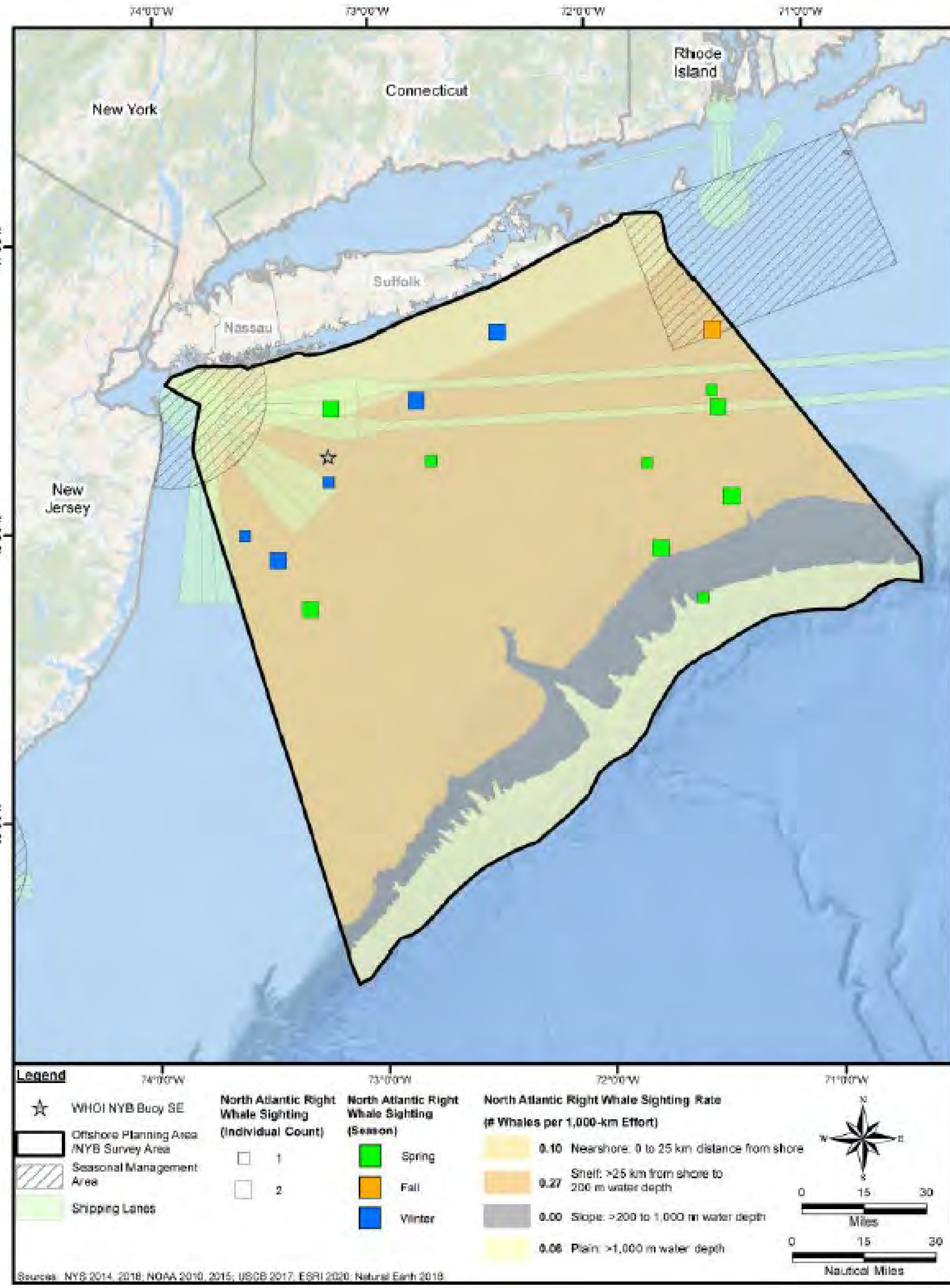

Figure 13. Locations of all aerial North Atlantic right whale sightings by count, season, and distribution, 2017-2020 (Tetra Tech and LGL 2020).

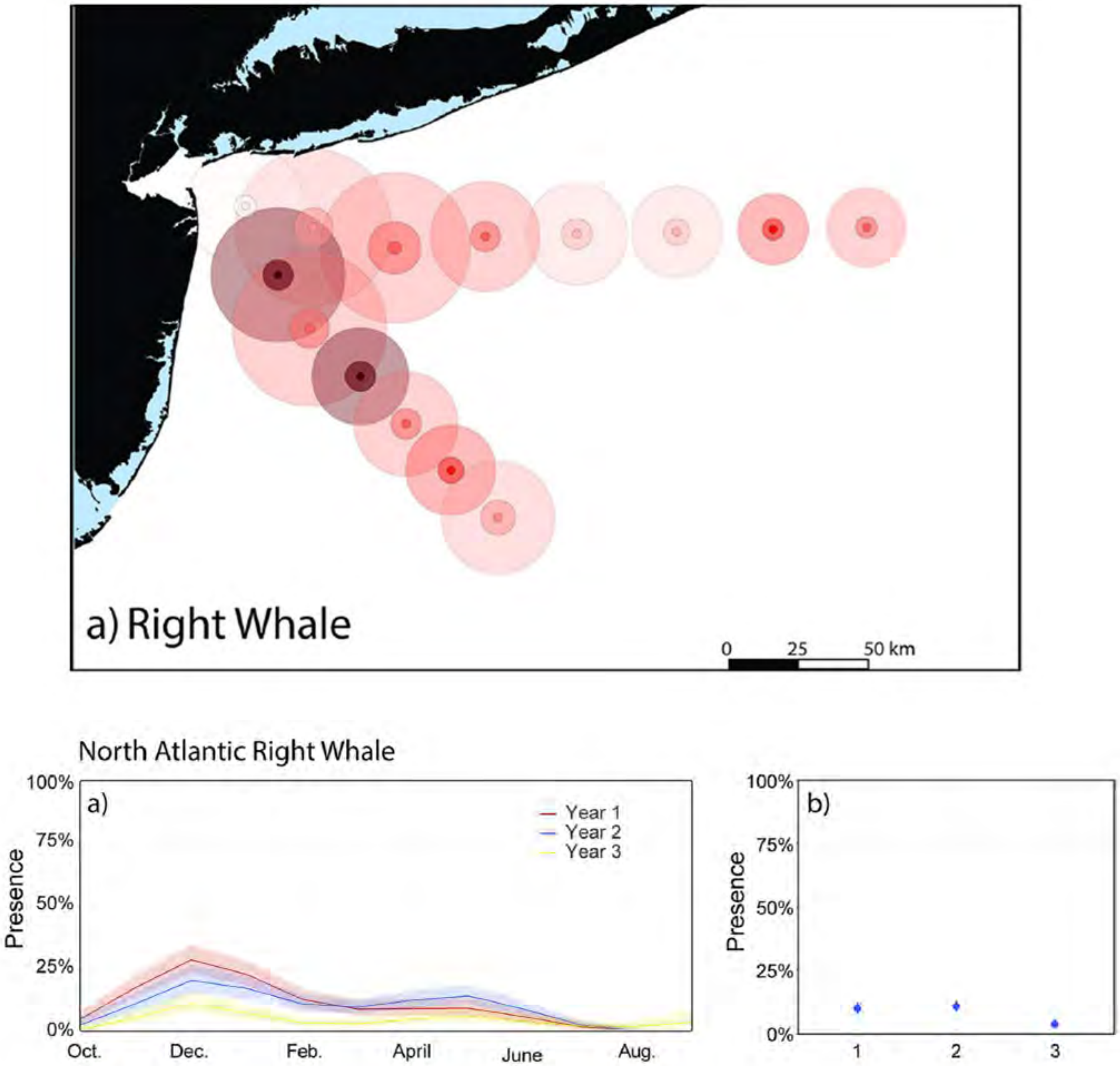

Figure 14. North Atlantic right whale passive acoustic detections in space (top) and time (bottom), 2017-2020. In the top figure, the size of the circle around each site represents the estimated detection area and the colormap is scaled to the proportion of days with detections over total days recorded, where white is 0 presence and deep red is the highest presence for the species (47-53). In the bottom left figure, the x-axis is calendar year and red is Year 1 (October 2017-2017), blue is Year 2 (October 2018-2019), and yellow is Year 3 (October 2019-2020). In the bottom right figure, the x-axis is survey year (Estabrook et al. 2025).

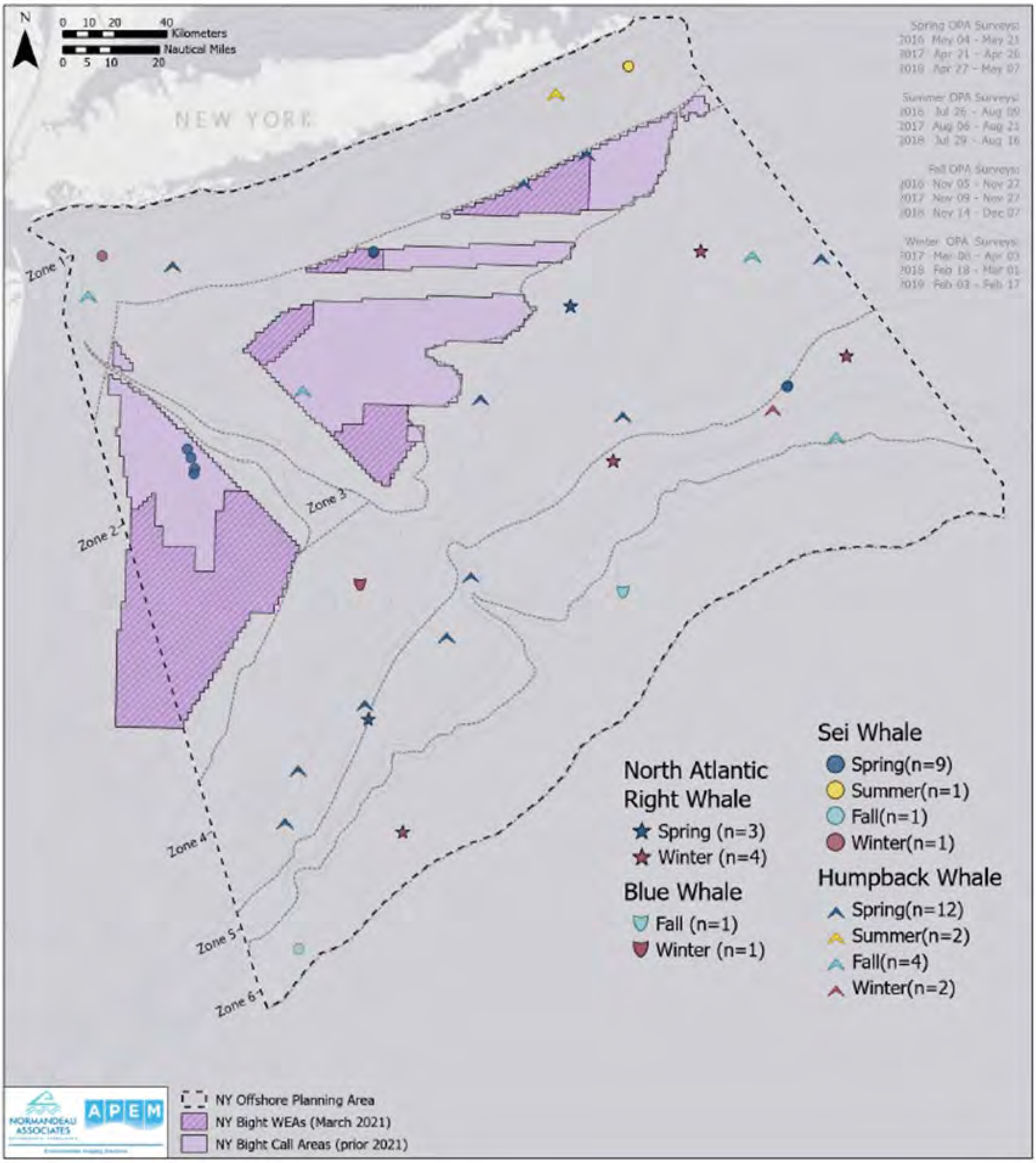

Figure 15. Spatial distribution of low-frequency cetacean species with fewer than 30 occurrences across all digital aerial surveys, 2016-2019 (NYSERDA 2021).

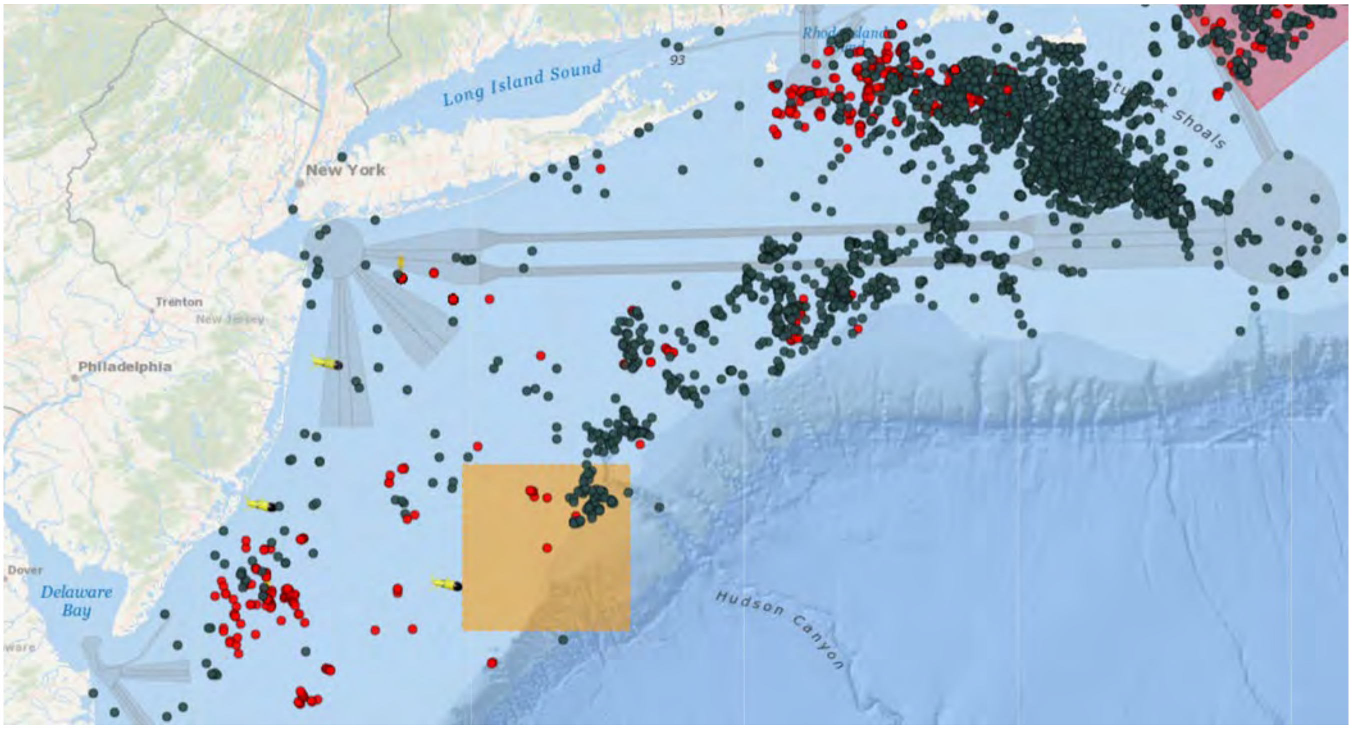

Figure 16. Map of New York Bight area North Atlantic right whale sightings, 1/1/15 to 6/18/25. Red circles indicate acoustic detections, green circles indicate visual sightings (WhaleMap.org, accessed 18 June 2025).

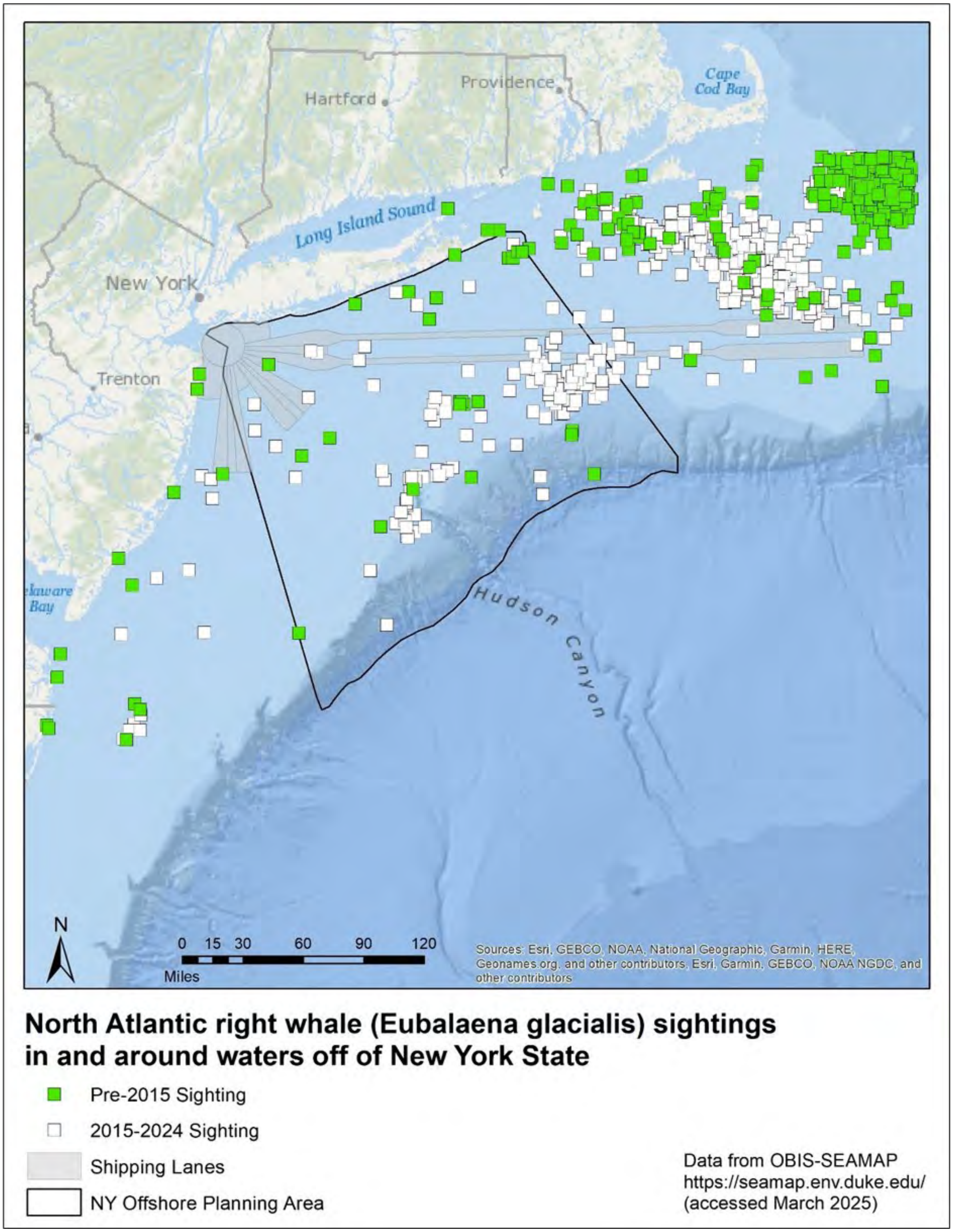

Figure 17. North Atlantic right whale sightings in the New York Bight area from OBIS-SEAMAP.

IV. Primary Habitat or Community Type *(from NY crosswalk of NE Aquatic, Marine, or Terrestrial Habitat Classification Systems):*

a. Pelagic, marine and estuarine, deep subtidal

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
No	Yes	Increasing	2016 to present

Column options
Habitat Specialist and Indicator Species: Yes; No; Unknown; (blank) or Choose an item
Habitat/Community Trend: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

Habitat Discussion:

Historically, there was an eastern North Atlantic population that has since been extirpated (Hayes et al. 2024). While it's unlikely that there is an unknown population of right whales frequenting that habitat, if there is any right whale presence it's likely only a few individuals (Cooke 2020, Hayes et al. 2024). North Atlantic right whale sightings have occurred east of Greenland, off Iceland, off northern Norway, in the Azores, and off northwest France (Hamilton et al. 2007, Jacobsen et al. 2004, Silva et al. 2012, Pettis et al. 2020, Hayes et al. 2024). There are records of extended range movement such as a lone calf documented off the Canary Islands in 2020 and sightings in the Gulf of Mexico (Hayes et al. 2024). The most recent example was documented this past spring. In February 2025, two adult female right whales spent about two months off Florida's western coast before traveling to the Bahamas and, just one month later, showing up in the Gulf of St. Lawrence (Russell 2025).

Movement within and between habitats can be extensive. Brown and Marx (2000) reported a right whale making the round-trip migration to the southeast and back to northeast at least twice during the winter. A known male right whale was tracked from Cape Cod to Norway and back again within the period of a year (Jacobsen et al. 2004). Other studies confirm extensive movements and indicate that sightings separated by a few weeks in the same area should not assume the animal remained in the area or is resident; there are also excursions into deep waters past the continental shelf (Mate et al. 1997, Baumgartner and Mate 2005, Aschettino et al. 2022, 2023).

Calving Grounds

Calving takes place from December through April, though some birth outliers are in November or May. Adult females appear to migrate to the southern calving grounds the years they give birth, while most males and other females do not migrate to the calving grounds, especially after summers with below-average prey abundance (Kraus et al. 1986, NMFS 2005, Gowan et al. 2019). However, some juveniles and non-reproductive females make the journey south with pregnant females (Kraus and Rolland 2007). We still don't know where most of the population is during the winter months and the location of much of the population during most of the year is also unknown (Hayes et al. 2024).

Nursery areas are in shallow, coastal waters off Georgia and Florida (Hayes et al. 2024). However, not all calving occurs here; calving likely generally occurs as far as north as North Carolina based on a birth documented in the Gulf of Maine and calves that are first seen farther north (e.g., New York or Massachusetts) with mothers that were never documented on the calving grounds (Watkins and Schevill 1979, Patrician et al. 2009, Hayes et al. 2024, NMFS 2025a). Calving can also occur farther offshore than is typical: a live birth was witnessed in March 2010 about 75 kilometers off Florida (Foley et al. 2011). To reflect this, in 2016, the Southeastern U.S. Calving Area Critical Habitat was expanded north to Cape Fear, North Carolina (81 FR 4837, 26 February 2016). In the southern critical habitat, the physical features essential for conservation are calm and warm waters, which are conducive for birth and care of neonate calves.

Feeding Grounds

The features essential for conservation on the feeding grounds are related to the distribution and aggregation of prey (NMFS 2005). North Atlantic right whale distribution appears to be driven primarily by prey, and specifically their preferred prey, the copepod *Calanus finmarchicus* (NMFS 2005). Right whales must locate and feed on extremely dense patches of zooplankton to feed efficiently (Mayo and Marx 1990, Sorochan et al. 2021). To feed, North Atlantic right whales open their mouths and swim slowly along the surface of the water, or just below the surface, filtering large patches of copepods through their baleen, a process known as skim feeding. Right whales are visual foragers that use the contrast of the prey patch to background light at various depths as a guide (Cronin et al. 2017, Fasick et al. 2017). High density prey patches justify the energy expenditure of foraging. Van der Hoop et al. (2019) examined the foraging rates during feeding and found that right whales filter large quantities of water (1.4m2/s, on average) at slow speed to reduce drag, resulting in the consumption of >60,000 copepods per minute.

In addition to copepod density, sea surface temperature, bathymetry, and sediment type have all been positively correlated with right whale abundance (Kenney and Winn 1986, Clapham 1999, Pendleton et al. 2009, Baumgartner et al. 2003, Baumgartner and Mate 2003, and Ross et al. 2023). Specifically, cooler water temperatures and 100-200 m depths adjacent to steep slopes seems to indicate utilization of an area. New England and Canadian waters are essential feeding habitats for right whales (Hayes et al. 2024). Feeding occurs from spring through fall, and also in winter in certain areas like Cape Cod Bay (Mayo and Marx 1990). In 2016, the Northeastern U.S. Foraging Area Critical Habitat was expanded to include nearly all U.S. waters of the Gulf of Maine (81 FR 4837, 26 February 2016).

Post-2010 Distribution Changes

For decades the Great South Channel; Georges Bank/Gulf of Maine; Cape Cod and Massachusetts Bays; the Bay of Fundy; and the Scotian Shelf were the major habitat areas for right whales, with travel within and between these habitats varying from year to year (NMFS 2013). In the spring, right whales were frequently found in Great South Channel and Massachusetts and Cape Cod Bay. In the summer and fall, most right whales were sighted in the Bay of Fundy and Roseway Basin (Kraus and Rolland 2007). Beginning in 2010, right whales exhibited significantly reduced occurrence in the Bay of Fundy and Gulf of Maine, two of the previous critical feeding areas (Davis et al. 2017, Davies et al. 2019, Meyer-Gutbrod et al. 2021). During this time, the number of whales using Cape Cod Bay during the spring increased (Mayo et al. 2018, Ganley et al. 2019, Meyer-Gutbrod et al. 2023). Despite the consistent, albeit decreased, acoustic detections of right whales each year in the Gulf of Maine, the large aggregations that were typically present in central Gulf of Maine during the winter have not been seen since 2011 (Cole et al. 2013, Davis and Van Parijs 2023, PACM 2025).

Since 2011, there have been significant changes to right whale habitat use patterns (Hayes et al. 2024). These changes include: a northward shift in summer distribution into the Gulf of St. Lawrence; a new feeding ground south of the Massachusetts islands (i.e., Southern New England) marked by increased and sustained presence nearly year-round; and coast-wide and/or year-round distribution in both the mid- and south-Atlantic (Stokstad 2017).

In Canada, right whales are found in the Gulf of St. Lawrence and other maritime waters. From 2010 to 2018 right whales were detected annually in the Gulf of St. Lawrence, as early as April and as late as January (Simard et al. 2019, Durette-Morin et al. 2022). Importantly, daily detection rates in the Gulf of St. Lawrence quadrupled starting in 2015. Since 2015, increased acoustic detections and survey effort in the Gulf of St. Lawrence have documented right whale presence there from late spring through the fall (Cole et al. 2016, Simard et al. 2019, DFO 2020). Photographic captures of right whales in the Gulf of St. Lawrence during the summers of 2015–2019 documented a total of 187 unique individuals (Crowe et al. 2021). Individuals utilizing the Gulf of St. Lawrence foraging habitat exhibit site fidelity, and individual variation in the use of this habitat is partially explained by maternal lineage (Crowe et al. 2021, Bishop et al. 2022). In recent years, approximately 40 percent of the population has been observed using the Gulf of St. Lawrence as a summer foraging habitat, with over 100 individuals sighted each year in the region since 2016 (Crowe et al. 2021).

There is now extensive data available on right whale presence in the Southern New England wind energy areas, an area outside the Northeast U.S. Foraging Critical Habitat (Leiter et al. 2017, Stone et al. 2017, Quintana-Rizzo et al. 2021, O’Brien et al. 2022). The importance of Nantucket Shoals as a feeding ground for right whales is well understood (Leiter et al. 2017, Quintana-Rizzo et al. 2021, Estabrook et al. 2022). Year-round presence of this species, including the summer months, has been demonstrated since 2011 (Quintana-Rizzo et al. 2021, Estabrook et al. 2022). There is a peak in presence in the area during the winter months (PACM 2025).

Passive acoustic studies have documented year-round presence on the Scotian Shelf, in the Gulf of Maine, off southern New England, New York, New Jersey, and Virginia (Durette-Morin et al. 2022, Bort et al. 2015, Estabrook et al. 2022, Murray et al. 2022, Whitt et al. 2013, Salisbury et al. 2016). Right whales have also been acoustically detected off Georgia and North Carolina in more than half the year (Hodge et al. 2015). Davis et al. (2017) pooled acoustic detections from 2004 to 2014 along the eastern seaboard of North America and found occurrence in winter months ranging from Florida to the southern Scotian Shelf. Across the study’s period, right whales were detected at all receiver locations from Florida to Greenland. Since 2015 there has been year-round presence of right whales from Cape Hatteras, North Carolina to Cape Cod Bay, Massachusetts. Peak sighting rates are between December and May, when almost a quarter of the population is present.

Right whales were believed to use New York waters primarily for migration, despite studies off New Jersey that indicated right whales are also feeding in the mid-Atlantic and can be found there year-round (Sadove and Cardinale 1993, NMFS 2005, Whitt et al. 2013). As previously described, the DEC aerial and passive acoustic surveys from 2017 to 2020 determined that right whales are present year-round in the New York Bight (Zoidis et al. 2021, Estabrook et al. 2025).

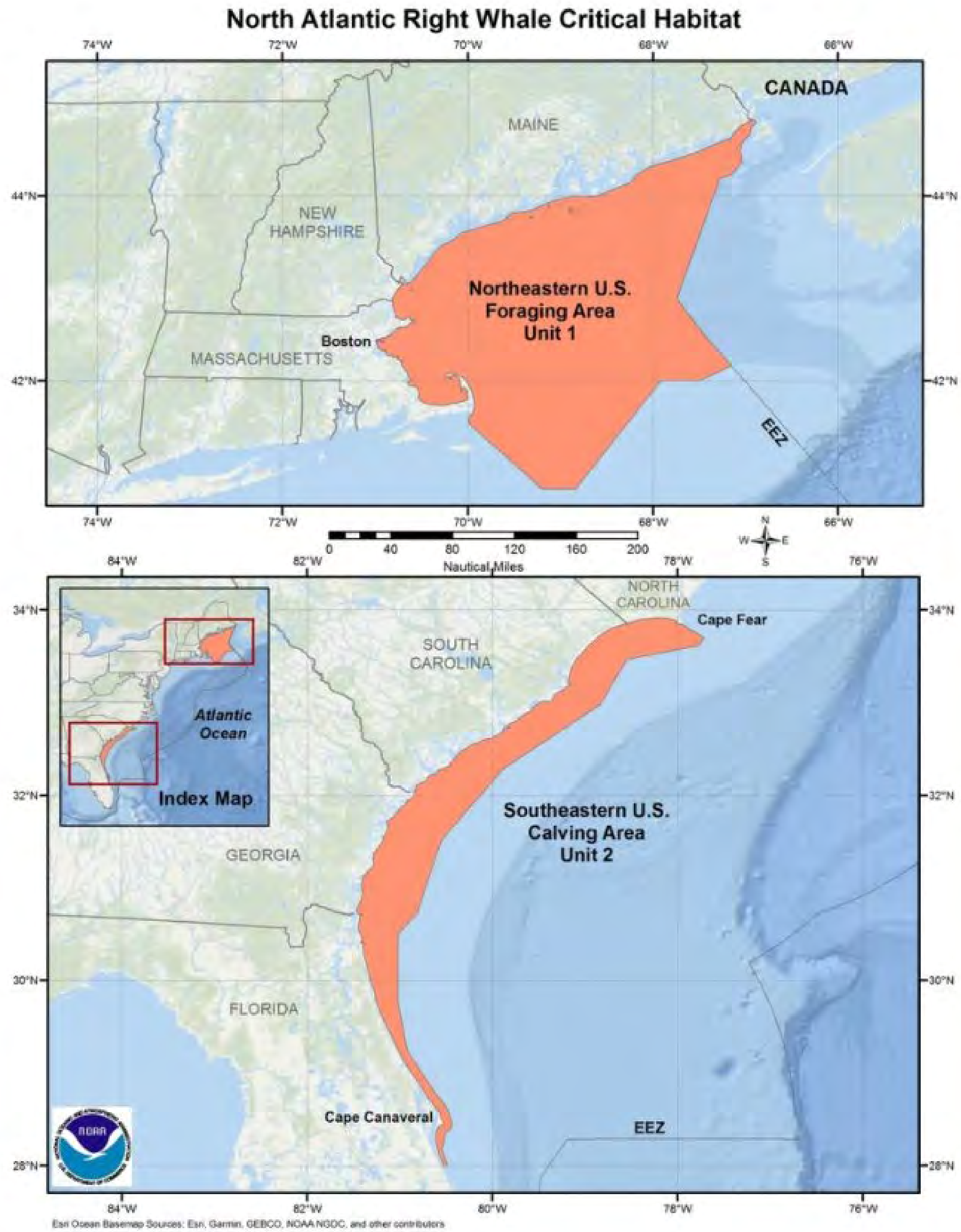

Figure 18. North Atlantic right whale critical habitat areas (NMFS 2022b).

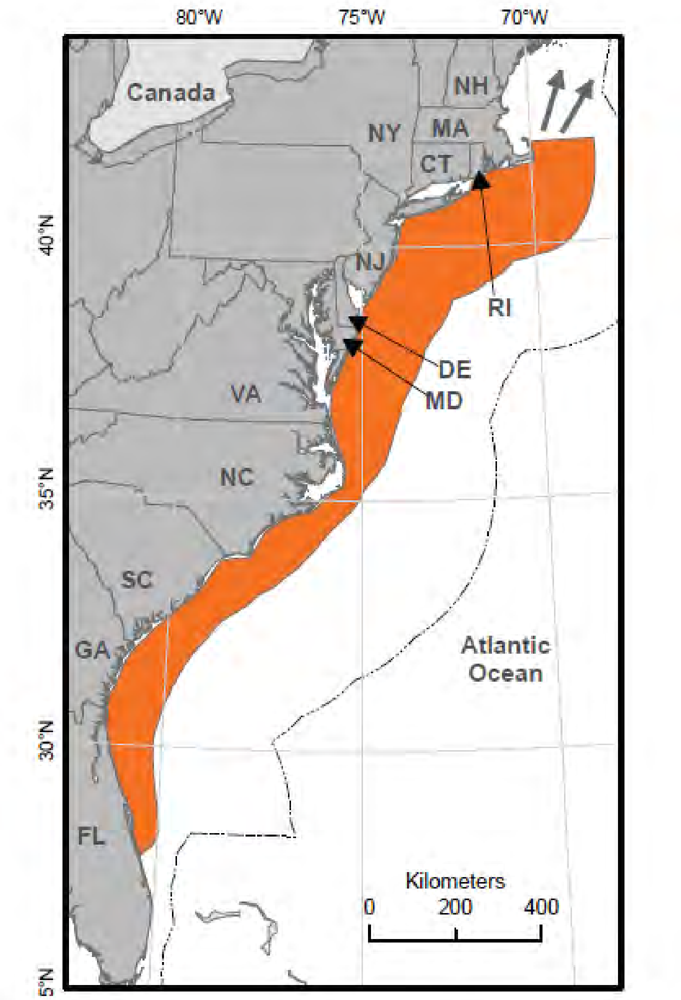

Figure 19. North Atlantic right whale migratory corridor BIA along the U.S. East Coast, substantiated through vessel- and aerial-based survey data, photo identification data, radio tracking data, and expert judgement; right whales migrate south to the calving grounds in November and December, and migrate north to the feeding areas, the Bay of Fundy, and unknown areas in March and April (LaBrecque et al. 2015).

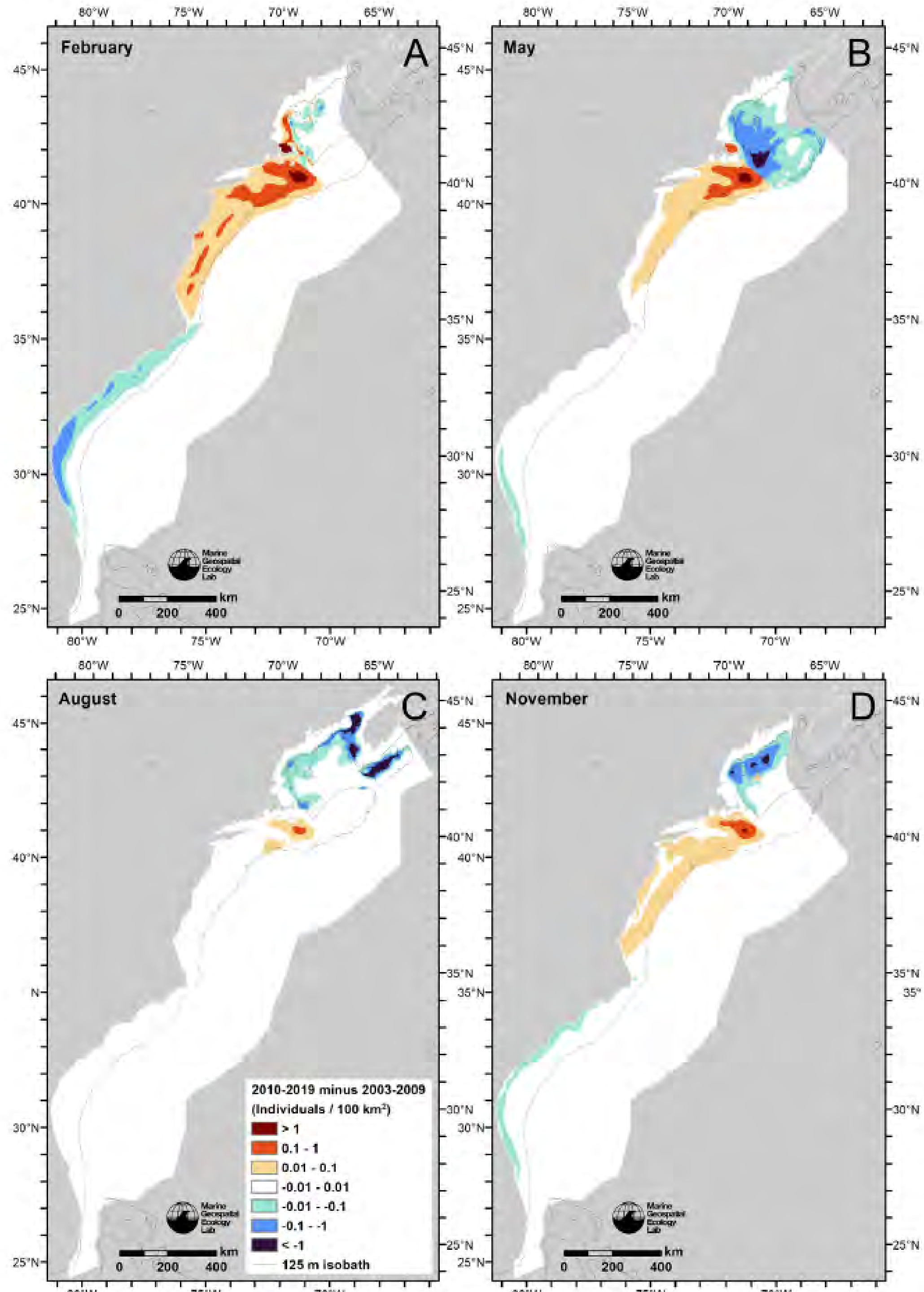

Figure 20. Differences in mean monthly densities predicted for the 2010-2019 and 2003-2009 eras for (A) February, (B) May, (C) August, and (D) November. Red indicates density was higher in 2010-2019; blue indicates density was lower in 2010-2019; white indicates density was about the same (Roberts et al. 2024).

V. Species Demographics and Life History

Breeder in NY?	Non-breeder in NY?	Migratory Only?	Summer Resident?	Winter Resident?	Anadromous/ Catadromous?
No	Yes	No	Choose an item.	Choose an item.	Choose an item.

Column options
First 5 fields: Yes; No; Unknown; (blank) or Choose an item
Anadromous/Catadromous: Anadromous; Catadromous; (blank) or Choose an item

Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Morphology

North Atlantic right whales lack a dorsal fin and throat grooves and have an overall chunkier appearance with a broad, notched tail that is smooth on the trailing edge (Connor 1971, NMFS 2005). Adults grow 45 to 55 long and can weigh up to 70 tons; right whales attain average lengths and weights of 4.3 meters and 1 metric ton at birth, and 13.1 meters and 31.7 metric tons when sexually mature (NMFS 2005, Fortune et al. 2021). The species exhibits sexual dimorphism with females larger than males (NMFS 2005). They are mostly black, though some whales have white patches on their ventral sides. Their head, which is about one-third of its body length, has a strongly curved lower lip and two rows of baleen plates that can be up to eight feet long hanging from its upper jaw (NMFS 2005). On the top of their head are rough white patches called callosities (i.e., whale lice). Callosity patterns are used to identify individual right whales but are typically not fully developed until their second year. Given this gap in time, biopsy samples of calves on the calving ground are a priority so that individuals can be genetically identified as well (NMFS 2005).

Reproduction

Mating appears to occur amid large surface-active groups (SAGs) of up to forty or more individuals (Kraus et al. 2007, Parks et al. 2007a). Females appear to call in males, who travel from distances up to several kilometers to participate in the SAG (Parks 2003, Kraus et al. 2007). Males, in turn, use a specific vocalization called the “gunshot” likely as a reproductive tool to advertise themselves (Parks et al. 2005). The females are usually located in the center of the SAG, with males competing for “alpha” positions next to the female. The female spends much of the time avoiding copulation on her back, rolling over about once a minute to breathe and give males the chance to copulate (Kraus and Hatch 2001, Kraus et al. 2007). Females often mate with multiple males, and males achieve reproductive success via sperm competition (Brownell and Ralls 1986). SAGs occur at all times of the year, although right whale biology indicates that fertilization occurs in late fall/winter, suggesting that fertilization does not occur in most SAGs (Kraus et al. 2007). It should be noted that not all SAGs are reproductive in nature, with all male and all female SAGs also occurring (Rickard et al. 2022). They appear to also be important for socialization (Kraus et al. 2007).

The average age of first calving is 10 years, though female right whales have given birth to their first calf at as early as five years of age and as late as twenty-one years of age (Best et al. 1998, Kraus et al. 2007). The age that males reach sexual maturity is unknown, as even juvenile males have been seen involved in SAGs (Kraus and Hatch 2001, Kraus et al. 2007). However, most males who get close enough to mate with a female in a SAG are over ten years of age (Kraus et al. 2007). Paternity studies have shown that most males do not successfully reproduce until they are over 15 years old (Kraus et al. 2007).

Female right whales give birth to one calf after a gestation period of approximately 12 months (Best 1994). Lactating females on the calving grounds spend up to 80 percent of their time within

3.5 meters of the surface, mostly at rest (Cusano et al. 2019, Dombroski et al. 2021). Calves are nursed for approximately 10 months and separate from the mother at around one year of age, though weaning has been reported from 8 to 17 months (Hamilton et al. 1995, Kraus et al. 2007, Hamilton et al. 2022). On the calving grounds, mother-calf pairs demonstrate reduced acoustic communication in what is called acoustic crypsis, or “whispering”, possibly to avoid detection by predators such as sharks and orcas, both of which have been documented predating on North Atlantic right whale calves in the past (Parks et al. 2019a). The low-level vocalizations decrease when calves are around five months old and the pair leaves to migrate north (Cusano et al. 2019; Parks et al. 2019b). Across their range, individuals communicate with low frequency vocalizations and can be seen interacting with other individuals in pairs or larger SAGs. The majority of right whale calls are within the 50-600 Hz range and they are short in duration. The “upcall”, for example, is the hallmark vocalization of right whales. However, there is variation in their acoustic rates and behavior among social contexts, different behaviors, and different geographical regions (Matthews and Parks 2021, Franklin et al. 2022).

As discussed, the number of calves born in the population each year is highly variable and, to date, ranges from zero (in 2017) to 39 (in 2009) (Frasier et al. 2024). By 2017 almost half (44%) of adult females had either not given birth or had just 1 calf (Frasier et al. 2024). The small population size and low annual reproductive rate of right whales suggest that human sources of mortality have a greater effect relative to population growth rates than for other whale species (Corkeron et al. 2018). As of November 2012, there were 103 living reproductive females; there are now less than 70 (Knowlton et al. 2012, Linden 2024). One female has given birth to nine calves, which is the maximum number of calves that have been born to one female, to date (Knowlton et al. 2012).

Unfortunately, the true longevity of North Atlantic right whales is unknown since most individuals die before 30 years of age, especially females, which are at greater risk for mortality due to the life stages they experience before, during, and after breeding. Sources estimate that the lifespan is at least 70 years of age, though it’s presumed that right whales can live even longer (Hamilton et al. 1998, Kraus and Rolland 2007, NMFS 2025c). Breed et al. (2024), using over 40 years of mark-recapture databases for both the Southern right whale, which is thriving, and the North Atlantic right whale, determined that the average life spans were 73.4 and 22.3 years, respectively. Furthermore, they reported that 10% of Southern right whale individuals lived past 131.8 years while 10% of North Atlantic right whales lived past 47.2 years. The authors propose that the “potential for great longevity…has been masked by the demographic disruptions of industrial whaling” and that North Atlantic right whale life spans were considerably shortened due to anthropogenic impacts. Kraus (1990, 2002) estimated that 26-31% of right whales died in their first year of life, 10% in their second, 5% in their third, and at rates between 1% and 4% from ages 4 to 10.

North Atlantic right whales exhibit very low levels of genetic diversity, have limited options for mates, and as discussed, exhibit extremely variable reproductive success (Waldick et al. 2002, Crossman et al. 2023, Crossman et al. 2024). Frasier, Hamilton, and Pace (2024) calculated the theoretical maximum number of calves each year and reported that, between 1990 and 2017, the number of calves born “never came close to the theoretical maximum, resulting in overall reproductive performance of only about 27%”. Crossman et al. (2024) quantified reproductive success of female North Atlantic right whales given the concern for potential genetic limitations of population growth from inbreeding depression. The authors explain: “Inbreeding depression could not explain the variance in reproductive success of females, however we present evidence that inbreeding depression may be affecting the viability of inbred fetuses—potentially lowering the reproductive success of the species as a whole”, though genetic diversity is selected for against inbreeding. However, if genetics plays such a small role in female reproductive success, then “variance may be explained by external factors that can potentially be mitigated” and conservation measures can therefore be designed to reduce serious injury and morality from human activities (Crossman et al. 2024). Observed human-caused mortality far exceeds sustainable levels, and a recent assessment of total right whale mortality estimates range-wide indicates that observed deaths likely capture only about 36 percent of total deaths between 1990 and 2017; unobserved deaths are known as cryptic mortalities (Pace et al. 2021).

Health of Individuals

Poor body condition, arrested growth, and maternal body length have led to reduced reproductive success and are contributors to low birth rates for the population over the past decade (Christiansen et al. 2020, Reed et al. 2022, Stewart et al. 2021, Stewart et al. 2022). There is clear evidence that North Atlantic right whales are growing up to 4 feet shorter than previous decades and are in poor body condition compared to other right whale species (Stewart et al. 2021, Knowlton et al. 2022, Christiansen et al. 2020, Miller et al 2011). A whale born in 2019 is now expected to reach a body length at least 1 m shorter than a whale born in 1981. Smaller whales may be the result of poor nutrition and/or sublethal injury, either to the whale or to their mother. Lactating and entangled North Atlantic right whales are likely to exhibit declining condition, indicating that energetic stressors for North Atlantic right whales may suppress growth and survival over time (Christiansen et al. 2020; Pettis et al. 2017). Calf body length is correlated with maternal body condition, so reproductive females in poorer condition may reduce calf growth rates (Christiansen et al. 2020, Stewart et al. 2021).

Stewart et al. (2022) found that smaller females have longer inter-birth intervals than larger females. The length of a reproductively active female is related to inter-birth intervals and count of calves per potential reproductive year; longer whales having shorter intervals and more calves, though length appears to be unrelated to age at first reproduction (Stewart et al. 2022).

Reed et al. (2022) show that it is both the failure of the pre-breeding females to transition to reproducing females, as smaller whales have less capacity to gain sufficient condition to calve than larger females (Christiansen et al. 2020), as well as the mortality of reproducing females, that has contributed to the recent right whale population decline. Likewise, skin lesions were recorded on NARWs 1995-2002, correlated with failure of females to have reproduced when they normally would (Rolland et al. 2007).

All of these changes may result from a combination of documented regime shifts in primary feeding habitats and increased energy expenditures related to non-lethal entanglements (Meyer-Gutbrod and Greene 2014, Meyer-Gutbrod et al*.* 2021, Meyer-Gutbrod et al. 2023, Record et al*.* 2019, Rolland et al*.* 2016, Pettis et al*.* 2017, van der Hoop et al. 2017a). The effects of energetic stress related to foraging, reproduction, and chronic entanglement in fishing gear have been examined through studies of stress hormone levels in North Atlantic right whales (Fernandez Ajo et al. 2018, Burgess et al. 2017, Burgess et al. 2018, Corkeron et al. 2017, Graham et al. 2021, Hunt et al. 2017, Rolland et al. 2017). These effects on reproductive success have led to a declining birth rate for the population, which has exacerbated the effect of human caused mortality and slowed species recovery.

Natural Mortality

Natural mortality in the species is poorly understood. An analysis of right whale mortalities between 2003 and 2018 found that of the 33 examined non-calf carcasses for which cause of death could be determined, all mortality was human caused (Sharp et al*.* 2019). North Atlantic right whales are not dying from old age or natural causes; except for the neonate mortalities (which are considered natural mortalities), all juvenile and adult right whale deaths are due to anthropogenic causes (i.e., entanglement or vessel strike).

Predation is believed to play some role, although it is unknown how much. Killer whale rake marks have been documented on right whales (Kraus 1990), and recently white sharks have been observed relatively frequently near NARWs in the southeastern United States (L. Crowe, pers. comm.). High levels of *Giardia* and *Cryptosporidium,* parasites that can cause diarrhea, dehydration, weight loss and death in some animals, have been documented in right whales

(Hughes-Hanks et al. 2005). Several marine biotoxins occur in the same areas as right whales, raising concern that the species may be affected by harmful algal blooms (Rolland et al. 2007). Environmental neurotoxins produced because of harmful algal blooms have the potential to affect reproduction and development. Paralytic shellfish toxin and domoic acid that were detected in fecal samples indicate that right whales are exposed to environmental neurotoxins regularly (Durbin et al. 2002, Doucette et al. 2012). Leandro et al. (2010) reported right whale exposure to domoic acid over a period of months, likely via ingestion of contaminated prey. Doucette et al. (2006) found that paralytic shellfish poisoning (PSP) toxins occurred in right whales and suggested that the trophic transfer of such toxins is a factor in the lack of right whale recovery. Right whales exhibit very low levels of genetic variability, which raises concerns that the population could be more at risk from disease and contaminant effects, and there is some thought that these combined effects could play a role in the low reproductive rates of right whales (Kraus et al. 2007).

There is no direct evidence of competition between right whales and other species, though it’s been noted that sei whales are sympatric with right whales in the North Atlantic because both species feed on zooplankton (Watkins and Schevill 1979, CETAP 1982).

Threat Level 1	**Threat Level 2**	**Threat Level 3**	**Spatial Extent***	**Severity***	**Immediacy***	**Trend**	**Certainty**
2. Agriculture & Aquaculture	2.4 Marine & Freshwater Aquaculture		Small	Moderate	Immediate	Intensifying	Low
3. Energy Production & Mining	3.1 Oil & Gas Drilling	3.1.2 Offshore oil development	Pervasive	Serious	Unknown	Choose an item.	Choose an item.
3. Energy Production & Mining	3.1 Oil & Gas Drilling	3.1.5 Offshore natural gas development	Pervasive	Serious	Unknown	Choose an item.	Choose an item.
3. Energy Production & Mining	3.3 Renewable Energy	3.3.2 Wind farms	Large	Unknown	Immediate	Intensifying	Moderate
4. Transportation & Service Corridors	4.3 Shipping Lanes	4.3.1 Shipping	Pervasive	Extreme	Immediate	Intensifying	High
4. Transportation & Service Corridors	4.3 Shipping Lanes	4.3.2 Dredging of shipping lanes	Small	Slight	Immediate	Stable and ongoing	High
5. Biological Resource Use	5.4 Fishing & Harvesting Aquatic Resources	5.4.1 Recreational or subsistence fishing	Large	Serious	Immediate	Intensifying	High
5. Biological Resource Use	5.4 Fishing & Harvesting Aquatic Resources	5.4.2 Commercial fishing	Pervasive	Extreme	Immediate	Stable and ongoing	High
6. Human Intrusions & Disturbance	6.1 Recreational Activities	6.1.4 Recreational boating	Pervasive	Extreme	Immediate	Intensifying	High
6. Human Intrusions & Disturbance	6.2 War, Civil Unrest & Military Exercises	6.2.3 Military exercises	Restricted	Moderate	Immediate	Stable and ongoing	Low
8. Invasive & Other Problematic Species	8.2 Problematic Native Plants & Animals	8.2.6 Increased predation by large predators	Restricted	Slight	Immediate	Intensifying	Low
8. Invasive & Other Problematic Species	8.4 Pathogens		Small	Slight	Immediate	Intensifying	Low

8. Invasive & Other Problematic Species	8.5 Intrinsic Biological Limitations	8.5.1 Loss of genetic diversity	Large	Moderate	Immediate	Intensifying	Low
9. Pollution	9.1 Domestic & Urban Wastewater		Pervasive	Slight	Immediate	Intensifying	Low
9. Pollution	9.2 Industrial & Military Effluents		Pervasive	Slight	Immediate	Intensifying	Low
9. Pollution	9.4 Garbage & Solid Waste	9.4.4 Drifting plastic and entanglement rubbis	Pervasive	Serious	Immediate	Intensifying	Moderate
9. Pollution	9.6 Excess Energy	9.6.3 Noise pollution	Pervasive	Serious	Immediate	Intensifying	High
11. Climate Change	11.1 Habitat Shifting & Alteration	Choose an item.	Pervasive	Extreme	Immediate	Intensifying	High
11. Climate Change	11.3 Changes in Temperature Regimes	Choose an item.	Pervasive	Extreme	Immediate	Intensifying	High

VI. Threats *(from NY 2015 SWAP or newly described)*

Table 3. Threats to North Atlantic right whale.

Human-Caused Mortality

While whaling may no longer be a threat, all North Atlantic right whale deaths over the past few decades have been due to human activity, specifically vessel strikes and entanglement in fishing gear (Sharp et al. 2019). Brown et al. (2009) noted that serious injuries could eventually lead to mortality through infection or decreased foraging efficiency and that it was also possible that whales that recover from such injuries could experience decreased reproductive potential. We know now that those things are true. The factors preventing growth and recovery of the species are indeed vessel strikes and entanglements (Kraus et al. 2016). Sharp et al. (2019) reported on the 124 mortalities documented between 1970 and 2018. Of these, 18 were calves believed to have died from perinatal complications or other natural causes. Of the remaining cases, 21% died from vessel strike, 21% died from entanglement in fishing gear, and 43.5% were of undetermined cause. At minimum, therefore, 42% of the observed mortalities were from human impacts. However, in the cases where cause of death was determined, 100% of non-calf mortality was human caused. It’s also important to note that only about 30% of right whale carcasses are ever detected by humans, meaning that the actual number of serious injuries and mortalities is vastly higher than the numbers presented (Pace et al. 2021).

It's important to note that entanglement and vessel strikes may not kill an animal directly but may instead weaken its health to the level of decreased reproductive success (see “Sub-Lethal section; van der Hoop et al. 2017a, Corkeron et al. 2018, Christiansen et al. 2020, Stewart et al. 2021). These sublethal impacts of injuries on reproduction and health are becoming clearer (Stewart et al. 2021, Knowlton et al. 2022, Moore 2023, Pirotta et al. 2023, 2024). There is evidence that females are particularly at risk from human activities. Mother/calf pairs, which migrate from the southeastern U.S. to the Gulf of Maine and/or Gulf of St. Lawrence, are often found in nearshore waters where shipping and fishing are the most common (Fujiwara and Caswell 2001). Additionally, mother/calf pairs spend significantly more time at the surface than other demographic groups, putting them at increased risk of ship collisions (Fujiwara and Caswell 2001). Brown et al. (2009) found that known deaths from entanglement and ship strikes from 2005 - 2009 are biased towards females. Human impacts were responsible for the loss of at least 12%, and potentially as much as 37%, of the female population between 1980 and 2012 (Knowlton et al. 2012). These numbers are particularly concerning for the population, as the death of a reproductive female also represents a loss of the potential calves the female would produce. Significantly, even a single human-caused mortality impacts the population (Linden 2024). Additionally, multiple environmental and anthropogenic stressors may further impact health and reproduction rates in right whales. The cumulative impact of all of these factors needs further consideration for overall population health and ongoing risks to individuals.

Vessel Strikes

Vessel strikes are a major cause of mortality and injury to right whales, which appears to be the most vulnerable large whale species to ship strikes (Kraus 1990, Knowlton and Kraus 2001, van der Hoop et al. 2012, Vanderlaan and Taggart 2007). Ship strikes were found to be the cause of death for 53% of the 40 right whales necropsied between 1970 and 2006. Vessel speed is a primary factor in lethal vessel strike events involving whales, with faster vessel speed increasing the likelihood of interactions and mortality resulting from an interaction (Vanderlaan and Taggart 2007, Conn and Silber 2013, Garrison et al. 2025). Using simple biophysical models, Kelley et al. (2021) determined that whales can be seriously injured or killed by vessels of all sizes and that a collision with a 50-ton vessel transiting at seven knots has a probability of lethality greater than 50%.

Vessel strikes can cause broken bones and massive internal injuries, known as blunt force trauma, or cuts from propellers (e.g., lacerations), known as sharp force trauma. Both blunt and sharp force trauma have been observed as the cause of death for North Atlantic right whales. Importantly, there is not always obvious external impacts with blunt force trauma, which requires a necropsy for determination (Moore et al. 2013, 2020). Priotta et al. (2023) used modeling to estimate that blunt and deep vessel strike injuries (as well as severe entanglement injuries) had the largest effect on the health of right whales.

Right whales are notoriously difficult to spot in the ocean, even by seasoned scientists and captains (Wiley et al. 2016). As previously stated, mother/calf pairs are at higher risk due to time spent at the surface but overall, the species spends at least 67% of its time and up to 98% of its time within 10 meters of the surface throughout their range (Garrison et al. 2022, 2025). Many factors are taken into consideration when estimating vessel strike mortality including encounter risk, probability of avoidance, probability at strike depth, probability of mortality, whale distribution, vessel distribution, vessel speed, and vessel size (Garrison et al. 2022, 2025). Recent analysis using an encounter risk model found that the highest risk of vessel strike mortality occurred in the mid-Atlantic and Southern New England (i.e., New York) from November through May and, most importantly, that expanding speed zones to those areas would reduce overall mortality risk by almost 28% (Garrison et al. 2022).

Unfortunately, very little data exist on if or how right whales avoid vessels (Blondin et al. 2025). We do know that vessel traffic will continue to increase, especially with the emergence of offshore wind energy and aquaculture development. The only viable management measures for vessel strike mitigation are changing vessel routes, a lengthy and political process, and vessel speed restrictions, which are the easiest to implement and enforce. Effectiveness of measures has been proven following the implementation of the 2008 North Atlantic Right Whale Vessel Speed Reduction measures (van der Hoop et al. 2015). However, the 2008 rule only applies to vessels 65 feet or greater in length and now smaller vessels that are currently unregulated and have been determined as the cause of multiple right whale vessel strike mortalities, are a priority for management. However, the spatial and temporal extents of the 2008 rule are no longer applicable as right whale distribution has shifted significantly since the rule went into effect (see Climate Change section) and there was little data available on right whale presence in the mid-Atlantic, including the New York Bight, during the original rulemaking (Garrison et al. 2022). Other potential mitigations measures are in their infancy. Technology such as thermal imaging systems are being explored as a surface-based detection method to mitigate vessel strikes (Baille and Zitterbart 2022).

<u>Entanglement</u>

Entanglement in fishing gear is one of the greatest threats to North Atlantic right whales. Entanglement has also been shown to be a major factor contributing to the slow recovery of this species (Knowlton et al. 2005). Most entanglements involve gear from fixed gear fisheries, such as gillnets and pot gear (Johnson et al. 2005). Fishing gear can cut into a whale's body, cause serious injuries, and result in infections and mortality. Wu et al. (2021) found that the drag coefficient for North Atlantic right whales at normal swimming speeds without entanglements was approximately twice that of other cetaceans.

Entanglement events are increasing in both frequency and severity (Knowlton et al. 2016). Right whales acquire new entanglement scars on a nearly annual basis and since 1990, entanglement wounds have become more severe, likely due to the increased use of stronger fishing lines (Knowlton et al. 2012b, 2016). Likewise, van der Hoop et al. (2013) found an increasing trend in entanglement mortality across multiple large whale species despite regulatory efforts. In fact, Pace et al. (2014) found that entanglement mortality rates had no significant change over a 20-year period, indicating that implemented mitigation measures have not been effective.

Whales can sometimes free themselves of gear following an entanglement event, and as such, scarring may be a better indicator of fisheries interaction rates than entanglement records. Because despite management actions, overall entanglement rates as measured by the rate at which scars are acquired by living North Atlantic right whales remain high. Knowlton et al. (2012) estimated that, from 1980 to 2009 in over 1,000 unique entanglement events occurring in 626 individual right whales, over 85% of North Atlantic right whales have been entangled in fishing gear at least once. In addition, over half (59%) were entangled more than once and about a quarter of the individuals identified in each year (26%) were entangled in that year. Importantly, juveniles and calves were entangled at higher rates than adults.

Disentanglement is not always possible or successful, and is therefore not a viable solution, but there are multiple documented cases of entanglements for which the intervention by disentanglement teams averted a likely serious-injury determination, worse. Even if gear is shed or removed through disentanglement efforts, the time spent entangled can severely stress a whale, weaken it, prevent it from feeding, and reduce the energy it has available to swim, feed, and reproduce. Over time, entanglement results in high drag, lower blubber stores, reduced reproductive success, and behavior changes (Lysiak et al. 2018, Reed et al. 2022, van der Hoop et al. 2016, van der Hoop et al. 2017b). Entanglement has a negative effect on the health of both reproductive and non-reproductive North Atlantic right whales across severity levels, although reproductive females display worse health metrics at lower levels of severity than non-reproductive whales (Knowlton et al. 2022).

As previously stated, right whale body size has decreased over time, with entanglement being a critical factor (Stewart et al. 2021). Even if not directly fatal, entanglement is detrimental to the whale’s energy balance leading to poorer body condition, lower reproduction, and lower survival (Pettis et al. 2017, van der Hoop et al. 2017). Reproductive females that are carrying gear or have serious injuries from entanglements were significantly less likely to calve again. Females that experienced a moderate or severe entanglement had a significantly longer calving interval than those with no or minor entanglement wounds (Knowlton et al. 2012). Many whales with severe entanglements are in poor condition and thus are more likely to sink when dead and therefore go undetected (Brown et al. 2009). Robbins et al. (2015) estimated a mortality rate of approximately 25% during the first year after which the individual was first seen with gear.

- *Aquaculture*

Expansions to the aquaculture industry, both inshore and offshore, may also affect North Atlantic right whales. The addition of vertical lines in the water increases the risk of entanglement, both directly through whale interactions with aquaculture gear or secondarily through the entanglement of trailing gear on a whale with fixed aquaculture gear (Price et al. 2017). Increased vessel traffic in and around aquaculture farms will increase ambient noise levels and the risk of vessel strikes (Price et al. 2017). There may also be oceanographic changes to areas used for aquaculture that could affect the physical environment or create changes to prey availability.

<u>Offshore Energy Development</u>

The effects of other anthropogenic activities, such as offshore energy development and oil spills, are largely unknown. Pre-construction, construction, operation, and decommissioning encompass a wide range of underwater sound in addition to pile driving noise (Ruppel et al. 2022). Offshore energy development could potentially degrade right whale habitat or displace them from common foraging or breeding areas. Studies have found that the Southern New England area, a hot spot of offshore wind energy development, is also an important established area for right whales and other endangered cetacean species (Stone et al. 2017, Van Parijs et al. 2023). Development of offshore wind energy areas will also introduce a significant amount of vessel traffic, compounding impacts (Van Parijs et al. 2023). In addition, baleen whales are at the highest risk of entanglement in the moorings and associated power cables used to anchor offshore renewable energy, including wind, wave, and tidal energy (Benjamins et. al. 2014, Maxwell et al. 2022).

- *Wind Energy*

Impacts to right whales from offshore wind energy development may include hearing impairment, behavioral disturbance, avoidance of areas, injury and mortality, changes in quality and availability of prey that leads to reduced survival and reproduction (Barkaszi et al. 2021, Dorrell et al. 2022, Leiter et al. 2017, Maxwell et al. 2022, Quintana-Rizzo et al. 2021). Construction of an offshore wind farm requires pile-driving to install the foundations. Pile-driving produces high levels of intense noise and is generally considered the largest threat to marine mammals when talking about wind farms (Madsen et al. 2006). Operational wind turbines produce more constant, low levels of noise (Madsen et al. 2006). While these levels are generally not considered loud enough to disrupt marine mammal hearing, this is the potential for behavioral effects. No studies on wind turbines currently exist for right whales or any other baleen whales, but Nowacek et al. (2004) documented avoidance responses of NARWs to a tonal signal that was similar in frequency and amplitude to the sound produced by wind turbines. This level is also similar to noise produced by dredging and drilling, and thus there is the potential that these activities could alter right whale use of an area (Madsen et al. 2006).

While only a few projects in U.S. waters are currently fully approved and under development, should the proposed scope of development go forward as planned, the extensive overlap of wind energy areas with right whales' habitat range would mean that in the future, any individual right whale may be exposed to multiple projects of varying effects. Offshore wind energy development will coincide with existing stressors including noise, entanglement risk, vessel traffic, and changes in oceanographic conditions, making it essential for the consideration of cumulative effects.

- *Oil Spill*

An offshore or nearshore oil spill would likely cause further population decline for North Atlantic right whales. Oil spills that occur while right whales are present could result in skin irritation, baleen fouling, ingestion of oil, respiratory distress, ingestion of contaminated prey, and displacement from habitat (Geraci 1990). Actual impacts would depend on the extent and duration of contact and the characteristics of the oil. Most likely, the effects would be irritation to the respiratory system and absorption of toxins into the bloodstream (Geraci 1990). Oil can be ingested if whales attempt to feed while swimming through an oil slick, poisoning them and causing damage to internal systems such as the immune and endocrine systems. Health assessments conducted on bottlenose dolphins after the Deepwater Horizon Oil Spill indicated that persistent lung disease and impaired stress response were present for at least 4 years after the disaster (Smith et al 2017). Oil spills would likely also have effects down the food chain, potentially causing energetic effects for North Atlantic right whales who may have to travel further to forage.

Climate Change

Climate change is triggering the impacts that cause population decline and poses a significant threat to right whale recovery. It has led to temperature and current shifts throughout the North Atlantic Ocean (Pershing et al. 2021). These changes have led to shifts in distribution of right whales as occupied habitats become unsuitable and previously unsuitable habitats become occupied (Davis et al. 2017, Davies et al. 2019, Meyer-Gutbrod et al. 2021, Pershing and Pendleton 2021, Johnson et al. 2025).

To date, climate change has significantly impacted right whale prey, especially the distribution of the copepod *Calanus finmarchicus*, and therefore has influenced the timing of right whale seasonal presence in traditional habitats. Climate change has displaced *Calanus* and disrupted the mechanisms that create the dense copepod patches that right whales rely on. Higher ocean temperatures in the Gulf of Maine has changed the availability of late stage Calanus, which led to a sharp decrease of right whales in the Bay of Fundy and an increase in right whale presence in Cape Cod Bay (Record et al. 2019, Davies et al. 2019, Meyer-Gutbrod et al. 2021, Mayo et al. 2018, Ganley et al. 2019). Meyer-Gutbrod et al. (2022) found right whale presence in the Gulf of St. Lawrence over the last 10 years was driven by prey decline in the Gulf of Maine, not an increase in prey in Canada.

Prey changes or limitation may also contribute to a decline in population health and reproduction. Knowlton et al. (2022) found that the health of all right whales had declined significantly since the 1980s, including those without injury. As previously discussed, North Atlantic right whales are experiencing a declining body size, a potential factor of low birth rates over the past decade. Smaller whales may be the result of poor nutrition or sublethal injury, either to itself or its mother (Stewart 2021). Reed et al. (2022) showed there is a failure of females to transition into breeding whales since smaller whales have less capacity to get to breeding condition, thereby contributing to the population decline. Reduced or low prey densities may have broader impacts to overall health, growth, and body condition that affect population dynamics that are not yet fully understood (Christiansen et al. 2020).

Right whale seasonal presence has already been documented as shifting (Charif et al. 2019). Climate change appears to have caused a northward shift in the summer distribution of right whales, likely due to effects on prey distribution, which exposed the whales to shipping and entanglement risks over a greater area (Meyer-Gutbrod et al. 2018). These changes led to a mismatch with existing management measures (Ganley et al. 2022, Pendleton et al. 2022). As the Gulf of St. Lawrence became an important habitat for a large portion of the population since at least 2015 (Simard et al. 2019, Crowe et al. 2021, Durette-Morin et al. 2022), there was a substantial increase in anthropogenic mortality before new management measures could be implemented (Davies and Brillant 2019). An Unusual Mortality Event (UME) was declared for the species in June 2017 as a result, which is still ongoing (NMFS 2025b). Gavrilchuk et al. (2021) suggested that ocean warming in the Gulf of St. Lawrence may eventually compromise the suitability of this “new” foraging area for right whales, potentially displacing them even further. However, these long-term range shifts have resulted in enduring and effective policy changes to reduce risks. Since the start of the UME in 2017, Canada has been extremely proactive in developing and implementing mitigation measures that prioritize the species while allowing human activity to continue.

Anthropogenic Noise

Anthropogenic noise in the marine environment has increased substantially since the 1950s, and this rapid change in the acoustic environment may have profound implications for marine mammals that evolved in a much quieter environment (McDonald et al. 2006, Hildebrand 2009, Clark et al. 2009). The primary sources of anthropogenic noise in the ocean are shipping, oil and gas exploration (e.g., seismic surveys/air guns), military activities, and marine construction (e.g., pile-driving, dredging, etc.; Nowacek et al. 2007).

Marine mammals, and especially cetaceans, rely on sound during all stages of life; they use sound to communicate, navigate, locate prey, and sense their environment. As highly migratory species, right whales, like all baleen whales, depend on long-range communication to maintain individual and population health (Payne and Webb 1971). As such, increasing levels of anthropogenic noise in the ocean could hamper these abilities in the form of masking (e.g., not hearing conspecifics), displacement, temporary or permanent hearing loss, stress, and other behavioral changes (Gordon et al. 2004, Nowacek et al. 2007, Tyack 2008, Southall et al. 2019). Noise, however, is highly variable in its generation and its reception. Noise may be intermittent or continuous, steady or impulsive, and may be generated by stationary or passing sources. Noise exposure can result in a multitude of impacts, ranging from those causing little to no impact to more severe outcomes like serious injury or mortality (Richardson et al. 1995, Foote et al. 2004).

Response to anthropogenic noise exists on a spectrum, from minor physiological changes to death, and the level of response varies due to many factors. The noise source type and characteristics, the surrounding environment (e.g., distance from shore, bathymetry), distance between the source and receptor, receptor characteristics (e.g., behavioral context, age, sex), and the time of day and/or season all affect the impact and response to noise (Richardson et al. 1995, NRC 2003, 2005). Hearing damage in marine mammals is usually categorized as causing either a temporary threshold shift (TTS) or a permanent threshold shift (PTS) (Southall et al. 2007, 2019). Excessive noise exposure may be damaging via physiological stress during early individual development, may cause stress hormone fluctuations, and/or may cause whales to leave an area or change their behavior within it (Weilgart 2007). An animal's auditory threshold may be masked by noise at frequencies similar to or louder than biologically important sounds. Masking these acoustic signals can disturb the behavior of individual animals, groups of animals, or entire populations (Richardson et al. 1995). Above a certain level of noise, some whale species are known to stop vocalizing (Melcón 2010) and in a large, solitary species like right whales, this could lead to difficulty finding other whales, including potential mates.

In response to the increased noise experienced by right whales, they display distinct changes in vocal behavior (Parks et al. 2012, Matthews and Parks 2021). Right whales may try to minimize masking by changing their behavior, such as producing more calls, producing longer calls, or shifting the frequency of the calls (Parks et al. 2007b, Parks et al. 2010). Interruption of normal vocalizing behavior could have significant energetic consequences, particularly if these shifts in vocalizing impact foraging efficiency (Parks et al. 2007b, 2010). Increasing anthropogenic activities generate more isolated noise events and overall ambient noise. The population-level effects of increasing ambient noise due to anthropogenic activities are not well defined, but individual North Atlantic right whales do perceive various sound types (e.g., vessel noise) and display differential behavioral responses to isolated noise events, including shifting habitat which may increase stress (Matthews and Parks 2021).

- *Shipping Noise*

Shipping is the main source of low-frequency noise in the oceans (Ruppel et al. 2022). Over the past few decades, the contribution of shipping activities to ambient noise has increased by 12 dB (Hildebrand 2009). Cholewiak et al. (2018) determined that vessel noise near shipping lanes, which includes most of the New York Bight, significantly decreases the communication space of multiple baleen whale species. Additionally, Clark et al. (2009) found that baleen whales showed diminished call rates in the presence of passing vessels. Low-frequency noise from shipping activity has been linked to physiological stress in North Atlantic right whales (Rolland et al. 2012). Acoustic masking from ship noise may negatively affect both reproduction by interfering with courtship vocalizations and finding prey patches by interfering with communication and reducing feeding opportunities (Hatch et al. 2012, Southall et al. 2019).

Noise pollution may make a previously occupied area unsuitable for this species. Passive acoustic monitoring in the New York Harbor region and offshore of Long Island to the continental shelf edge found that there was acoustic masking of right whale calls due to high levels of anthropogenic noise (BRP 2010, Rice et al. 2014). During the 2017-2020 PAM conducted by NYSDEC, the 120 dB threshold for Level B harassment under the MMPA was exceeded 5% of the time at the site closest to NY Harbor (Estabrook et al. 2021). It is possible that right whales may avoid these areas when noise levels are elevated. Further research is needed to identify to what extent these factors are altering habitat availability in New York waters (Rice et al. 2014).

- *Military Activity*

Acute, intermittent noise from military activity, especially from mid-frequency sonar and explosions, is likely to result in significant behavioral disruption and responses and area avoidance, and, at sufficiently high levels, may result in mortality from acoustic trauma for some baleen whale species (Richardson et al. 1995, Weilgart 2007). Controlled experiments have shown clear behavioral responses to simulated military sonar and sounds by baleen whale species, including cessation of feeding, increased swimming speed, and travel away from the sound source (Goldbogen et al. 2013, Southall et al. 2014). Military training exercises and active sonar could adversely affect right whales, since the low frequency transmissions overlap with the right whale hearing range, thereby masking communications between individuals and negatively affecting social ecology and interactions of right whale groups, which we know play an important role in reproduction (NMFS 2005).

- *Oil and Gas Exploration*

As with military activity, the acute, intermittent noise from seismic mineral exploration is likely to cause significant behavioral change and, for some baleen whale species at high enough levels, result in mortality (Gailey et al. 2007, Dunlop et al. 2017, Harris et al. 2018). Baleen whales are known to detect the low-frequency sound pulses emitted from air guns used during seismic surveys over large areas and have been observed changing their behavior due to the presence of seismic survey vessels (McCauley et al. 2000, Stone 2006). Stone et al. (2003) found that baleen whales were sighted less frequently and exhibited avoidance behavior when air guns were active. Seismic operations have also been linked to extended area avoidance and louder vocalization levels by baleen whales (Castellote et al. 2012a, Nieukirk et al. 2012). Other effects, like dive-cycle behavior changes, have been documented in bowhead whales, *Balaena mysticetus*, a close relative of the right whale (Robertson et al. 2013). In some studies, bowhead whales displayed a cessation of calling (Blackwell et al. 2013). In addition, whales tended to dive less at these times, possibly because noise levels are lower near the surface than at depth

(Richardson et al. 1995). Avoidance behavior was documented in bowhead whales in response to air gun use in Canada's Beaufort Sea (Richardson et al. 1986). The continuous compensation by individuals in high-activity areas, such as the east coast of Canada which has been subject to much oil and gas exploration, may have lingering impacts on a right whale's overall fitness. Studies have highlighted concerns about the long-term effects of prolonged exposure to air guns (Delarue et al. 2018).

Marine Debris

According to the United Nations Global Compact, more than 8 million tons of plastic ends up in the ocean every year, and the amount of plastic in the ocean is expected to quadruple by 2040 (United Nations Global Impact 2025). Plastic ingestion has been well documented in cetaceans including several species of baleen whales. Ingestion of marine debris by cetaceans may include internal injuries or cause complete blockage to the digestive tract leading to malnutrition, starvation, and mortality (Simmonds 2012, Baulch and Perry 2014). Most cetacean ingestion of marine debris is discovered through necropsies of stranded animals and has been documented in more than half of extant cetacean species, including nine baleen whale species, with ingestion rates as high as 31% in certain populations (Baulch and Perry 2014).

As filter feeders, baleen whales like right whales are exposed to microplastic on a greater scale. Kahane-Rapport et al. (2022) found that fish-feeding baleen whales ingested less microplastics than krill-feeding baleen whales like right whales, but overall, there is a high risk of cumulative physiological and toxicological impacts across baleen whale species. It's likely that daily microplastic ingestion is underestimated by orders of magnitude and more monitoring and assessment is needed. Alexiadou et al. (2019) highlighted the impact on mobility that ingesting marine debris can have on whales and the potential severity of cumulative impacts noting that half of ship-struck cetaceans had ingested plastic. Roman et al. (2020) explored the types of debris ingested by marine taxa and how lethal each type is, and determined that rubber, while less commonly ingested by cetaceans, is most likely to be lethal when ingested. More research is still needed to see how prevalent marine debris ingestion is in North Atlantic right whales.

Contaminants, Toxins, and Chemical Pollutants

Organochlorines, such as polychlorinated biphenyl (PCBs), chlorinated pesticides, and brominated flame retardant concentrations have all been found in right whale blubber and/or feces (Weisbrod et al. 2000, Montie et al. 2010). However, it is unclear how seasonal distribution, expenditure of energy reserves, and transfer of pollutants through milk to nursing calves influence bioaccumulation of contaminates in the right whale population. Even so, the North Atlantic right whale lipid-rich nature and life history makes them potentially vulnerable to persistent bioaccumulating compounds (Klanjscek et al. 2007). High concentrations of toxicants can further stress individual health, especially in times of nutritional deficiency, negatively impacting fertility and reproductive success (Klanjscek et al. 2007).

- *Harmful Algal Blooms*

Climate change will likely have secondary effects on North Atlantic right whales, such as an increase in harmful algal blooms (HABs) due to warming waters. In cetaceans in all the world's oceans, there has been an increase in cases of poisoning due to harmful algal blooms (HABs; Harvell et al. 1999). Higher than usual precipitation during the summer may lead a decrease in salinity on top of the rise in temperature and create conditions which favor HABs (Dufour et al., 2010). The algae produce a neurotoxin called saxitoxin, ingested via prey, which causes neurological issues that may result in death. Trophic transfer of biotoxins from harmful algal blooms has been shown to be potentially fatal in baleen whales (Fire et al. 2010).

Global warming and subsequent changes in rainfall may lead to an increase in the frequency and intensity of algal blooms and increase the impact of this threat (Gobler et al. 2017). More intense and/or frequent toxic blooms in winter/spring feeding areas may affect the recovery of species. The effects can be potentially catastrophic for small populations, as hundreds of animals may die in a single episode from (Häussermann et al. (2017). HABs will increase the risk of biotoxin exposure, which likely already happens for North Atlantic right whales on an annual basis in multiple habitats (Doucette et al. 2012).

Sub-lethal effects may include lower reproductive success and increased susceptibility to other mortality causes (Leandro et al. 2010). Recent analysis of HAB events indicated that there is not as strong a relationship between HAB occurrence and whale injuries and deaths on the east coast as there is on the west coast, but there is still risk of whales being more susceptible to other threats due to HAB effects (Silber and Silber 2024). A HAB event would likely be highly detrimental to the population because many individuals are already stressed and immune-suppressed from other sub-lethal factors (Borggaard et al. 2020, Moore et al. 2021). Calves may be particularly at risk of detrimental effects due to HABs, as seen in a 10-year unusual mortality event in Southern right whales that involved 623 dead newborn whales (Sironi et al. 2018).

<u>Whale Watching and Harassment</u>
In the U.S., all vessels must abide by a mandatory distance of 1500 feet from North Atlantic right whales. Because of this, right whales are not a target of whale watching and are therefore not subjected to the harassment and close approaches by vessels that other species like humpback whales are. In addition, the typical New England and New York whale watching season of May to September is generally the time of year with the least right whale presence, making the species an exceedingly rare sight on whale watches.

Are there regulatory mechanisms that protect the species or its habitat in New York?

Yes: _✓_ **No:** ____ **Unknown:** ____

If yes, describe mechanism and whether adequate to protect species/habitat:

The North Atlantic right whale is protected in the United States under the ESA by its status as a federally endangered species. In addition, the right whale (along with all other marine mammals) receives federal protection under the Marine Mammal Protection Act of 1972 (MMPA). The North Atlantic right whale (and all other right whale populations) is protected internationally from commercial hunting under the International Whaling Commission’s (IWC) global moratorium on whaling introduced in 1986. In addition, the species is listed as endangered under Canada’s Species at Risk Act and is listed in Appendix I of both the Convention on International Trade in Endangered Species and the Convention on the Conservation of Migratory Species of Wild Animals. Efforts are underway in both the U.S. and Canada aimed at limiting North Atlantic Right Whale deaths and injuries due to ship strikes and entanglements. In both countries, recovery plans have been implemented.

At the state level, North Atlantic right whales are protected under the Environmental Conservation Law (ECL) of New York. The North Atlantic right whale is listed as a state endangered species in New York. Section 11 – 0535 protects all state-listed endangered and threatened species and makes it illegal to take, import, transport, possess or sell any listed species or part of a listed species. In addition, Article 17 of the ECL works to limit water pollution, and Article 14 presents the New York Ocean and Great Lakes Ecosystem Conservation Act. This act is responsible for the conservation and restoration of coastal ecosystems "so that they are healthy, productive and resilient and able to deliver the resources people want and need." Both state law features help to protect the habitat of the right whale.

Regarding entanglements

The Atlantic Large Whale Take Reduction Team was convened in 1997 with the goal of reducing the level of serious injury and mortality in North Atlantic right, humpback, and fin whales in commercial gillnet and trap/pot fisheries. The Atlantic Large Whale Take Reduction Plan (TRP) was developed by NMFS with input from the Team, which identified floating groundline used in the trap and pot fisheries as an entanglement threat for large whales. It is often difficult to determine which fishery entangling gear is from; however, 53% of identified entanglements on North Atlantic right whales and humpback whales examined by Johnson et al. (2005) involved trap and pot gear. NMFS subsequently passed a new law making it mandatory for all pot and trap fisheries to switch over to sinking groundline by 2008. To encourage compliance by fishermen, DEC partnered with the Cornell Cooperative Extension of Suffolk County and initiated gear buyback programs, which removed 16.9 tons of floating rope from New York's commercial lobster fishery. Cornell Cooperative Extension also focused on removing ghost gear from New York waters. Working with the DEC and commercial fishermen, the project removed 4,881 abandoned lobster traps from Long Island Sound as of June 21, 2012. Since 2009, a number of new entanglement mitigation measures have been implemented as part of the Atlantic Large Whale Take Reduction Plan, but their effectiveness is unknown. Since 2009, new entanglement mitigation measures (72 FR 193, 05 October 2007; 79 FR 124, 27 June 2014; 86 FR 51970, 17 September 2021; 87 FR 11590, 02 March 2022) have been implemented as part of the TRP but their effectiveness has yet to be formally evaluated. The data set needs to be robust enough to determine statistically significant effectiveness of measures, which is difficult to parse out. Assessments of management measures to date generally indicate that those measures implemented have not significantly reduce the rates of serious injury and mortality (van der Hoop et al. 2013, Pace et al. 2014, Bisack and Magnusson 2021).

Regarding vessel strikes

In 2008, NMFS implemented vessel speed regulations (hereafter the "vessel speed rule") to reduce vessel strike mortality of North Atlantic right whales (50 CFR 224.105). From November 1 to April 30 each year, vessels 65 feet and greater are required to travel at 10 knots or less when traveling through designated Seasonal Management Areas (SMAs) along the East Coast. For areas of right whale presence that are outside of the required SMAs, Dynamic Management Areas (DMAs) can be designated and, importantly, are voluntary. Evaluations of compliance and effectiveness were done at various points in time (Vanderlaan and Taggart 2009, Silber and Bettridge 2012, Laist et al. 2014, van der Hoop et al. 2015, Hayes et al., 2018). Most indicated that the speed rule was only partially effective in that there was a slight decrease in mortalities but the overall risk reduction was not sufficient for conservation goals. The most important assessment, the North Atlantic Right Whale (*Eubalaena glacialis*) Vessel Speed Rule Assessment, was completed by NMFS in 2020 (NMFS 2020). The report detailed the review that was conducted by the agency which included updates such as that "the number of documented vessel strike mortalities and serious injuries decreased from 12 during the 10 years prior to the rule's implementation to 8 in the 10 years since implementation". NMFS also determined that compliance was variable across Seasonal Management Areas (SMAs) with apparent compliance reaching a peak during 2018-2019 season of 81% compliance coastwide. The decline and compliance numbers demonstrated progress but indicated that additional action was required. In August 2022, NMFS proposed substantial changes to the speed rule, which was supported for a new vessel strike risk assessment (Garrison et al. 2022). NMFS withdrew the proposed rule in January 2025, leaving the original 2008 vessel speed rule as the only mandatory speed restriction along the entire coast. Inaction on the proposed modifications to vessel speed rule threatens the survival of this species. As an example, the large aggregation present in the New York Bight during the summer of 2024 received no regulatory protection. The aggregation did trigger the voluntary speed reduction in the DMA but, as stated, voluntary measures provide little to no protection.

Figure 21. Location of Seasonal Management Areas (SMAs) in the mid-Atlantic (NEFSC 2013).

Other regulatory actions include a Mandatory Ship Reporting Scheme that has been in place since 1999 in two areas of right whale habitat to warn vessels of whales' presence. There are also regulations that specify minimum approach distances for whale-watching and other vessels. Unfortunately, despite regulatory efforts to protect the North Atlantic right whale, and given the individual and population level status of the species, more regulation is needed to prevent its functional extinction within the next few decades.

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

An increased understanding of right whale distribution, abundance and habitat use in New York waters would be beneficial when developing management and conservation strategies (Baumgartner et al. 2017). Long-term surveys and monitoring strategies should be developed to determine which areas of state waters are important to right whales, and when they use these habitats. Relatedly, little is known about current zooplankton distribution and abundance in New York state waters and the New York Bight. Knowledge about prey distribution may enable predictions about right whale distribution, making this an important area of research.

If right whale use of state waters is better understood, it would be possible to attempt to limit known threats in these areas. For example, wind farms and any drilling or construction activities could be done in areas not frequented by right whales. Additionally, a thorough analysis on right whale sighting locations and shipping routes could be conducted. If right whales are consistently being sighted within shipping lanes, it may be possible to divert vessel traffic from the area.

Shipping lanes in the Bay of Fundy and Massachusetts Bay were rerouted to avoid the areas right whales inhabit most frequently. Both rerouting efforts were successful in reducing vessel strikes though not completely.

Massachusetts regulatory measures and survey effort surpasses all other states in terms of right whale conservation. Separate from the federal vessel speed rule, the state requires most vessels less than 65 feet to travel at 10 knots or less in Cape Cod Bay from March 1 to April 30, with the possibility of extension for 15-day periods due to continued presence of right whales. Federally, near real-time acoustic monitoring of right whales is used off Massachusetts to reduce vessel collisions. When a right whale is detected, an alert goes out to all large shipping vessels in the area and a speed restriction goes into place. Massachusetts also has a robust ongoing monitoring program that maintains a minimum level of surveillance for right whales using multiple methods and employing a number of staff dedicated to monitoring program management. Similar monitoring and regulation in New York could help reduce ship collisions with right whales and data analyses that can support the implementation of such regulations in New York, such as that by Murray et al. 2022, should be prioritized. State-level regulation can fill the gap created by federal inaction.

Other threats and research topics such as offshore wind energy development are being addressed. In January 2024, NMFS and the Bureau of Ocean Energy Management (BOEM) released the BOEM and NOAA Fisheries North Atlantic Right Whale and Offshore Wind Strategy that specifies important goals and actions to be taken by both agencies as the offshore wind industry continues growing (BOEM and NOAA 2024). Inter-agency collaboration is vital to ensuring that all actions, federal and otherwise, are assessed and managed for the survival of North Atlantic right whales.

Finally, as with all species conservation, increased education and outreach to targeted groups like fishermen and the general public in New York is beneficial to spread awareness of the plight of the species, as well as the regulations that must be followed. It's possible that mandatory measures, as opposed to the current voluntary measures, will need to become the only accepted mitigation measures. One of the largest problems with the current regulations protecting right whales from vessel collisions is lack of compliance. We now know that voluntary measures are not effective, and mandatory measures must be put in place (NMFS 2020).

Most importantly, we are now managing and conserving for the survival of individual animals to ensure the species' survival. This has developed out of necessity due to the dire status of North Atlantic right whales, highlighting that the loss of even one individual, especially an adult female, can have cascading and long-lasting effects. Mother/calf pairs, for example may require different management considerations due to their behavioral state in the months following birth (Cusano et al. 2018). As we learn more about sublethal impacts to right whales and their role in right whale recovery, it's important to acknowledge that they are not adequately addressed in current management and recovery plans. Moreover, as climate-driven changes continue to result in large shifts in right whale distribution, managers need to prioritize the development of flexible survey and management strategies so they can identify and respond to novel presence, such as the Hudson Canyon aggregation, and newly established habitat, such as the Gulf of St. Lawrence (Pettis and Hamilton 2025). The scope of monitoring for the species needs to be increased and will require additional and significant resources (Pettis and Hamilton 2025). Overall, the two required mitigation measures that would result in sufficient risk reduction for the species' survival are broadscale mandatory vessel speed restrictions on all vessels 35 feet and greater, and the complete transition of fixed-gear fisheries to on-demand fishing technology.

Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme

Action Category	Action	Description
A.1 Direct Habitat Management	A.1.3 Mitigate human environmental impact	Limit known threats to the species by requiring strict mitigation measures like time-area restrictions for various projects like offshore wind development Implement seasonal speed restrictions on vessels in high-use and/or high-risk areas and/or during high-presence times of year
A.2 Direct Species Management	A.2.1 Stewarding wild individuals	Continue funding stranding response Enhance disentanglement response
B.3 Outreach	B.3.1 Outreach, communication, and distribution	Increase education of New York mariners to spread awareness of right whale regulations Consider educational requirements, like incorporating a mandatory section on boating around whales in the NYS boater safety course Encourage responsible human behavior and reporting sightings and/or interactions; target recreational boaters and avid beach goer
B.4 Law Enforcement and Prosecution	B.4.1 Detection and intervention B.4.2 Prosecution and conviction	Enforce potential regulations and maintain presence in high-use and/or high-risk areas to deter problematic activity Explore use of enforcement to guide individual North Atlantic right whales through NY waters, especially mom/calf pairs
B.5 Economic and Other Incentives	B.5.4 Economic incentives and disincentives	Consider possible incentives and disincentives to support compliance and/or precautionary measures
C.6 Design and Plan Conservation	C.5 Conservation planning	Long-term conservation and management strategies should be developed
C.7 Legislative and Regulatory Framework or Tools	C.7.1 Create, amend, or influence legislation, regulation, or codes C.7.2 Create or amend policies, guidelines, or best practices	Broaden the geographic scope of vessel speed restrictions in space and time Apply to vessels 35 feet and greater Make all speed restrictions mandatory Create regulation structure for on-demand fishing gear; trouble shoot technology and compliance concerns
C.8 Research and Monitoring	C.8.1 Basic research and status monitoring	Monitor North Atlantic right whale presence in New York long-term

Action Category	Action	Description
		Provide a minimum level of funding to carry out monitoring each year Determine when right whales are present, especially mom/calf pairs; determine interannual variability and residency time
C.10 Institutional Development	C.10.3 Alliance and partnership development	Establish and maintain partnerships that bring additional resources to research and/or mitigation Engage with local organizations and companies that are invested in whale conservation

Table 4. Recommended conservation actions for North Atlantic right whale.

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