Species Status Assessment

Common Name: Sperm whale **Date Updated:** 2/16/2025

Scientific Name: *Physeter macrocephalus* **Updated by:** Meghan Rickard

Class: Mammalia

Family: Physteridae

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

Sperm whales are the only toothed large whale species, the most sexually dimorphic of all cetaceans, and have the largest brain of any animal that has ever lived (Rice, 1989, Perry et al. 1999, Whitehead 2002, Jefferson et al. 2015). They are named for the waxy substance in their head, spermaceti, which is a high-quality oil for which sperm whales were globally commercially hunted for more than two and a half centuries (NMFS 2010). Direct harvest of sperm whales went unregulated until quotas were introduced in the North Pacific Ocean in 1970, and all whale species were not afforded complete protection from commercial whaling until the global Internal Whaling Commission (IWC) moratorium went into effect in 1986 (NMFS 2010). There has been extreme under-reporting and misreporting of modern catch data for sperm whales but estimates range in the tens of thousands in the North Atlantic alone and over one million worldwide (Best et al. 1984, NMFS 2010). The estimated overall decline of the species from 1711 to 2022 was 56% (Whitehead & Shin 2022).

There is only one recognized species of sperm whale. There has been some debate over whether *Physeter catodon* or *Physeter macrocephalus* is the correct name for the species. The name *P. macrocephalus* is used most often but *P. catadon* is considered a synonym (Taylor et al. 2019). For management purposes, all sperm whales in the North Atlantic are considered one stock; the IWC also recognizes one stock for the North Atlantic. The United States recognizes two sperm whale stocks on its Atlantic coast: a North Atlantic stock and a northern Gulf of Mexico stock due to significant genetic subdivision found between the Gulf of Mexico stock and the North Atlantic stock (Engelhaupt 2009, Hayes et al. 2024). More fine scale population structure may exist but is difficult to determine (Reeves and Whitehead 1997, Lyrholm and Gyllensten 1998, Hayes et al. 2024).

Sperm whales are found throughout all oceans. Sperm whales occur primarily on the continental shelf edge, continental slope, and open ocean though distribution extends into partially enclosed areas like the Mediterranean Sea (NMFS 2010). Sperm whales in the U.S. Exclusive Economic Zone (EEZ) are closely associated with the edge of the Gulf Stream and other oceanographic factors such as bathymetry (Waring et al 1993, Hayes et al. 2024). In New York, sperm whales are most frequently observed in deep waters at the continental shelf break, as well as in relatively shallow areas on the continental shelf close to land (Sadove and Cardinale 1993, Scott and Sadove 1997). They are present year-round but most often seen in summer (Sadove and Cardinale 1993, Scott and Sadove 1997, Zoidis et al. 2021, NYSERDA 2021).

Geographic distribution is also likely linked to social structure and a low reproductive rate (Hayes et al. 2024). The basic social unit of sperm whales is a mixed group of adult females, their calves, and juveniles of both sexes, usually about 20 to 40 animals (Christal et al. 1998). Females and juveniles generally inhabit tropical and subtropical waters while males are wide-ranging (Hayes et al. 2024). Only males range into Arctic waters, particularly in the summer feeding season, then migrate back to warmer waters to breed (NMFS 2010). Stable social groups, site fidelity, and latitudinal range limitations for females and juveniles are hallmarks of the species (Whitehead 2002).

There is no reliable population estimate for North Atlantic sperm whales and current population trends are unknown (Hayes et al. 2024). The best recent abundance estimate for western North Atlantic sperm whales is 5,895 individuals, with a minimum population estimate of 4,639 (Hayes et al. 2024).

I. Status

a. Current legal protected Status

i. **Federal:** Endangered **Candidate:** ________

ii. **New York:** Endangered

b. Natural Heritage Program

i. **Global:** G3G4

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: Vulnerable

-CITES: Appendix I

-Northeast Regional SGCN: Highly imperiled, migratory species; very high conservation concern

-Canada Species at Risk Act (SARA): Not At Risk

-Marine Mammal Protection Act (MMPA): Strategic

-COSEWIC: Not At Risk

Status Discussion:

The hunting of sperm whales began in New England in the early 1700s and spread throughout the North Atlantic Ocean by mid-century (Starbuck 1878). Two of the major 19th century whaling grounds for sperm whales were off the U.S. East Coast (Townsend 1935). Oil and spermaceti products drove the sperm whale hunt, though ambergris and tooth ivory were also valuable harvests. Demand fluctuated over the years; it decreased due to petroleum use relieving the need for whale oil but increased again for use in cosmetics. The meat from sperm whales has reportedly only been consumed Japan, the West Indies, and Indonesia (NMFS 2010).

Historical data on the killing of sperm whales are important in understanding the current global population status. The total take of sperm whales worldwide between 1800 and 1909 has been estimated as close to 700,000, and between 1910 and 1973, as close to 605,000 (Best et al. 1984). In the eastern and central North Atlantic, as far west as Iceland, nearly 30,000 sperm whales were killed between 1893 and 1975 (Jonsgård 1977). Canadian whalers killed over 500 sperm whales in the 1900s (Mitchell 1975).

The International Whaling Commission (IWC) moratorium gave sperm whales protection beginning in 1981 and the moratorium was fully implemented in 1986. Norway and Iceland object to the IWC moratorium and actively whale but do not take sperm whales. Iceland was poised to stop whaling in 2024 but instead issued new permits for hunting fin whales and minke whales between June and September from 2025 through 2029 (WWF 2024). Japan never stopped whaling; the country immediately objected to the IWC moratorium and focused on hunting minke whales in Antarctica under a scientific research program permit. In 2018, Japan withdrew from the IWC and resumed commercial whaling in 2019 within its territorial waters. Currently Japanese whaling targets minke whales, Bryde's whales, sei whales, and fin whales (Ministry of Foreign Affairs Japan 2025). However, Japan has taken sperm whales in the past and even hunted them under Special Permit while a member nation in the IWC as recently as 2013 (IWC 2025).

The extent of depletion and degree of recovery from commercial whaling for sperm whales is uncertain at best (NMFS 2010). A pre-whaling global population of about 1,100,000 was reduced by about 29% by 1880, and then to approximately 360,000 by the 1990s. The global sperm whale population experienced a total reduction of 67% during whaling, although there is much uncertainty with these estimates (Whitehead 2002). Whitehead (2002) estimated current global sperm whale abundance to be approximately 300,000– 450,000. The most extensive surveys in the North Atlantic were conducted from 1966–69 and estimated a population of approximately 22,000 sperm whales (Mitchell 1972).

It is often assumed that sperm whale numbers have increased since the 1986 whaling moratorium but there is insufficient data to assess this assumption (NMFS 2015). There is no direct evidence that any part of the population has increased, though for most areas there is also no direct evidence that they have not increased (Taylor et al. 2019). Abundance estimates are complicated by the wide-ranging nature of sperm whales, their offshore distribution, and extended dive periods (Whitehead 2002). All estimates from sighting surveys are negatively biased due to the long submergence times of sperm whales (dives lasting up to 2 hours). Due to imprecise estimates and lengthy survey intervals, there is not enough statistical power to detect trends in abundance (NMFS 2010, Hayes et al. 2024). Population growth/recovery can be expected to be low in the species; long-lived animals such as sperm whales are not well adapted to recover from depletion on the scale of commercial whaling. Even in the absence of whaling, the Mediterranean population appears to have declined over the past 20 years, with bycatch in driftnets a likely principal cause (Reeves and Notarbartolo di Sciara 2006).

In the United States, the sperm whale has been protected under the Marine Mammal Protection Act since 1972 and has been listed as endangered by the Endangered Species Act since it was enacted in 1973. The species is considered strategic under the MMPA due to its endangered status under the ESA. Sperm whales are listed on the IUCN Red List as Vulnerable with an unknown population trend (Taylor et al. 2019). The sperm whale U.S. Recovery Plan mandated under the ESA was created in 2010 and has not been updated since (NMFS 2010). The 5-Year Status Review of sperm whales, also mandated under the ESA, was last updated in 2015 and is currently being updated since being initiated in 2021 (NMFS 2015, Department of Commerce 2021).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Unknown	Unknown			Choose an item.
Northeastern US	Yes	Unknown	Unknown		Endangered	Yes
New York	Yes	Unknown	Unknown		Endangered	Yes
Connecticut	Yes	N/A	N/A		Not listed	No
Massachusetts	Yes	Unknown	Unknown		Endangered	Yes
Rhode Island	Yes	Unknown	Unknown		Not listed	No
New Jersey	Yes	Unknown	Unknown		Not listed	No
Pennsylvania	No	Choose an item.	Choose an item.			Choose an item.

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
Vermont	No	Choose an item.	Choose an item.			Choose an item.
Ontario	No	Choose an item.	Choose an item.			Choose an item.
Quebec	Yes	Unknown	Unknown		Not listed	No

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):*

Sperm whales are difficult to study due to their far offshore habitat and lengthy submergence times. In addition, funding for monitoring, especially visual surveys, is extremely limited. 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, humpback, 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 sperm 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 2025). 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 data on other taxa including sei whales (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 records sightings of sperm whales. Sightings of sperm whales off the coast of New England are common and occur year-round, though typically include single individuals.

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 real-time monitoring buoys, and later gliders, to record the presence of large whales in the New York Bight. 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 whales. Currently, the data shared publicly is limited to four large whale species: sei, humpback, fin, and North Atlantic right whales (WHOI 2025).

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 and identify probable discreet periods of space and/or time that sperm whales are likely to be found. The NYS Whale Monitoring Program will conduct another three years of visual aerial surveys for a total of 18 surveys beginning in November 2024. 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 sperm whale strandings are rather rare, they do occur in New York and provide valuable data, making stranding response an essential component of monitoring.

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

It's estimated that the worldwide population of sperm whales was at about 32% of its pre-whaling level as of 1999 (Whitehead 2002). The rate of population increase was estimated to be 0.965% per year (Chiquet et al. 2013). However, this rate is sensitive to changes in survivorship especially of mature females, where a decline of just over 2% could lead to population decline (Chiquet et al. 2013). A more recent study estimated 11,185 sperm whales in the North Atlantic (Gunnlaugsson et al. 2009). However, there is no reliable estimate for sperm whale abundance in the western North Atlantic (NMFS 2015). Recently, Westell et al. (2022) used passive acoustic line transect data collected between June and August 2016 to estimate the abundance of foraging sperm whales in the Western North Atlantic from Virginia to the southern tip of Nova Scotia. The resulting estimated number of sperm whales was 2,199. Roberts et al. (2022) used density modeling to estimate coast-wide abundance of sperm whales. The mean abundance predicted was 6,147 sperm whales, with the highest abundance at the slope and past the slope in deep offshore waters. Temporally, the lowest abundance was estimated in February at 5,516 and the highest in September at 6,856. The current best estimate for sperm whale abundance in the U.S. Atlantic is 5,895, which comes from surveys conducted in 2021 (Hayes et al. 2024).

Sperm whales can be found across the entire North Atlantic, which the International Whaling Commission recognizes as one stock (NMFS 2010, Hayes et al. 2024). Lack of genetic differentiation and documented movements of male sperm whales across the ocean basin suggest that there is not distinct separation between the western and eastern North Atlantic populations (Reeves and Whitehead 1997, Dufault et al. 1999, Englehaupt et al. 2009). Examples of movements include a tag returned in 1973 from whalers in Spain to Nova Scotia, where the male sperm whale was tagged in 1966 (Mitchell 1975) and harpoon fragments from the Azores found in sperm whales killed off of Iceland, which indicates movement across the eastern North Atlantic as well (Martin 1982, Aguilar 1985).

The range of sperm whales in the western North Atlantic extends across the Scotian Shelf and into the Labrador Sea and Davis Strait (Reeves and Whitehead 1997). As such, sperm whales occurring off the U.S. East Coast are only a fraction of the total stock but it's also unclear how the sperm whales in the

U.S. are connected to others in the North Atlantic. Generally, study results tend to find low genetic differentiation among ocean basins and little evidence of subdivision within ocean basins, with the exception of some distinct geographic basins such as the Mediterranean Sea and Gulf of Mexico (Lyrholm and Gyllensten 1999, Lyrholm et al. 1999, Engelhaupt et al. 2009).

It's likely that the Gulf Stream plays an important role in sperm whale distribution due to the distinct seasonal cycle of presence in the U.S. (Mitchell 1972, CETAP 1982, Scott and Sadove 1997, Hayes et al. 2024). The overall distribution of sperm whales along the U.S. East Coast is centered along the shelf break and over the slope (CETAP 1982, Hayes et al. 2024). In winter, sperm whales are concentrated around Cape Hatteras, North Carolina (NMFS 2013, Stanistreet et al. 2018). In spring, the center of distribution shifts to the north, off of Virginia and Delaware, and is more widespread throughout the mid-Atlantic and the southern part of Georges Bank (Stanistreet et al. 2018, Roberts et al. 2022, Hayes et al. 2024). The Block Canyon area, in particular, appears to be part of a primary pathway for sperm whales in Southern New England pursuing migrating squid (CETAP 1982, Scott and Sadove 1997). During the summer months, movement and abundance increase, with distribution spreading even farther north onto Georges Bank, onto the continental shelf in Southern New England, and into the Northeast Channel (Roberts et al. 2022, Hayes et al. 2024). In fall, high numbers of sperm whales remain on the continental shelf south of New England and most presence is predicted along the continental shelf break in the mid-Atlantic (Roberts et al. 2022, Hayes et al. 2024).

Another factor influencing sperm whale distribution and migration patterns is social structure. The complex social dynamics exhibited by sperm whales ultimately determine their movements, where adult females - some related to each other and some not - travel with their calves and sub-adult offspring. Because these social groups are stable, there is evidence of site fidelity and latitudinal range limits for females, their calves, and juveniles (Whitehead 2002). Females rarely, if ever, migrate north of the southern boundary of the Canadian EEZ while adult males migrate to and from polar regions to feed and breed (Best 1979, Reeves and Whitehead 1997, Whitehead 2002, Engelhaupt et al. 2009).

Figure 1. Conservation status of sperm whale in North America (NatureServe 2024).

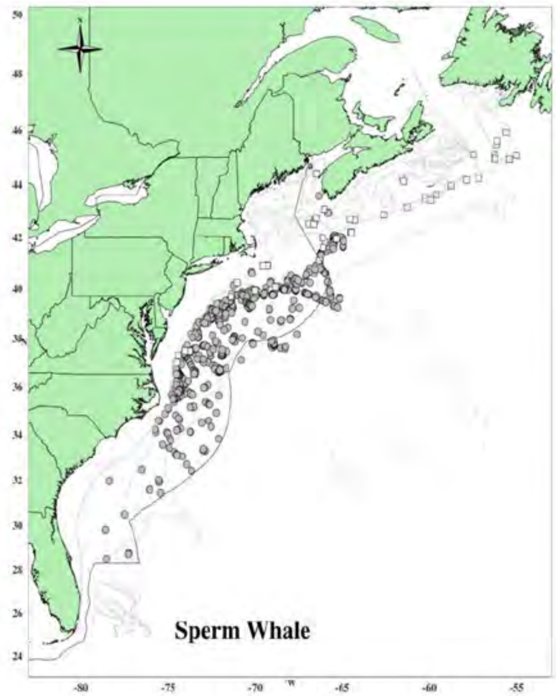

Figure 2. Distribution of sperm whale sightings from NEFSC and SEFSC shipboard and aerial surveys during the summer in 1998, 1999, 2002, 2004, 2006, 2011, 2016 and 2021 and Department of Fisheries and Oceans Canada 2007 TNASS and 2016 NAISS surveys. Isobaths are the 100m, 1,000m, and 4,000m depth contours. Circle symbols represent shipboard sightings and squares are aerial sightings (Hayes et al. 2024).

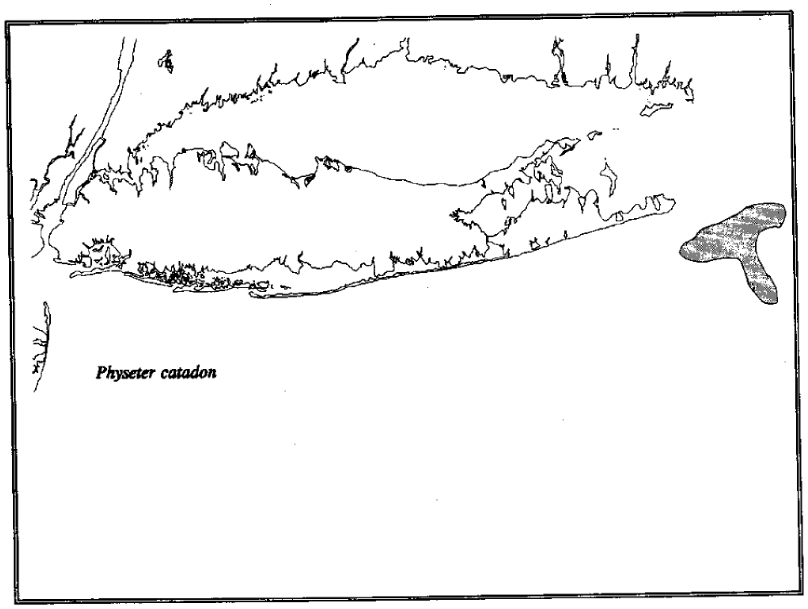

Figure 3. Sighting locations of sperm whales from the 1970s – early 1990s (Sadove and Cardinale 1993).

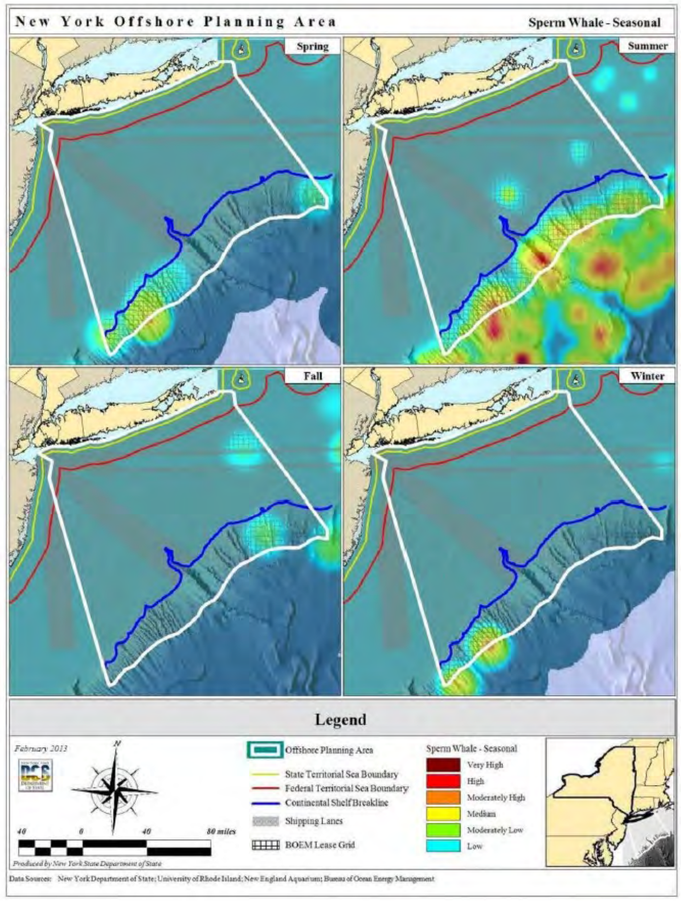

Figure 4. Sperm whale seasonal relative abundance (NYSDOS 2013).

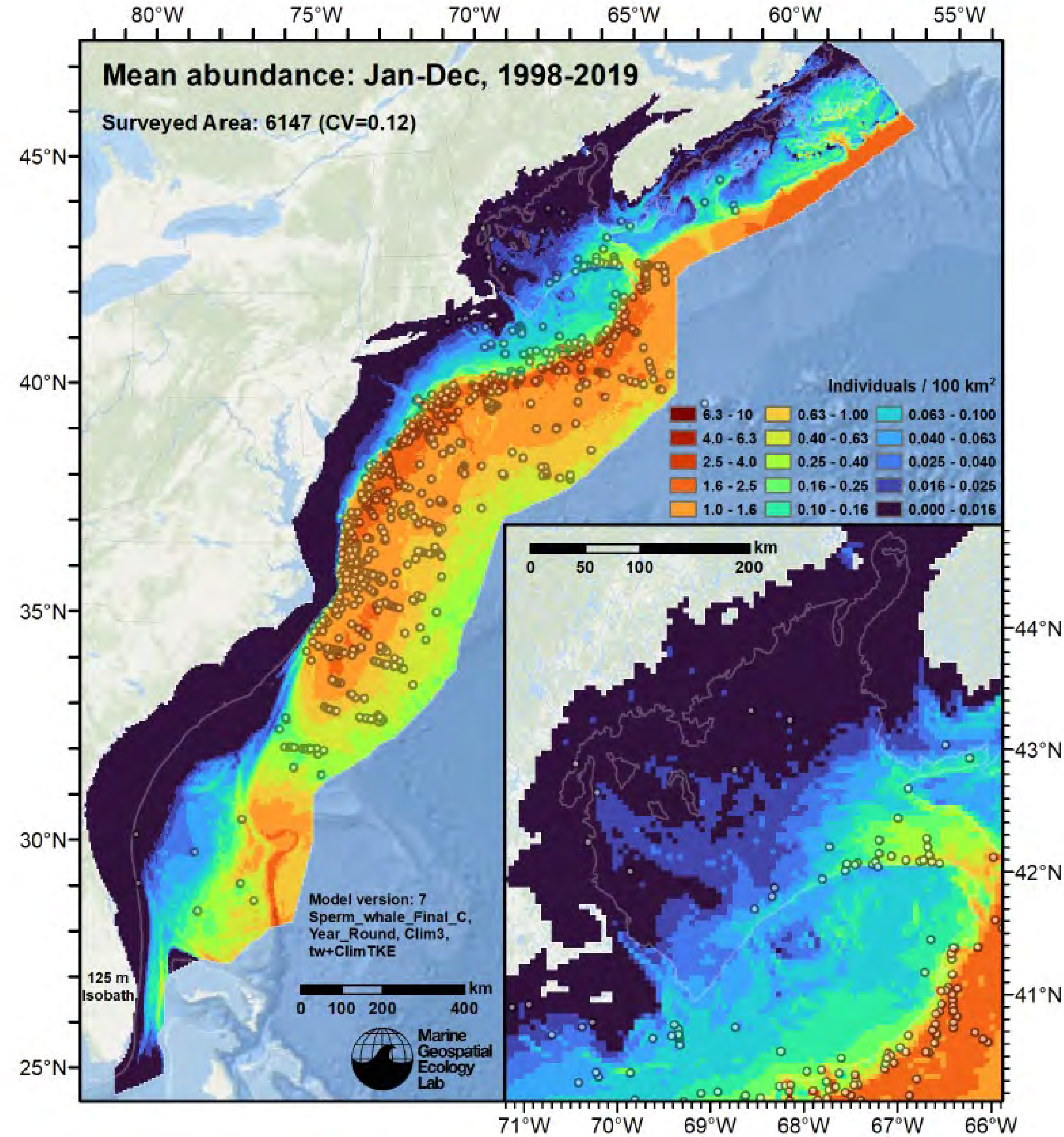

Figure 5. Sperm whale mean density, as predicted by the density model (Roberts et al. 2022).

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

Years	# of Records	# of Distinct Waterbodies/Locations	% of State
Pre-1995			
1995-2004			
2005-2014			
2015-2023			

Table 1: Records of sperm whale in New York.

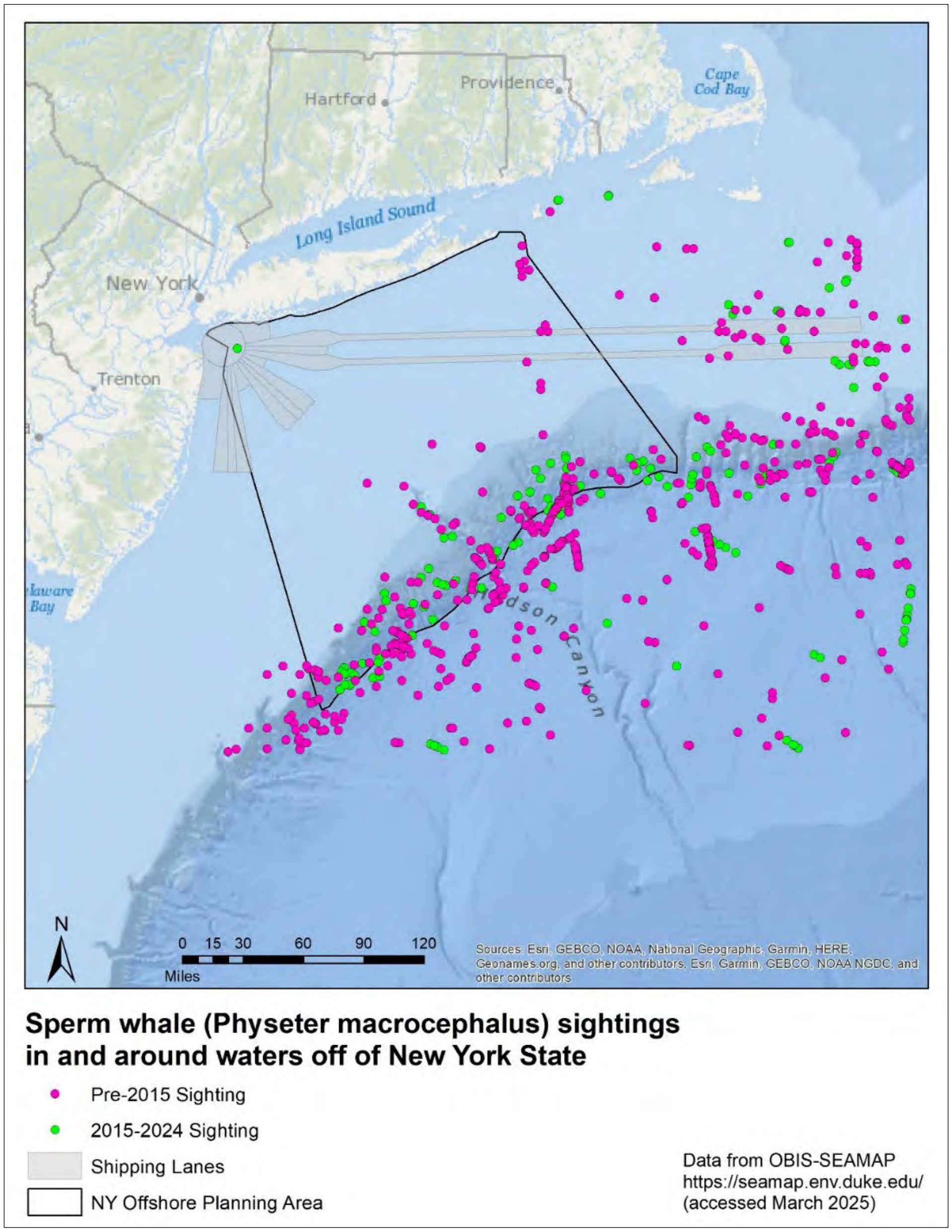

Figure 6: Records of sperm whales in New York. Data downloaded from OBIS-SEAMAP and mapped in ArcMap10.2.

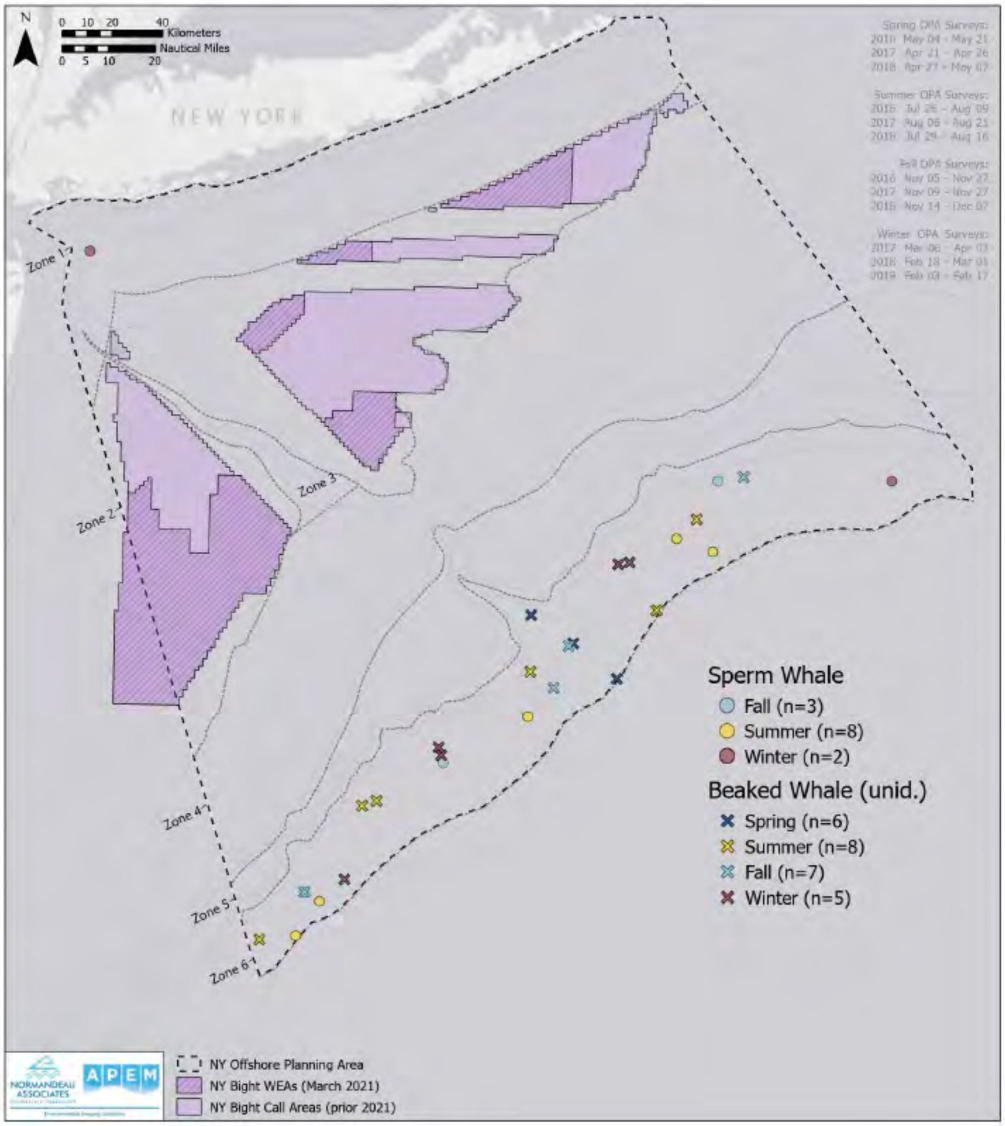

Figure 7. Spatial distribution of mid-frequency cetacean species with fewer than 30 occurrences across all surveys (NYSERDA 2021).

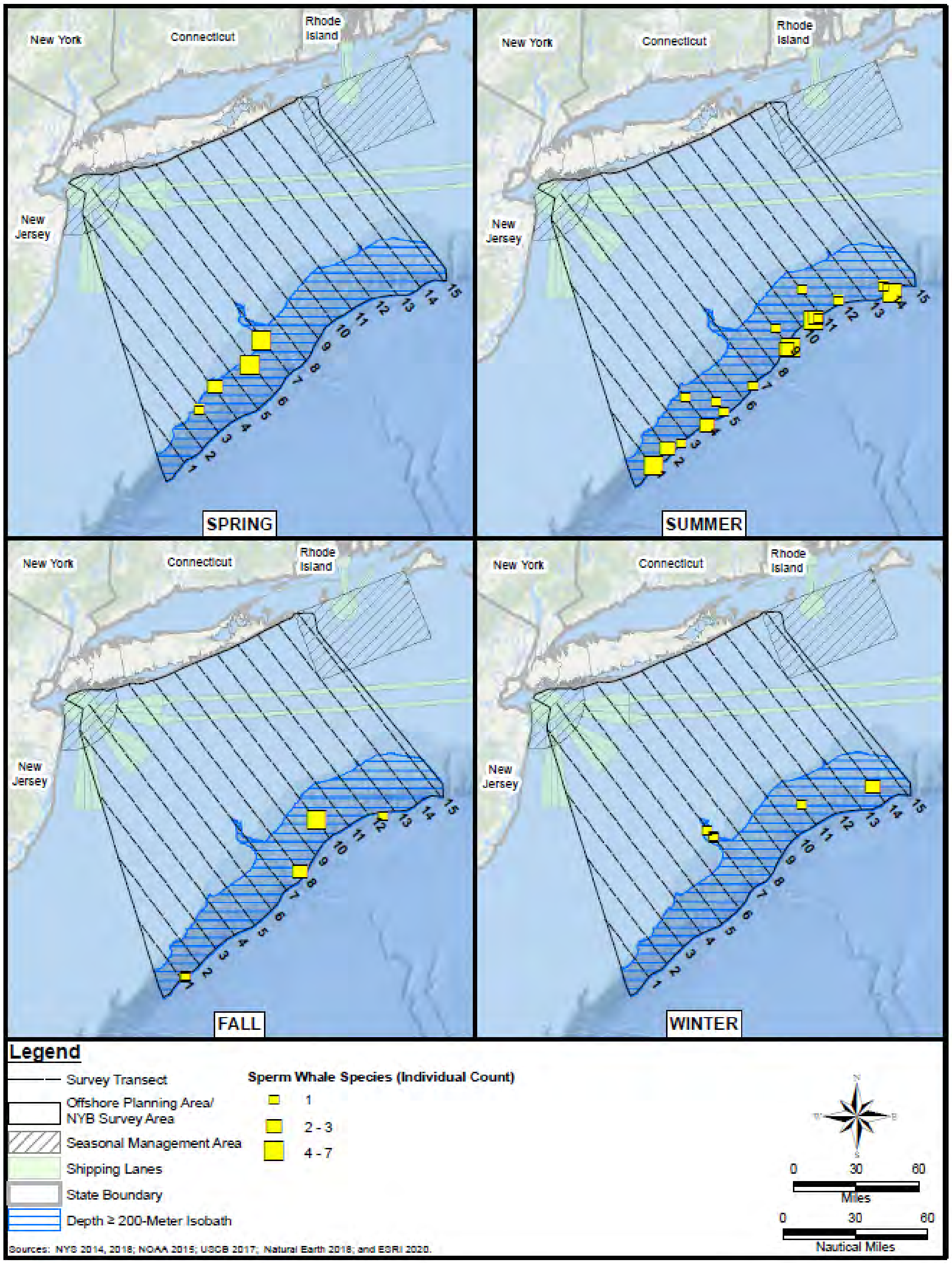

Figure 8. Locations of all sperm whale sightings by count and season, 2017-2020 (Tetra Tech and LGL 2020).

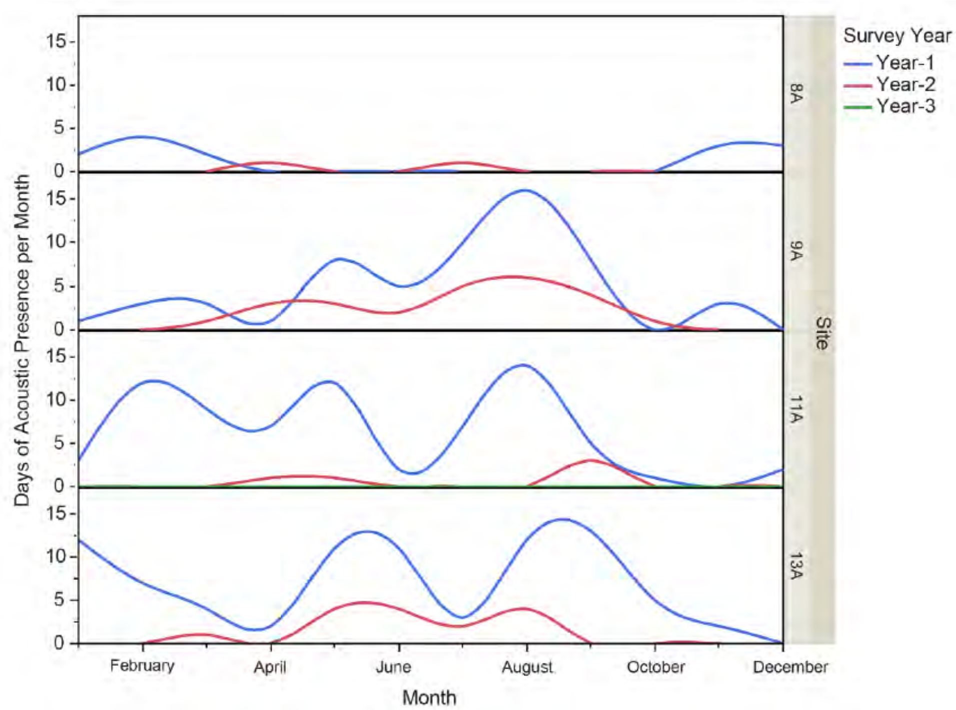

Figure 9. Sperm whale monthly presence across four passive acoustic monitoring sites (Site 8 just outside New York Harbo, extending southeast to Site 13 near the shelf break) in the New York Bight, 2017-2020 (Estabrook et al. 2021).

Details of historic and current occurrence:

During the early days of American whaling some sperm whales were killed in waters off Long Island but Murphy (1918) noted that generally, sperm whales avoided shallow waters and therefore did not get close enough to be sited from shore. Peak whaling years in Sag Harbor were the late 1830s to 1840s, followed by a rapid decline and eventual final whale hunt in 1871.

Connor (1971) claimed the oldest record of a sperm whale stranding in New York was a 12-meter whale captured in Fishers Island Sound in December 1894. A different stranding account stated that there was indeed an earlier stranding, a 4.8-meter sperm whale in East Hampton in March 1891. Additional historic stranding records in New York include a 39-foot female that stranded alive on Fire Island in February 1918 but died soon after (Murphy 1918, Connor 1971) and an 18-foot young male sperm whale that swam inside New York Harbor and into Upper New York Bay, where it was captured alive but subsequently died (Raven and Gregory 1933).

Townsend (1935) mapped favored whaling grounds, including one southeast of Long Island known as the “Southern Ground”; the western edge aligned with the continental shelf off New York. Influenced by the Gulf Stream, sperm whales were killed on this whaling ground from May to September, and the whales found closest to Long Island were present May through July.

Despite the period of lucrative whaling just offshore, Connor (1971) reported that sperm whales are “very rare near the shores of Long Island” and are “uncommon offshore”. If this was the case in the 1970s, it did not last long. Beginning in the late 1970s and continuing well into the 1990s, a local group collected cetacean sightings mostly during whale watch cruises (Scott and Sadove 1997, Sadove and Cardinale 1993). From 1981 to 1995, sperm whales were documented in 8 of the 14 years in shallow coastal waters off Long Island (Scott and Sadove 1997). Sightings were made in an average water depth of 55 meters during late spring and early summer months (e.g., May through July) on nearly 30 separate occasions. Sightings included either single animals or groups of up to 7 individuals. No calves were recorded but both sexes and all other age classes were seen, and the longest continuous sighting period was seven weeks. Scott and Sadove (1997) noted that the "whales do not appear to be transient visitors but take up a short-term residence". Sightings were within a bathymetric depression "marking the channel between Block Island Sound and Block Canyon". Scott and Sadove (1997) speculated. Most of these whales were sighted in a seafloor depression marking a channel between Block Island Sound and Block Canyon (Scott and Sadove 1997). Scott and Sadove (1997) speculated that the channel is used to follow prey (e.g., spawning squid) inshore during late spring and early summer and sperm whales, therefore, take up a short-term residence (whales were usually sighted for a duration of one to four weeks) before migrating farther east as summer progressed. (Scott and Sadove 1997) typically not reported off LI after July, and CETAP saw August through November in southern NE.

Southern New England is one of the rare locations in the world where sperm whales occur frequently well inshore of the shelf break (CETAP 1982, Scott and Sadove 1997). Sightings on the shelf in waters shallower than 200 m have occurred in all four seasons, many of them aggregated in the relatively narrow channel off Montauk Point. Notable sightings recorded in this location are: a multi-species feeding aggregation in July 1983 including one sperm whale, six fin whales, one humpback whale, and two minke whales feeding on sand lance; three mature male sperm whales in May 1997, which were resighted for another three weeks, and a separate May 1997 sighting of multiple adults with squid at the surface; and a September 1994 sighting in which two of the four whales were breaching, an uncommon behavior.

CETAP surveys were conducted from 1979 through 1981, from Cape Hatteras, North Carolina to Nova Scotia, Canada. In total the program recorded 341 sightings of 1,034 individual sperm whales (CETAP 1982). The number of individuals per sighting ranged from 1 to 100 with an average of 3. Sperm whale distribution was centered at the 1,000-meter depth contour but extended seaward of the 2,000-meter contour, confirming that sperm whale habitat extends well beyond the shelf edge and into mid-ocean areas. CETAP surveys also documented shoreward presence related to squid in southern New England, which was most common from August to November, and occurred in areas as shallow as 60 meters. Many sightings included calves and juveniles, which were most common off New York in summer. Abundance estimates specific to the New York Bight were 27 individuals in spring, 63 in summer, 17 in fall, and zero in winter (CETAP 1982). It's important to note that these were not systematic surveys (Scott and Sadove 1997). Some sightings were recorded in September and October, but since the whale watch was not operational in the fall and winter, it is unknown whether the few additional fall sightings represented a seasonal return to New York waters or were random, chance sightings (Scott and Sadove 1997). Though these were opportunistic sightings, 17 individual sperm whales were identified in this inshore New York area, which produced an estimate of 102 animals.

Based on data collected since the 1990s, sperm whale presence in New York appears to have remained consistent. Towed arrays of acoustic devices have picked up extensive vocalizations of sperm whales at the shelf break and into the plain (PACM). There is a steady presence throughout the year though numbers are slightly higher in summer and fall then decrease into spring (PACM).

During the 2017-2020 DEC Whale Monitoring Program, aerial surveys recorded 72 individuals in 32 sightings (Zoidis et al. 2021). The sightings occurred during all survey years and all calendar months except May and November. The sighting rate was highest in summer followed by spring, fall, then winter. Group size ranged from 1 to 7 individuals and four calves were seen. There were 18 single-animal sightings, five pairs (including mother-calf pairs), and nine groups of 3+ individuals (including mother-calf pairs). Newly described observations for the NYB are rosette formation, phalanx (shoulder to shoulder) formation, and nursing (Zoidis et al. 2023), as well as a record of socio-sexual behavior in which mating can't be ruled out (Rickard et al. 2022).

The 2017-2020 DEC Whale Monitoring Program passive acoustic monitoring (PAM) effort was also successful in detecting sperm whales (Estabrook et al. 2021). While sampling effort for sperm whales was inconsistent due to limited capability (4 of 14 receivers were able to detect sperm whales) and receiver malfunction (no data collected during the third survey year). During the first year, sperm whales occurred mostly between January and September 2018, with a mean percent calendar-day presence of 58%. Sperm whales were not detected during November 2018 – February 2019. During the second year, sperm whales were detected between May and September 2019, with a mean percent calendar-day presence of 25%. Both years showed lower presence of sperm whales during fall months. Sperm whales were detected at all four receiver locations, with highest presence near the shelf edge. Interestingly, sperm whale presence was recorded at the receiver location just outside of New York Harbor. Per historic documentation, it's not unheard of for sperm whales to travel inshore towards the harbor hunting squid. Importantly, sperm whale presence in this area was also visually documented during the NYSERDA digital aerial surveys. In total the NYSERDA survey documented 13 sperm whale sightings, most in the summer and some in fall and winter. Generally sperm whale records in New York indicate presence concentrated at the shelf edge through all seasons (Johnson et al. 2021).

Marine mammal stranding records are submitted to and managed by the National Oceanic and Atmospheric Administration (NOAA) in the NOAA National Stranding Database, which dates back to 1991 (NMFS 2025b). According to the Database, sperm whales have stranded in New York 10 times with dates ranging from 1999 to 2022. Four of the 10 strandings happened since 2015. There are a number of stranding records that pre-date the national database, as previously noted. The most publicized sperm whale stranding in New York happened in April 1981 when a live juvenile male stranded at Coney Island, was pushed back into the water, and re-stranded at Oak Beach the next day. The whale was nicknamed "Physty" and was towed to an area where he was diagnosed with and treated for pneumonia by divers that fed him squid containing antiobiotics. Less than 10 days later, the whale was herded back into the Atlantic Ocean by small boat.

The Ocean Biogeographic Information System (OBIS) Spatial Ecological Analysis of Megavertebrate Populations (SEAMAP), or OBIS-SEAMAP, is an online database for marine mammals contributed to from research worldwide (Halpin et al. 2009). There are 186 records included for sperm whales in the Offshore Planning Area developed by NYS Dept. of State, from the 1970s through 2021, 52 of which are from the past 10 years. Additionally, sperm whales are tagged annually off the coast of Virginia during vessel-based surveys (Engelhaupt 2018, 2019, 2020, 2023). Sperm whales were only recorded in waters deeper than 1,000 meters and tagged individuals traveled mostly in waters deeper than 1,000 meters as well, though tagged animals traveled in all directions (north to Georges Bank, offshore to the Gulf Stream, and south to Blakes Plateau). Available tag data to date shows a maximum dive depth of 2,127 meters and maximum dive duration of 70 minutes (Engelhaupt 2019).

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

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

a. Pelagic

b. Marine, Deep Subtidal

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
Yes	Yes	Unknown	

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:

Almost all marine waters deeper than 1,000 meters and not covered by ice are sperm whale habitat (Rice 1989, Whitehead 2003). Sperm whale distribution on the U.S. East Coast centers around the continental shelf edge, approximately the 1,000-meter depth contour, and farther into open ocean (CETAP 1982, Waring et al. 2001). Deep waters in the mid-Atlantic Bight are an area of sperm whale concentration year-round (CETAP 1982). They often show a strong preference for areas of high sea floor relief, like seamounts and underwater canyons (Rice 1989, Waring et al. 2001). Sperm whales are also often associated with the Gulf Stream edge and warm-core eddies (Waring et al. 1993, 2001). For example, the seamount chain off New England is an important spring foraging area for sperm whales. The Gulf Stream meanders and eddies around the seamounts providing rich productivity, including high abundance of cephalopods, which is a primary food source for the sperm whale (Wong and Whitehead 2014).

Distribution seems to be driven primarily by suitability of the area for breeding and the availability of prey. Sperm whale diet consists of sharks, skates, fishes and large squid (NMFS 2024). They are able to perform long, deep dives to access their prey. Dives can easily last 60 minutes and be to depths of more than 400 m (NMFS 2024). Several nearshore populations are well known but are associated with some deep bathymetric feature, such as New Zealand (Gordon et al. 1992), the Caribbean (Watkins et al. 1985), and the Azores (van der Linde and Eriksson 2020). Few sightings are documented in waters less than 200 meters deep however, particularly in the western North Atlantic, sperm whales, especially males, occur in shallower waters (Leatherwood et al. 1976). The continental shelf in southern New England supports the year-round feeding habits of sperm whales, especially in the fall (Gambell 1972, CETAP 1982, Scott and Sadove 1997). These seasonal movements onto the continental shelf, usually between late spring and autumn but most commonly from August to November, bring sperm whales into waters less than 100 meters deep (CETAP 1982, Whitehead et al. 1992, Whitehead and Kahn 1992, Scott and Sadove 1997).

Most sperm whales feed from 500 to 1000 meters below the surface and feed regularly throughout the year. Lockyer (1981) estimated that sperm whales consume about 3.0–3.5% of their body weight per day. They hunt with echolocation and on average diver over 2,000 feet for 54 minutes. Sperm whales eat primarily large, deep-water squid but their diet can be diverse and also include sharks, rays, fish, and octopus (Rice 1989). In some areas of the North Atlantic, males prey heavily on the oil-rich squid *Gonatus fabricii*. The diet of large males in some areas, especially in high northern latitudes, is dominated by fish (Rice 1989). Lumpsuckers (*Cyclopterus lumpus*), for example, are frequently consumed by sperm whales in the Denmark Strait (Martin and Clarke 1986).

In addition to localized feeding movement, sperm whales also exhibit long-distance migrations related to reproduction and social organization (CETAP 1982). No movement documented in the species affects all individuals; even in winter, sperm whales are present at low to moderate levels along the shelf edge in the mid-Atlantic and along the southern edge of Georges Bank (CETAP 1982). This is because males range farther north into cooler waters than females, who remain in temperate to tropical waters with calves and immature animals (NMFS 2010). Mature female and immature sperm whales of both sexes are found in more temperate and tropical waters from the equator to around 45°N throughout the year. These groups of adult females and immature sperm whales are rarely found at latitudes higher than 50°N and 50°S (Rice 1989, Reeves and Whitehead 1997). Sexually mature males join these groups throughout the winter. During the CETAP surveys, the average water temperature was 17.7 degrees Celsius, the warmest out of all the large whales, and 90% of sperm whale sightings were in water temperatures between 9.5 and 26 degrees Celsius (CETAP 1982).

Together, these studies indicate that sperm whales are present throughout the year, and that their distribution varies by season. Roberts et al. (2022) developed a single, year-round density model that incorporated survey data from 1998-2019 and provided monthly predictions. Significant covariates included: sea surface temperature (sperm whale density increased above 17 degrees Celsius), bottom salinity (density declined), bottom temperature (less sperm whales present if 18 degrees Celsius or greater), anticyclonic eddies (more whales predicted closer to these eddies), fronts (fewer animals predicted farther away), and the 1,500-meter isobath (fewer animals predicted farther away).

V. Species Demographics and Life History

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

Sperm whales are known to live for at least 60 years, with females potentially living up to 80 years (Rice 1989, Whitehead 2003). Sperm whale generation time has been calculated to be just over 27 years (Taylor et al. 2019). Sperm whales display extreme sexual dimorphism, with males nearing three times the mass of females. Photographs of distinctive markings on the dorsal fins and flukes of sperm whales are used in studies of life history and behavior (Whitehead 1990). Mean age at physical maturity is 45 years for males and 30 years for females (Best 1974, Best et al. 1984, Lockyer 1981, Rice 1989). Adult weight averages 57 metric tons for males and 24 metric tons for females (Rice 1989).

Female sperm whales reach sexual maturity at around 9 years of age (Rice 1989, Whitehead 2003). Sexual maturity among males is prolonged and occurs between the ages of 10 and 20, with an average of 19 years, though males are not active breeders until their late twenties (Best 1979). Length at sexual maturity averages 11 to 12.5 meters for males and 8.3 to 9.2 meters for females.

In the Northern Hemisphere, mating occurs from December to August with a peak breeding season from March to May during the spring migration north (Katona et al. 1978, Best et al. 1984). Gestation lasts over a year and is believed to range from 15 months to over a year and a half. Births typically occur in late summer to early fall, from July to November (Katona et al. 1978, NMFS 2010). Length at birth is about 4 meters. The calving interval is estimated to be about four to six years (Best *et al.* 1984). Inter-birth interval is generally 4-6 years, though females rarely become pregnant after the age of 40 (Best et al. 1984, Whitehead 2003).

Females nurse their offspring for at least two years (Katona et al. 1978, Best et al. 1984). Nursing females may change their vocalizations and separate from their social unit (Gero et al. 2013). However, alloparental care has been well documented in sperm whales, with many individuals from the social unit participating in caring for calves. Females may also feed calves that are not their own, a phenomenon called allonursing (Gero et al. 2009).

Sperm whales have a complex, multilevel society. Like other odontocetes, they are extremely social, living in permanent matrilineal groups (Whitehead 2003). The basic unit of sperm whale social organization is the mixed school, consisting of adult females of all ages (both related and unrelated), juvenile males, and calves (Best 1979, Christal et al. 1998). Mixed schools are predominantly female, 70% or more, and usually consist of 20 to 30 animals (Christal et al. 1998). Adult females in the school are closely related, and the calves and immatures of both sexes are their offspring. Mixed schools travel together, care for each other's offspring, and defend each other (Whitehead 1998, Christal et al. 1998, Pitman et al. 2001, Gero et al. 2008, Ortega-Ortiz et al. 2012). There is evidence that these bonds persist for many years, and most females remain within their social unit their entire life (Christal et al. 1998). These stable social units generally stay within temperate and tropical waters, and home ranges extend approximately 2,200 km in any direction (Whitehead et al. 2008). in the North Atlantic, sperm whales tend to aggregate in smaller groups and exhibit higher calving rates than other oceans (likely due, in part, to the lack of predation pressure by killer whales; Whitehead et al. 2012).

Other social units (i.e., nursery schools, harem or mixed schools, juvenile schools, bachelor schools, bull schools or pairs, and solitary bulls) have also been identified (Best 1979, Whitehead et al. 1991, Christal et al. 1998). Genetic studies suggest that groups of female and immature sperm whales generally contain more than one matriline (Mesnick 2001). These social units may join other groups, and multiple groups may then comprise a clan, though clans are unlikely to occur in the North Atlantic Ocean (Whitehead et al. 2012). Males typically leave their mothers around age 10 to move to colder waters and form bachelor groups, then are usually solitary once they reach prime breeding age (Christal and Whitehead 2001, Whitehead 2003). This bonding even among males is seen in the mass strandings of males, and juvenile males in the Mediterranean Sea form long-term relationships (Pace et al. 2014).

During their prime breeding period, male sperm whales are essentially solitary; they head south in the winter from near-polar waters and move among and between mixed schools (Christal and Whitehead 2001, Whitehead 2003). A male's association with a female group can be as short as a few hours due to the tendency for females to enter estrus synchronously (Best and Butterworth 1980). New research shows that adult males initiate migration for breeding at any time of year, suggesting there is not actually a specific breeding season. Satellite tag data from this study also showed an average travel time of 40 days to reach breeding areas, an average of 76 days spent roaming in lower latitudes, and an average round trip of 180 days (Lydersen et al. 2025).

Hearing and acoustics, specifically for communication and hunting, are essential to a sperm whale. The sperm whale's disproportionately large head is an evolutionary adaptation and evidence of the importance of different vocalizations and sound to their survival (Clarke 1979, Cranford 1992). Southall et al. (2007) categorized sperm whales as mid-frequency cetaceans, the same hearing groups as dolphins, beaked whales, and bottlenose whales. Most sperm whale clicks are 2-4 kHz and 10-16 kHz (NMFS 2010).

Sperm whales produce four different types of sound: codas, usual clicks, creaks, and slow clicks (Weilgart and Whitehead 1988). Codas are distinctive, short, patterned series of clicks are associated with social behavior (Weilgart and Whitehead 1993). They are shared among individuals of a social unit and are considered to be primarily for intra-group communication to reinforce social bonds (Weilgart and Whitehead 1997, Schulz et al. 2008). When socializing, sperm whales repeat codas, which have a specific rhythm and last for hours (Watkins and Schevill 1975). Certain acoustic features of codas may be unique to individual sperm whales within a social unit, allowing for distinction among members (Antunes et al. 2011). Schulz et al. (2011) found that mother/calf pairs had different vocalizations from other group members; adult females were able to switch from the social unit coda to a distinctive vocalization to locate and suckle their calf during lactation, suggesting that adults with calves rely on unique calls to locate each other and maintain the social bond. Further studies suggest that distinct coda dialects are culturally transmitted (Rendell et al. 2012, Whitehead et al. 2012). Usual clicks are separated by one second or less and used when sperm whales are diving (Whitehead and Weilgart 1991). These clicks can be used for feeding, contact calls, and orientation during dives. Creaks, on the other hand, are very rapid and used when a sperm whale narrows in on prey. It's believed sperm whales adapted this particular vocalization to capture prey (Miller et al. 2004). Slow clicks are separated by five seconds or more and are believed to be made only by adult males in the context of mating (Mullins et al. 1988).

Natural Mortality

Both predation and disease are components of natural mortality in sperm whales. Little is known about the full impact disease has on sperm whale populations (Lambertsen 1997, NMFS 2010). Lambertsen (1997) identified two potentially lethal diseases in sperm whales: myocardial infarction and gastric ulceration as a result of nematode infection. Bones lesions have also been observed in sperm whales, which Moore and Early (2005) hypothesized could be caused by the formation of nitrogen bubbles after deep dives and ascents. The bone necrosis appeared to be cumulative, with the bone damage increasing in severity as the size of the whale increased (Moore and Early 2005). A live-stranded sperm whale in Belgium tested positive for a pathogen known to cause sepsis, which produces disorientation and impaired echolocation and likely caused the whale to strand (Cools et al. 2013). It's unknown if parasitism can affect sperm whales on a population level; though parasites may have no impact on healthy animals, effects could become significant if combined with other stressors (NMFS 2015).

There have been several accounts of killer whales harassing and/or attacking sperm whales and these attacks have resulted in death, though the risk is believed to be low (Pitman and Chivers 1998, Pitman et al. 2001). All of the existing published records of attacks on sperm whales by killer whales are from either the Pacific or Southern Oceans. Surprisingly, there is a record of a group of killer whales killing a seemingly healthy adult female sperm whale off the coast of California (Pitman and Chivers 1998).

Sperm whale calves in particular are vulnerable to predation by killer whales and likely large sharks (Arnbom et al. 1987, Best et al. 1984). Sperm whale remains have been found in the stomachs of sharks but were most likely from carcasses rather than live animals (Rice 1989). Sperm whales are also harassed by pilot whales (*Globicephala spp.*) and false killer whales (*Pseudorca crassidens*), but most "attacks" by these species do not kill sperm whales (Palacios and Mate 1996, Weller et al. 1996, Fernandez et al. 2022). Male sperm whales also fight among each other (Best 1979, NMFS 2010).

Mass strandings may also be a source of natural mortality for sperm whales because the cause(s) of these stranding events are relatively unknown (Rice 1989, NMFS 2010, NMFS 2015). Evidence from mass strandings in different oceanic regions has pointed to a number of potential causes, including lunar cycles, solar cycles, wind patterns, topography, geomagnetic field changes, changes in water temperature or prey distribution, and pollution (Wright 2005, Vanselow et al. 2009, Evans et al. 2005, Vanselow and Ricklefs 2005).

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

Whaling

Despite the international moratorium on whaling, from 1986 through 2013, IWC member states, under reservation or objection, reported harvesting 388 sperm whales (NMFS 2015). While there is currently no evidence of any country targeting sperm whales for direct harvest, the residual effects of whaling continue to affect present-day populations. Removals of large numbers of males may have had lingering effects on pregnancy rates in some subpopulations (Best 1979, Whitehead et al. 1997) and large males are noticeably uncommon on some breeding grounds (Whitehead 2003). For example, the Nova Scotian sperm whale fishery's catch between 1966 and 1972 was 98% males (Sutcliffe and Brodie 1977). The importance of females in sperm whale societies and survival cannot be understated (Whitehead et al. 1997, Best 1979, Best et al. 1984). The removal of large numbers of females from social groups, and older females in particular, is most likely disruptive to sperm whale populations. Furthermore, recovery might be inhibited via temporary or permanent loss of social cohesion and of socio-ecological knowledge such as is known to occur in other large-brained, long-lived social mammals such as elephants. For example, Reeves et al. (2011) estimated that 1,179 sperm whales were caught during whaling in the Gulf of Mexico between the 1780s–1870s, most of which were juveniles and females.

Vessel Strikes

Two of the best-known anthropogenic threats to large whale populations include vessel strikes and entanglement in fishing gear. Both of these threats are believed to be more of a problem than observational studies suggest, as many events are most likely not reported and affected whales may die offshore and never be seen (Heyning and Lewis 1990). Williams et al. (2011) estimated that the carcass recovery rate for sperm whales was, on average, only 3.4% of the actual mortalities. For example, during the AMAPPS spring 2023 aerial survey, observers sighted a dead sperm whale almost 200 miles offshore of Cape Hatteras.

Vessel strikes of cetaceans have increased over the years (Ritter 2012). Vessel strikes of sperm whales have been reported along the entire U.S. East Coast, from Florida to Maine (NMFS 2015). Jensen and Silber (2004) compiled information on reported ship strikes from 1975 – 2002 and found that sperm whales were involved in seventeen out of 292 records. In the Northwest Atlantic, from 1970-2009, there were six documented vessel strike mortalities on sperm whales, of 176 total mortalities observed (Van der Hoop et al. 2013).

Sperm whales spend relatively long periods of time at the surface between dives, which could make them more vulnerable to ship strikes (Jaquet et al. 1998, Whitehead 2003, NMFS 2010). Whitehead and Weilgart (1991) noted the surface time of sperm whales accounts for one quarter of their time and often includes social interactions that help maintain bonds. If time spent at the surface places sperm whales in close proximity to vessels, they could be vulnerable to ship strikes. In May 2000, a merchant ship reported a collision with a sperm whale in Block Canyon off Long Island (Waring et al. 2009). In the spring, Block Canyon is a major pathway for sperm whales entering southern New England continental shelf waters chasing squid, which is perhaps another behavior that makes them vulnerable to vessel strikes (CETAP 1982, Scott and Sadove 1997). Because of their offshore distribution, it is likely that sperm whales are struck by vessels more often than reported, however, ship strikes are believed to have a relatively low effect on sperm whale populations overall (NMFS 2010).

Recreational vessel activity, such as whale-watching, has been known to affect some species of cetaceans (NMFS 2010) In the waters off of New York and the East Coast, sperm whales are rarely sighted by whale-watching vessels, so this unlikely to be much of a threat.

Entanglements

Sperm whales do not appear to become entangled in fishing gear as often as several other species of large whales, though their offshore distribution has likely led to an underreporting of sperm whale entanglements (NMFS 2010). Sperm whale entanglements recorded off the U.S. East Coast occurred in the pelagic gillnet fishery which was closed in 1997 and drift gillnets were banned shortly after in 1999 (NMFS 2013). Currently, sperm whales have not been documented as bycatch in U.S. Atlantic commercial fisheries, though abandoned “ghost gear” may still pose a threat (NMFS 2013).

Sperm whales can break through or carry away fishing gear once they become entangled, even when injured (NMFS 2010). Whales that experience entanglements, whether actively entangled or not, can become debilitated and seriously injured, and some die (Moore and Van der Hoop 2012). Even if entangled whales do not die from the entanglements, they could suffer from reduced survival and fecundity, as have been documented in North Atlantic right whales (Knowlton and Kraus 2001). Scott and Sadove (1997) reported that one of the adult sperm whales sighted off Montauk had net entanglement scars on its head, allowing them to identify its return over a period of time. This was likely a product of the drift gillnet fishery that was still active at the time of observation. During the 2017-2020 DEC aerial surveys, observers documented an entangled sperm whale in what appeared to be a fishing trap close to the shelf break. This is likely the only record of an entangled sperm whale in New York (Zoidis et al. 2023).

Farther north, depredating sperm whales targeting the halibut and cod fisheries have been recorded off Norway, Greenland, and Canada (Mesnick et al. 2006). Off Alaska, depredation by sperm whales is very common. One sperm whale was taken by the Canadian halibut longline fishery in 2009 and another in 2010 (NMFS 2015). Karpouzli and Leaper (2004) documented interactions between sperm whales and trawlers in the Greenland halibut fishery and one case of entanglement in the trawl was reported.

Climate Change

Climate change has already led to temperature and current shifts throughout the North Atlantic, especially in the Gulf of Maine (Pershing et al. 2021). Poleward and increasing depth shifts in cetacean species have been documented (MacLeod 2009, Sousa et al. 2019). Chavez-Rosales et al. (2022) documented an overall 178 km northeastward spatial distribution shift of the seasonal core habitat of Northwest Atlantic cetaceans that was related to changing habitat and climatic factors. In the study, the weighted centroid of sperm whale core habitat moved farthest during fall (255 km towards the northeast) and least during winter (71 km).

The potential impacts of climate and oceanographic change on sperm whales will likely affect habitat availability and food availability. Site selection for whale migration, feeding, and breeding for sperm whales, may be influenced by factors such as ocean currents and water temperature (NMFS 2010). Any changes in these factors could lower habitat quality with possible long-term impacts to sperm whales or render currently used habitat areas unsuitable. These changes could lead to shifts in distribution of sperm whales as occupied habitats may become unsuitable and previously unsuitable habitats may become occupied. From a management perspective, it's extremely problematic when endangered species shift their distribution into previously unutilized habitat because there are no existing mitigation measures to protect those animals from threats. Likewise, a novel threat introduced to existing habitat without appropriate mitigation measures will also become problematic. For example, since sperm whale distribution extends into the high latitudes, melting Arctic ice will lead to newly open areas of ocean where vessels and anthropogenic noise will likely be introduced for the first time (Alter et al. 2010).

Squid, being the primary prey of sperm whales, may be negatively impacted by rising ocean temperatures and subsequently may strongly affect the size and distribution of sperm whale populations (NMFS 2010). There is some evidence from Pacific equatorial waters that sperm whale feeding success and, in turn, calf production rates are negatively affected by increases in sea surface temperature (Smith and Whitehead 1993, Whitehead 1997). This could mean that global climate change will reduce the productivity of at least some sperm whale populations (Whitehead 1997). In addition, sperm whale strandings have been associated with higher temperatures, possibly due to prey moving further inshore, which may become more frequent as sea temperatures rise (Pierce et al. 2007). However, the sperm whale's immense feeding range may provide some resilience to prey impacts due to climate change (MacLeod 2009). The degree of impact from climate change on sperm whales remains uncertain, so the effects of climate change on both sperm whales and their prey need to be researched further.

Offshore Energy Development

The effects of other anthropogenic activities, such as offshore energy development and oil spills, are also largely unknown. Sperm whales are at 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). Baleen whales were determined to be at the highest risk of entanglement, but sperm whales also had a relatively moderate to high risk based largely on their size and foraging habits (Benjamins et. al. 2014). Oil spills that occur while sperm whales are present could result in skin irritation, ingestion of oil, respiratory distress, contaminated prey, and displacement from feeding areas (Geraci 1990). Long term ingestion of pollutants, including oil residues, could affect reproductive success, but data is lacking to determine how oil may fit into this scheme for sperm whales. The dispersants used in the Deepwater Horizon oil spill clean-up in 2010 were found to impair organ function in sperm whales (Wise et al 2014a). If the toxicity occurred during pregnancy, mortality or developmental abnormalities in offspring would increase. In addition when testing nickel and chromium levels in Gulf of Mexico sperm whales following the oil spill, levels were higher than the global mean (Wise et al. 2014b)

Contaminants/Toxins

Another source of anthropogenic threat and mortality is pollution in the form of heavy metals and other contaminants such as polychlorobiphenyls (PCBs), chlorinated pesticides (DDT, etc.), and polycyclic aromatic hydrocarbons (PAHs). Metals and other stable pollutants are ubiquitous in the marine ecosystem) and their accumulation in long-lived, high-trophic level animals such as sperm whales is of concern for reproduction and overall health (Hall et al. 2018, Murphy et al. 2018, Wise et al 2011a, Wise et al. 2011b). Research is ongoing to determine the level of bioaccumulation of various stable pollutants and their health effects (Savery et al. 2013a, Savery et al. 2013b, Savery et al. 2014). Holsbeek et al. (1999) do suggest that the stable pollutants might affect the health or behavior of North Atlantic sperm whales. Sperm whale tissues have high levels of some contaminants (O'Shea 1999, Nielsen et al. 2000) so while no direct link between contaminant level and stranded sperm whales has been found (Jacques and Lambertsen 1997), the levels of mercury, cadmium and organochlorines have been high enough to be concerning (Bouquegneau et al. 1997, Law et al. 1997). Fossi et al. (2003) state that concentrations in the Mediterranean could influence reproductive rates of sperm whales. Following a stranding of multiple sperm whales in Italy, necropsies found high levels of contaminants including toxins categorized as immunosuppressors (Marsili et al 2014). The cause of death remains unknown but it’s suspected that the contaminant loads lowered the whales’ immune systems, making them more susceptible to disease.

Marine Debris

According to the United Nations Global Compact (2025), 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. Sperm whales feed primarily at the bottom of the ocean and use suction to ingest prey (Lambertson 1997, NMFS 2010). Previously it was assumed that marine species visually confuse marine debris for prey, but Merrill et al. (2024) found that the acoustic signature of plastic marine debris mimics the acoustic signatures of deep-sea prey items like squid and squid beaks. The long history of marine debris ingestion by deep-diving species confirms this information. In 1989, a necropsy on a sperm whale in the Mediterranean Sea revealed the cause of death to be stomach obstruction by plastic bags and sheets (Viale et al. 1992). Lambertsen (1990) reported that a sperm whale examined in Iceland was killed by an illness believed to be caused by ingested plastic obstructing the gut.

Many additional cases of marine debris ingested by sperm whales, sometimes directly causing the animal to die, have been documented. “Gastric rupture due to compacted debris” was the cause of death for one sperm whale that stranded in Spain and one of two sperm whales that stranded separately in California in 2008; the other California sperm whale starved to death due to “gastric impact” also caused by debris (Jacobsen 2010, De Stephanis et al. 2013). In 2016, necropsies were performed on 22 of 30 sperm whales that stranded over the course of a month in the North Sea (Unger et al. 2016). Nine of the 22 whales had significant amounts of marine debris in their upper digestive system and stomachs including netting, ropes, packaging material, and part of a car. While none of the debris was determined to be the cause of death, the significant risk associated with marine debris ingestion was clear (Unger et al. 2016). In 2018 in Indonesia a sperm whale stranded with 13 pounds of plastic in its stomach (BBC 2019). In 2019 in Scotland, 220 pounds of trash were removed from a dead sperm whale (CBS News 2019). Also in 2019, a dead, pregnant sperm whale was found in Italy with 50 pounds of plastic in its stomach (CNN 2019). In November 2022, a 46-foot sperm whale died just off Nova Scotia. The necropsy revealed 330 pounds of fishing gear, including ropes, nets, and gloves, in the whale’s stomach, which caused a blockage and lead to starvation (The Canadian Press 2022). In February 2023, a 56-foot sperm whale washed up in Hawaii and was also found to have a blockage from ingesting fishing traps, nets, and line, plastic bags, and other debris items (State of Hawaii 2023).

From 2017 through 2021, 10 strandings of sperm whales were recorded on the U.S. East Coast. Two of the strandings were documented as human interaction (HI) due to plastic ingestion, which was the cause of death in one of those cases (Hayes et al. 2024). Goold et al. (2002) investigated sperm whale strandings in the North Atlantic and found that strandings had been increasing at a rate “higher than would be expected from a simple increase in sperm whale population size alone”. They hypothesized that an increase in reporting occurred alongside increasing anthropogenic impacts, in particular pollution.

Anthropogenic Noise

One of the most significant anthropogenic threats to sperm whales is anthropogenic noise. Marine mammals rely on sound during all stages of life; they use sound to communicate, navigate, locate prey, and sense their environment. Sperm whales rely heavily on sound to both communicate (e.g., maintain social bonds) and to forage (e.g., echolocation) and increasing levels of anthropogenic noise in the ocean could hamper these abilities. Noise may seriously disrupt marine mammal communication, navigational ability, and social patterns, but noise is also 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 is usually categorized as causing either a temporary threshold shift (TTS) or a permanent threshold shift (PTS) (Southall et al. 2007, 2019). There are also short-term and long-term behavioral changes. Long-term changes include displacement from habitat, which may or may not be recolonized, sensitization (i.e., increased behavioral or physiological responsiveness over time) to noise that could exacerbate other effects, and habituation (i.e., decreased behavioral responsiveness over time) to chronic noise that could cause animals to remain close to noise sources (NMFS 2010). With the exception of displacement, long-term behavioral changes are subtle and therefore difficult to detect and quantify.

Short-term changes include stopping a behavior such as feeding, resting, or socializing. Changes in dive patterns and acoustic behavior of sperm whales in response to anthropogenic noise have been documented (Farmer et al. 2018, Isojunno et al. 2020, Stanistreet et al. 2022). An individual may also stop vocalizing altogether. For examples, some individuals stop vocalizing for brief periods when codas are being produced by other individuals, perhaps because they can hear better when not vocalizing themselves (Goold and Jones 1995). Sperm whales have been observed to frequently stop echolocating during noise from echosounders such as pingers and sonar (Watkins and Schevill 1975, Watkins et al. 1985).

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). Individuals 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. 2007, Parks et al. 2009). Interruption of normal vocalizing behavior could have significant energetic consequences, particularly if these shifts in vocalizing impact foraging efficiency.

For decades sperm whales have been exposed to the U.S. Navy's low-, mid-, and high-frequency active sonar systems. It's largely unknown how sperm whales respond and what the consequences of the exposure could be on the longevity and reproductive success of sperm whales (NMFS 2010). Sivle et al. (2012) and Miller et al. (2012) found that low-frequency active sonar (LFAS) caused the most behavior changes while mid-frequency active sonar (MFAS) had no affect. However, sperm whales exposed to sonar may react as if a threat is nearby and rapidly change their dive behavior, causing them to mismanage their nitrogen load and become physiologically impaired when gas bubbles form in the blood and tissue (e.g., decompression sickness, or "the bends") (Hooker et al. 2009, 2011).

Seismic surveys, often used for oil and gas exploration, may also have effects on sperm whale behavior. Sperm whales respond to seismic survey sounds in some instances yet tolerate them in other instances (Bowles et al. 1994,). Some studies have shown that sperm whales continue to call during seismic surveys, while other studies did not report any changes in sperm whale distribution or behavior (Mate et al. 1994, Davis et al. 1995, Johnson and Miller 2002, mMadsen et al. 2002, Stone 2003, Weir 2008). It is important to recognize the difficulty of measuring behavior in free-ranging whales. For example, Miller et al. (2009) found that eight sperm whales exposed to air gun arrays in the Gulf of Mexico did not exhibit avoidance reactions to the air guns, but the authors suggest the animals were affected at ranges beyond those currently regulated due to more subtle effects on their foraging behavior.

Responses of sperm whales to anthropogenic noises are highly variable, but do not appear to result in the death or injury of individual whales, or result in reductions in the fitness of individuals involved. However, the severity of the effects of different noise on sperm whales and the effectiveness of measures that mitigate any adverse effects remains largely unknown and the uncertainty of our knowledge is high (NMFS 2010). The cumulative effects of habitat degradation due to noise are difficult to define and almost impossible to evaluate. Additionally, there is a lack of information on how short-term behavioral responses to noise translate into long-term or population-level effects (NRC 2005).

Threat Level 1	Threat Level 2	Threat Level 3	Spatial Extent*	Severity*	Immediacy*	Trend	Certainty
3. Energy Production & Mining	3.1 Oil & Gas Drilling	Choose an item.	Restricted	Slight	Near-term	Choose an item.	Choose an item.
3. Energy Production & Mining	3.3 Renewable Energy	3.3.2 Wind farms	Restricted	Slight	Near-term	Choose an item.	Choose an item.
4. Transportation & Service Corridors	4.3 Shipping Lanes	4.3.1 Shipping	Large	Moderate	Immediate	Choose an item.	Choose an item.
5. Biological Resource Use	5.4 Fishing & Harvesting Aquatic Resources	5.4.2 Commercial fishing	Large	Slight	Immediate	Choose an item.	Choose an item.
6. Human Intrusions & Disturbance	6.1 Recreational Activities	Choose an item.	Restricted	Slight	Immediate	Choose an item.	Choose an item.
6. Human Intrusions & Disturbance	6.2 War, Civil Unrest & Military Exercises	6.2.3 Military exercises	Large	Slight	Immediate	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.2 Problematic Native Plants & Animals	Choose an item.	Small	Slight	Immediate	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.4 Pathogens	Choose an item.	Large	Slight	Immediate	Choose an item.	Choose an item.
9. Pollution	9.2 Industrial & Military Effluents	Choose an item.	Large	Slight	Near-term	Choose an item.	Choose an item.
9. Pollution	9.4 Garbage & Solid Waste	Choose an item.	Pervasive	Moderate	Immediate	Choose an item.	Choose an item.
9. Pollution	9.6 Excess Energy	9.6.3 Noise pollution	Pervasive	Moderate	Immediate	Choose an item.	Choose an item.
11. Climate Change	11.1 Habitat Shifting & Alteration	Choose an item.	Pervasive	Moderate	Near-term	Choose an item.	Choose an item.
11. Climate Change	11.3 Changes in Temperature Regimes	Choose an item.	Pervasive	Moderate	Near-term		

Table 2: Threats to sperm whale.

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

Yes: _X__ **No:** _____ **Unknown:** _____

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

The sperm whale is protected in the United States by its status as a federally endangered species. In addition, the sperm whale (along with all other marine mammals) receives federal protection under the Marine Mammal Protection Act of 1972 (MMPA). The sperm whale is protected internationally from commercial hunting under the International Whaling Commission's (IWC) global moratorium on whaling. The moratorium was introduced in 1986, and is voted on by member countries (including the United States) at the IWC's annual meeting.

Sperm whales are also protected under the Environmental Conservation Law (ECL) of New York. The sperm 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 of these help to protect the habitat of the sperm whale. Whether they are adequate to protect the habitat is currently unknown. Unfortunately, we have limited understanding of where sperm whales occur in New York, so it is impossible to assess whether the habitat protection afforded by these acts are effective.

The majority of documented sperm whale entanglements occurred in gear used by the pelagic gillnet fishery (NMFS 2013). This fishery was closed in 1997, and drift gillnets were banned in 1999 (NMFS 2013). The North Atlantic Large Whale Take Reduction Plan identified floating groundline used in the trap and pot fisheries as an entanglement threat for large whales. The National Marine Fisheries Service 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's Marine Endangered Species and Crustacean Unit 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. Further analysis is required before it is known if any real reduction in large whale entanglement has occurred as a result of the switch from floating to sinking groundline.

More could be done to protect all large whales in the New York Bight from ship strike. Particularly around the shipping lanes.

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

The extent of sperm whale use of New York waters is poorly understood. What information is available comes from surveys done in the 1970s – early 1990s, though surveys by NMFS show generally the same pattern of distribution. However, these surveys are only carried out at certain times a year so they do not give a complete picture. Long-term surveys and monitoring strategies should be developed. Historically, vessel and aerial survey techniques have been used. Passive acoustics also has promise as a monitoring technique. Sperm whales can be especially difficult to spot during aerial and ship board surveys, as they frequently dive for long periods of time (40+ minutes), so passive acoustics may be needed (NOAA., Fisheries 2010).

If it is known where and when sperm whales are occurring in New York waters, more effective management and conservation strategies can be deployed. Seasonal speed restrictions on vessels in high use areas could be put into effect. In addition, seasonal and/or area closures on certain fisheries where the gear poses the largest threat to large whales may help minimize entanglement in gear.

Near real-time acoustic monitoring of large whales, specifically right whales, is currently being used off of the coast of Massachusetts in an effort to reduce vessel collisions with large whales. 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. Similar monitoring in New York could help reduce the threat of vessel collisions with large whales in coastal waters. Even if a speed restriction only goes into place for the critically endangered right whale, knowledge that there are large whales in the area could lead to increased awareness and alertness and possibly reduce the potential of a collision.

The sperm whale would benefit greatly from further research. Little is known about general life history and demography of this species in New York, and the real effects of the threats in state waters are largely unknown. Further research into the actual effects that threats such as climate change are having on sperm whales is warranted. In addition, education on this species and the importance of reporting ship strikes and entanglements is encouraged.

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.2 Direct Species Management	A.2.1.5.0 Prevent mortality or injury from humans	Implement seasonal sped restrictions on vessels in high us areas
C.8 Research and Monitoring	C.8.1.1.0 Field Research	Conduct research on general life history/demography of sei whale in NY.
C.8 Research and Monitoring	C.8.1.5.7 Designing and developing inventory or monitoring protocols	Develop near real-time acoustic monitoring system to alert shipping vessels
Choose an item.		
Choose an item.		

Table 3: (need recommended conservation actions for sperm whale).

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