



Northeast Fisheries Science Center Technical Memorandum 449

# HUMPBACK WHALE (*Megaptera novaeangliae*): Gulf of Maine Stock

July 2026



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## Editorial Notes

**Information Quality Act Compliance:** In accordance with section 515 of Public Law 106-554, the Northeast Fisheries Science Center (NEFSC) completed both technical and policy reviews for this report. These pre-dissemination reviews are on file at the NEFSC Editorial Office.

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## TABLE OF CONTENTS

|                                                                                  |    |
|----------------------------------------------------------------------------------|----|
| STOCK DEFINITION AND GEOGRAPHIC RANGE.....                                       | 1  |
| Figure 1. Distribution of humpback whale sightings from NEFSC and SEFSC .....    | 1  |
| POPULATION SIZE .....                                                            | 4  |
| Figure 2: Map of sampling strata for two reported humpback whale population..... | 6  |
| Table 1: Summary of abundance estimates for Gulf of Maine humpback whales .....  | 7  |
| CURRENT AND MAXIMUM NET PRODUCTIVITY RATES.....                                  | 7  |
| POTENTIAL BIOLOGICAL REMOVAL .....                                               | 8  |
| ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY .....                           | 8  |
| Table 2: Summary (five-year means) of confirmed human-caused mortality .....     | 9  |
| HABITAT ISSUES.....                                                              | 10 |
| STATUS OF STOCK .....                                                            | 10 |
| OTHER FACTORS THAT MAY BE CAUSING A DECLINE OR IMPEDING .....                    | 11 |
| REFERENCES CITED.....                                                            | 12 |

**NOTE:** NMFS is in the process of reviewing humpback whale stock structure under the Marine Mammal Protection Act (MMPA) in light of the 14 Distinct Population Segments established under the Endangered Species Act (ESA) (81 FR 62259, 8 September 2016). A complete revision of the humpback whale stock assessment will be postponed until this review is complete. In the interim, new information on humpback whale abundance, mortality and serious injury is provided within this report.

## STOCK DEFINITION AND GEOGRAPHIC RANGE

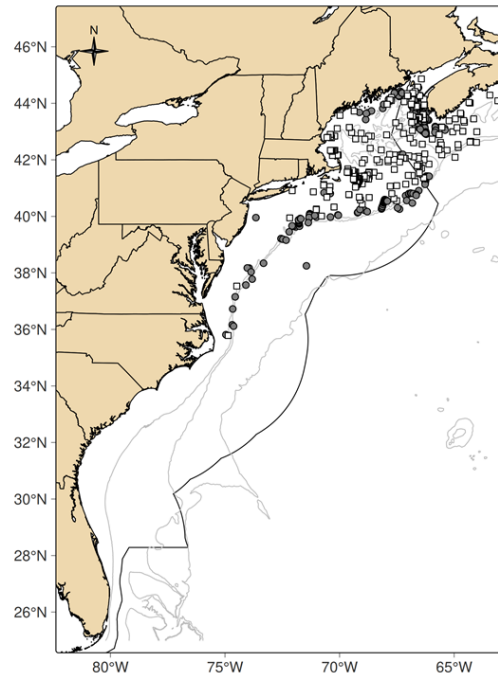


**Figure 1.** Distribution of humpback whale sightings from NEFSC and SEFSC shipboard and aerial surveys during the summers of 1995, 1998, 1999, 2002, 2004, 2006, 2007, 2008, 2010, 2011, 2016, 2021 and 2023. Isobaths are the 200-m, 1000-m and 4000-m depth contours. Circle symbols represent shipboard sightings and squares are aerial sightings.

Humpback whales occur worldwide and migrate seasonally from high latitude subarctic and temperate summering areas to low latitude subtropical and tropical wintering areas. Three subspecies are recognized globally (North Pacific, North Atlantic, and Southern Hemisphere), based on restricted gene flow between ocean basins (Jackson et al., 2014). The North Atlantic subspecies (*Megaptera n. novaeangliae*) occurs basin wide. In the western North Atlantic, humpback whales feed during spring, summer and fall over a geographic range encompassing the eastern coast of the United States (including the Gulf of Maine), the Gulf of St. Lawrence, Newfoundland/Labrador, and western Greenland (Katona & Beard, 1990). Other North Atlantic feeding grounds occur off Iceland and in the Norwegian Sea, including off northern Norway, Bear Island, Jan Mayen, and Franz Josef Land (Christensen et al., 1992; Palsbøll et al., 1997). These six regions represent relatively discrete subpopulations, fidelity to which is determined matrilineally (Clapham and Mayo 1987), which is supported by studies of the mitochondrial genome (Palsbøll

et al., 1995, 2001) and individual animal movements (Stevick et al., 2006). During the 2002 Comprehensive Assessment of North Atlantic humpback whales, the International Whaling Commission acknowledged the evidence for treating the Gulf of Maine as a separate management unit (IWC, 2002).

In New England waters, humpback distribution has been largely correlated to abundance of prey species, although behavior and bathymetry are factors influencing foraging strategy (Payne et al., 1986, 1990). Humpback whales are frequently piscivorous in New England waters, feeding on herring (*Clupea harengus*), sand lance (*Ammodytes* spp.), and other small fishes. In the northern Gulf of Maine, euphausiids are also frequently consumed (Paquet et al., 1997). Within the Gulf of Maine, core areas of humpback whale distribution appear to have shifted over time (e.g. Roberts et al. 2025, Lubansky et al. 2026). For example, during much of the late 1970s and early 1980s, humpback whales were densest over the sandy shoals in the southwestern Gulf of Maine favored by the sand lance (Payne et al., 1986). An apparent reversal began in the mid-1980s, and herring and mackerel increased as sand lance decreased (Fogarty et al., 1991). Humpback whale abundance in the northern Gulf of Maine increased markedly during 1992–1993, along with a major influx of herring (P. Stevick, pers. comm.). During this period, humpback whale density decreased in the Stellwagen Bank area (Weinrich et al., 1997), a trend which later shifted again (e.g. Wiley et al. 2003).

While the Gulf of Maine and the Newfoundland/Labrador regions are considered separate feeding stocks, where the division may occur along the Scotian shelf is less clear. During the summers of 1998 and 1999, the Northeast Fisheries Science Center conducted surveys for humpback whales on the Scotian Shelf to establish the occurrence and population identity of the animals found in this region. Photographs from both surveys were compared to both the overall North Atlantic Humpback Whale Catalog and a large regional catalog from the Gulf of Maine (maintained by the College of the Atlantic and the Center for Coastal Studies, respectively); this work is summarized in Clapham et al. (2003). The match rate between the Scotian Shelf and the Gulf of Maine was 27% (14 of 52 Scotian Shelf individuals from both years). The sighting histories of the 14 Scotian Shelf whales suggested that many of them were transient through the Gulf of Maine. In contrast, all the 36 humpback whales identified by the same NMFS surveys elsewhere in the Gulf of Maine (including Georges Bank, southwestern Nova Scotia, and the Bay of Fundy) had been previously observed in the Gulf of Maine region. Overall, while it appears that the northern range of most of the Gulf of Maine stock does not extend onto the Scotian Shelf, some uncertainty in the stock definition occurs along relatively contiguous Scotian shelf stock boundaries. However, exact placement of the boundary should have little effect on conservation status because the whales along the southern Scotian shelf represent a relatively small fraction of either the Gulf of Maine or Labrador stocks.

Humpback whale presence has increased during summer feeding months in the New York Bight (NYB) area since 2012 (e.g., Brown et al. 2018; 2022, Chou et al. 2022, King et al. 2021, Zoidis et al. 2021). Additional sightings occurring during summer (about July–August) along the shelf break east of New Jersey and New York during the NEFSC abundance surveys have been increasing since about 2004 (Palka, 2020). Recent observations of humpbacks foraging along the shelf break off New York and New Jersey may be indicative of changing forage distribution (Stepanuk et al., 2021). There has been documented exchange of animals within this area and the broader Gulf of Maine. Whether the increased numbers of sightings in the NYB area represent a

distributional change or are simply due to an increase in sighting effort and/or whale abundance, is unknown.

Since the mid-1980s, humpback whales have also been sighted further south within the U.S. Atlantic EEZ, through the coastal area of the U.S. mid-Atlantic states, primarily in winter months. This region is hypothesized to be a supplemental feeding area, primarily for juveniles. Wiley et al. (1995) reported stranded animals that were sexually immature, and whose small size strongly suggested that they had only recently separated from their mothers. Demographics and stock identity of individuals observed off southeastern and mid-Atlantic states were also investigated using fluke photographs of living and dead whales observed in the region (Barco et al., 2002). Length data indicated that 81% of stranded whales in this study were likely first-year animals. Of the photo-ID data, photographs of 41 whales (alive or dead) were compared to catalogs from the Gulf of Maine and other areas in the North Atlantic. Of those that were successfully matched to existing catalogs, 39% were matched to the Gulf of Maine, 53% were not matched, and the remainder were matched to Canadian waters. Barco et al. (2002) suggested that the coastal U.S. mid-Atlantic region primarily represents a supplemental winter feeding ground for humpbacks.

During winter, whales from most North Atlantic feeding areas (including the Gulf of Maine) mate and calve in the West Indies, where spatial and genetic mixing among feeding groups occurs (Clapham et al., 1993; Katona & Beard, 1990; Palsbøll et al., 1997; Stevick et al., 1998; Kennedy et al., 2014). Some whales using eastern North Atlantic feeding areas, particularly Norway and Iceland, migrate to the Cape Verde Islands (Reiner et al., 2006; Stevick et al., 2016; Wenzel et al., 2009; Jones et al. 2025), and some individuals have been recorded in both the Cape Verde Islands and the southeast Caribbean (Stevick et al., 2016). In the West Indies, most whales are found in the waters of the Dominican Republic, notably on Silver Bank and Navidad Bank, and in Samana Bay (Balcomb & Nichols, 1982; Mattila et al., 1989, 1994; Whitehead & Moore, 1982). Humpback whales also are found at much lower densities throughout the Lesser Antilles (Levenson & Leapley, 1978; Mattila & Clapham, 1989; Price, 1985; Winn et al., 1975). Photo-ID data and passive acoustic data indicate that animals in the Greater and Lesser Antilles have different arrival and departure times, and potential differences in migratory patterns (Smith & Pike, 2013; Stevick et al., 2016; Heenahan et al. 2019; Jones et al. 2025). A higher proportion of animals from the Greater Antilles appear to migrate to western North Atlantic feeding areas, while a higher proportion of animals from the Lesser Antilles migrate to the eastern North Atlantic feeding areas (Jones et al. 2025).

Not all whales from this stock may migrate to the breeding areas every winter. As referenced above, some animals are found in mid- and high-latitude regions at this time (Clapham et al., 1993), including juveniles (Swingle et al., 1993, Barco et al. 2002). While passive acoustic data examined along the U.S. east coast indicate a clearly seasonal occurrence in humpback song (Davis et al. 2020), acoustic recordings made within the Massachusetts Bay area and through the U.S. mid-Atlantic coastal region detected low levels of song occurrence in January and February (Murray et al. 2014, Davis et al. 2020). While these cases likely represent staggered migration of individual animals, they may also indicate that some portions of the population may not undertake the full annual migration.

## POPULATION SIZE

The current best abundance estimate available for the Gulf of Maine humpback whale stock is 1,510 (CV=0.57) for 2023. This is based on a density-habitat model of shipboard and aerial line transect sighting data collected year-round during 2010–2023 (Chavez-Rosales and Palka in review; Palka et al. in review).

### Gulf of Maine Stock - Recent surveys and abundance estimates

For this report, three estimates are available from different methods. The most recent estimate for 2023 is based on year-round ship and aerial line transect surveys conducted during 2010–2023 and analyzed using density-habitat modeling. In addition, there is an estimate based upon ship and aerial line transect surveys conducted in the summer of 2021 and analyzed using design-based methods. The third estimate for 2019 is based on the application of mark and recapture methods to dedicated photo identification records collected during 2000–2019 (Robbins et al., 2024).

An abundance estimate of 1,510 (CV=0.57) for 2023 was developed from a spatiotemporal density-habitat generalized additive model, GAM (Chavez-Rosales and Palka, in review; Palka et al. in review). This model utilized shipboard and aerial line transect sightings data collected on over 417,000 km of systematic line transect surveys conducted year-round from 2010 to 2023, including the data used in the design-based line transect abundance survey from 2021, described below. These surveys, part of the Atlantic Marine Assessment Program for Protected Species (Chavez-Rosales et al., 2022; Palka et al., 2021; in review), covered all Atlantic waters off the U.S. up to Nova Scotia, Canada. The model development involved a two-stage process. First, fitted detection functions were applied to estimate density, corrected for perception and availability bias, within surveyed 10x10 km<sup>2</sup> grid cells for 8-day time periods between 2010 and 2023. Next, these observed density estimates were modeled as a function of static and dynamic contemporaneous environmental covariates within those surveyed spatiotemporal cells. The final model was then used to predict density across all grid cells and time periods.

Second, the abundance of Gulf of Maine humpback whales was estimated at 863 (CV=0.36) based on concurrent shipboard and aerial line transect surveys conducted during the summer of 2021 (Figure 16; Palka 2023). This estimate incorporated corrections for perception and availability bias. The aerial survey effort (5,217 km of on-effort tracklines) covered coastal waters (from the coastline to approximately the 100 m depth contour) in the Gulf of Maine north of 38°N up to the lower Bay of Fundy. The shipboard survey (5,871 km of on-effort tracklines) covered primarily offshore waters north of 36°N, focusing on the shelf break and extending to the outer edge of the U.S. Exclusive Economic Zone. Additionally, a second concurrent shipboard survey was conducted further south, covering 5,659 km of on-effort tracklines between central Florida (25°N) and approximately 38°N latitude, between the 200-m isobaths and the outer edge of the U.S. Exclusive Economic Zone, though no humpback whales were detected in this area. All surveys employed an independent observer approach utilizing two visual teams to allow for the estimation of detection probability on the trackline. The multi-covariate mark-recapture distance sampling analysis method (Laake & Borchers, 2004) was applied to estimate abundance accounting for perception bias. Final estimates were then further adjusted by applying species-

platform specific availability bias correction factors. The results from the individual surveys were subsequently combined, and their coefficients of variation (CVs) were pooled, to generate a single stock-wide abundance estimate corrected for perception and availability bias.

Finally, an abundance estimate of 1,706 animals was produced using individual humpback whale sightings from 2000–2019 and applying capture-mark-recapture (CMR) method using a state-space model following the methodology described in Pace et al. (2017) and using the humpback photo-identification database (Robbins et al., 2024). Sightings histories of Gulf of Maine humpback whales were constructed from the photo-ID recapture database as it existed in April 2019. The data were provided by an annual spatially arranged survey dedicated to gathering photo-ID data on Gulf of Maine humpbacks. The estimation process was greatly enhanced by using photographic captures from sources other than the primary survey. These included additional research efforts by the principal survey team but outside of the dedicated survey effort, other cetacean research groups, and cooperating whale watch vessels. These later data were used to inform the known state matrix. All sightings from the primary survey were bounded by the hatched area noted on Figure 2 for CMR sampling strata. A hierarchical open population model of these histories produced a median abundance value of 1,706 individuals (95% credible intervals 1,639–1,771). Given the asymmetric uncertainty about  $N$ , the credible interval may better characterize that uncertainty than a CV; the latter was estimated to be 0.02.

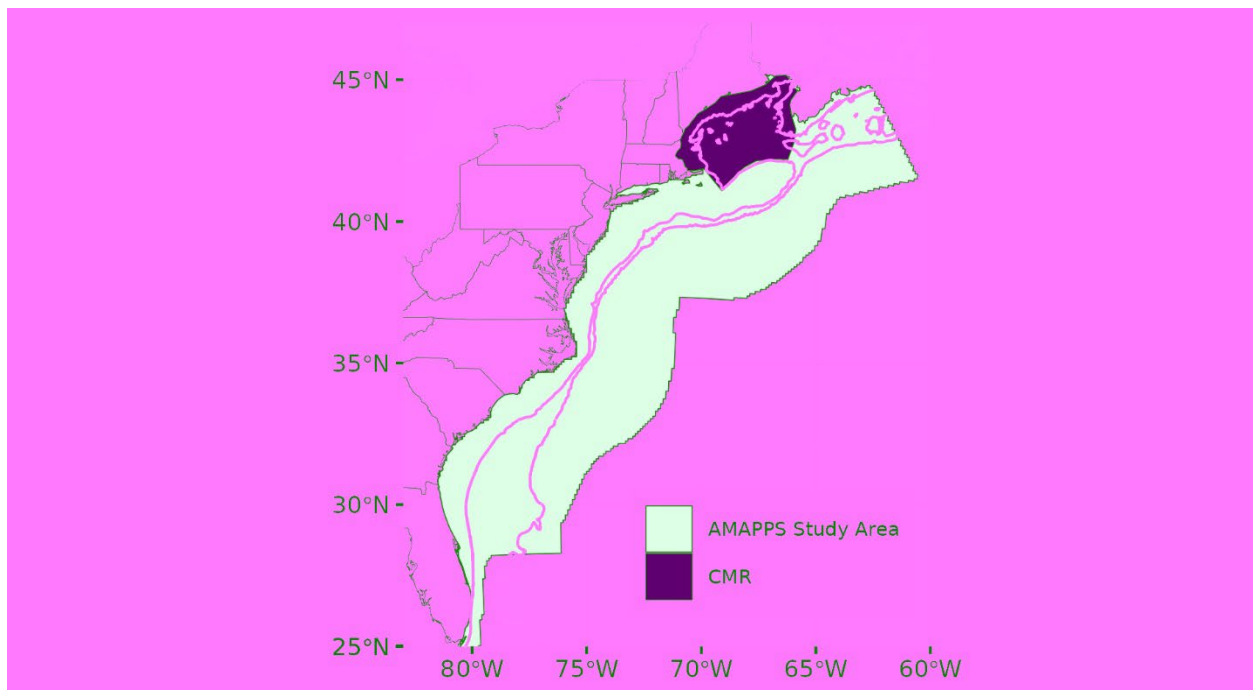
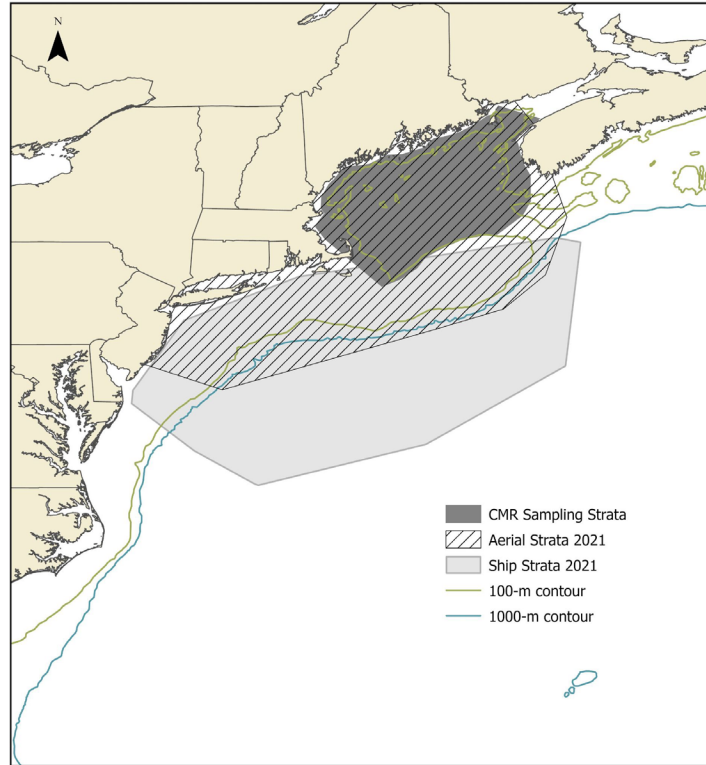


**Figure 2:** Map of sampling strata for two reported humpback whale population estimation methods. Capture-Mark-Recapture (CMR) strata identifies long term photo ID survey area in Gulf of Maine waters (note, western edge of CMR strata extends to coastline). Line transect strata of 2021 aerial and shipboard surveys are also defined.

### *Minimum Population Estimate*

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed best abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The best estimate of abundance for Gulf of Maine humpback whales is 1,510 (CV=0.57). The minimum population estimate for the Gulf of Maine humpback whales is 1,125.

### *Current Population Trend*

A current trend analysis has not been conducted for this stock.

**Table 1:** Summary of abundance estimates for Gulf of Maine humpback whales with month, year, and area covered during each abundance survey, and resulting abundance estimate (N<sub>best</sub>), coefficient of variation (CV) and either a 95% confidence interval or credible interval (95% CI).

| Time         | Survey Type and Analysis Method                                            | Area                    | N <sub>best</sub> | CV   | 95% CI      |
|--------------|----------------------------------------------------------------------------|-------------------------|-------------------|------|-------------|
| 2010–2023    | 2023 summer spatial density-habitat model of year-round line transect data | Florida to Nova Scotia  | 1,510             | 0.57 | 534–4,270   |
| Jun–Sep 2021 | Design-based estimate of line-transect data                                | Virginia to Nova Scotia | 863               | 0.36 | 435–1,710   |
| 2000–2019    | 2019 Bayesian state-space mark-recapture model of photo-id data            | Gulf of Maine           | 1,706             | 0.02 | 1,639–1,771 |

## **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Zerbini et al. (2010) reviewed various estimates of maximum productivity rates for humpback whale populations, and based on simulation studies, they proposed that 11.8% be considered as the maximum rate at which the species could grow. Barlow and Clapham (1997), applying an interbirth interval model to photographic mark-recapture data, estimated the population growth rate of the Gulf of Maine humpback whale stock at 6.5% (CV=0.012). Maximum net productivity is unknown for this population, although a theoretical maximum for any humpback population can be calculated using known values for biological parameters (Brandão et al., 2000; Clapham et al., 2001). For the Gulf of Maine stock, data supplied by Barlow and Clapham (1997) and Clapham et al. (1995) give values of 0.96 for survival rate, 6 years as mean age at first parturition, 0.5 as the proportion of females, and 0.42 for annual pregnancy rate. From this, a maximum population growth rate of 0.072 is obtained according to the method described by Brandão et al. (2000). This suggests that the observed rate of 6.5% (Barlow & Clapham, 1997) is close to the maximum for this stock.

Clapham et al. (2003) updated the Barlow and Clapham (1997) analysis using data from the period 1992 to 2000. The population growth estimate was either 0% (for a calf survival rate of 0.51) or 4.0% (for a calf survival rate of 0.875). Although uncertainty was not strictly characterized

by Clapham et al. (2003), their work might reflect a decline in population growth rates from the earlier study period. More recent work by Robbins (2007) places apparent survival of calves at 0.664 (95% CI: 0.517-0.784), a value between those used by Barlow and Clapham (1997) and in addition found productivity to be highly variable and well less than maximum.

Despite the uncertainty accompanying the more recent estimates of observed population growth rate for the Gulf of Maine stock, the maximum net productivity rate was assumed to be 6.5% calculated by Barlow and Clapham (1997) because it represents an observation greater than the default of 0.04 for cetaceans (Barlow et al., 1995) but is conservative in that it is well below the results of Zerbini et al. (2010).

## **POTENTIAL BIOLOGICAL REMOVAL**

Potential Biological Removal (PBR) is the product of minimum population size, one-half the maximum productivity rate, and a recovery factor (MMPA Sec. 3. 16 U.S.C. 1362, Wade & Angliss, 1997b). The minimum population size for the Gulf of Maine stock is 1,125 whales. The maximum productivity rate is 0.065 (based on Barlow & Clapham, 1997). In the 2015 and prior SARs, the recovery factor was 0.10 because this stock was listed as an endangered species under the Endangered Species Act (ESA). The 2016 revision to the ESA listing of humpback whales concluded that the West Indies Distinct Population Segment (of which the Gulf of Maine stock is a part) did not warrant listing (81 FR 62259, September 8, 2016). Consequently, since the 2016 SAR, the recovery factor was revised to 0.5, the default value for stocks of unknown status relative to optimum sustainable population (OSP) (NMFS 2023). PBR for the Gulf of Maine humpback whale stock is 18.

## **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

For the period 2019 through 2023, the minimum annual rate of detected human-caused mortality and serious injury to the Gulf of Maine humpback whale stock averaged 14.6 animals per year. This value includes incidental fishery interaction records, 9.0; and records of vessel collisions, 5.6 (Table 2; Henry et al. in press).

In addition to the total 82 (53 entanglement, 28 vessel, 1 unknown) anthropogenic mortalities and serious injuries for this period, 3 carcasses examined found no detected human interaction. In contrast to stock assessment reports before 2007, these averages include humpback mortalities and serious injuries that occurred in the southeastern and mid-Atlantic states that could not be confirmed as involving members of the Gulf of Maine stock. In past reports, only events involving whales confirmed to be members of the Gulf of Maine stock were counted against the PBR. Starting in the 2007 report, we assumed whales were from the Gulf of Maine unless they were identified as members of another stock. At the time of this writing, no whale was identified as a member of another stock. These determinations may change with the availability of new information. Canadian records from the southern side of Nova Scotia were incorporated into the mortality and serious injury rates, to reflect the effective range of this stock as described above. For the purposes of this report, the discussion is primarily limited to those records considered to be confirmed human-caused mortalities or serious injuries.

Important to stress is that serious injury determinations are made based upon the best available information; these determinations may change with the availability of new information (Henry et al. in press). For the purposes of this report, takes against PBR are limited to those records considered confirmed human-caused mortalities or serious injuries. Annual rates calculated from detected mortalities should be considered a low-biased accounting of human-caused mortality; they represent a definitive lower bound. Detections of mortality and serious injury are haphazard, incomplete, and not the result of a designed sampling scheme. A key uncertainty is the fraction of the actual human-caused mortality and serious injury represented by the detected mortalities and serious injuries. Research on small cetaceans has shown the actual number of deaths can be several times higher than that observed (n.d.; Wells et al., 2014).

Important to note is that NMFS declared an Unusual Mortality Event for humpback whales along the Atlantic coast, which includes cases from 2016 to the time of this writing in 2026 (<https://www.fisheries.noaa.gov/national/marine-life-distress/2016-2024-humpback-whale-unusual-mortality-event-along-atlantic-coast>). Partial or full necropsy examinations were conducted on approximately half of the whales during that period. Of the whales examined (approximately 90), about 40 percent had evidence of human interaction, either vessel strike or entanglement. A portion of the whales have shown evidence of pre-mortem vessel strike; however, this finding is not consistent across all whales examined. To better assess human impacts (both vessel collision and commercial fishery mortality and serious injury) timely recovery of carcasses and complete necropsies are needed. Decomposed and/or unexamined animals (e.g., carcasses reported but not retrieved or no necropsy performed) represent ‘lost data’, some of which may relate to human impacts.

**Table 2:** Summary (five-year means) of confirmed human-caused mortality and serious injury records of humpback whales (*Megaptera novaeangliae*), for the period of 2019–2023.

| Assigned.Cause | US  | CN   | XU  | XC   | TOTAL |
|----------------|-----|------|-----|------|-------|
| Vessel strike  | 5.1 | 0.00 | 0.5 | 0.00 | 5.6   |
| Entanglement   | 1.7 | 0.15 | 6.8 | 0.35 | 9.0   |

For more details on events please see Henry et al. in press. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured. Mortality events are counted as 1 against PBR. Serious injury events have been evaluated using NMFS guidelines (NOAA 2012). US=United States, CN=Canada, XU=Unassigned, 1st sighted in US, XC=Unassigned, 1st sighted in CN.

## Other Mortality

Between November 1987 and January 1988, at least 14 humpback whales died after consuming Atlantic mackerel containing a dinoflagellate saxitoxin (Geraci et al., 1989). The whales subsequently stranded or were recovered in the vicinity of Cape Cod Bay and Nantucket Sound, and it is highly likely that other unrecorded mortalities occurred during this event. During

the first six months of 1990, seven dead juvenile (7.6 to 9.1 m long) humpback whales stranded between North Carolina and New Jersey. The significance of these strandings is unknown. Between July and September 2003, an Unusual Mortality Event (UME) that included 16 humpback whales was invoked in offshore waters of coastal New England and the Gulf of Maine. Biotoxin analyses of samples taken from some of these whales found saxitoxin at very low/questionable levels and domoic acid at low levels, but neither were adequately documented and therefore no definitive conclusions could be drawn. Seven humpback whales were considered part of a large whale UME in New England in 2005. Twenty-one dead humpback whales found between 10 July and 31 December 2006 triggered a humpback whale UME declaration. Additionally, in January 2016 a humpback whale UME was declared for the U.S. Atlantic coast due to elevated numbers of mortalities ([a total of 212 strandings in 2016–2023](#)). This most recent UME is ongoing. For the period 2019–2023, there are records of 125 humpback whale strandings between Maine and Florida in the Marine Mammal Health and Stranding Response database (accessed 3 April 2026).

## HABITAT ISSUES

Climate-related changes in spatial distribution and abundance, including poleward and depth shifts, have been documented in and predicted for a range of plankton species and commercially important fish stocks (Grieve et al., 2017; Hare et al., 2016; Head & Pepin, 2010; Nye et al., 2009; Pinsky et al., 2013). There is uncertainty in how, if at all, the distribution and population size of this species will respond to these changes and how the ecological shifts will affect human impacts.

## STATUS OF STOCK

NMFS conducted a global status review of humpback whales (Bettridge et al., 2015) and revised the ESA listing of the species (81 FR 62259, September 8, 2016). The Distinct Population Segments (DPSs) that occur in waters under U.S. jurisdiction, as established in the Final Rule, do not necessarily equate to the existing MMPA stocks. NMFS is evaluating the stock structure of humpback whales in the North Atlantic under the MMPA, but no changes to current stock structure are proposed currently. As noted within the humpback whale ESA-listing Final Rule, in the case of a species or stock that achieved its depleted status solely on the basis of its ESA status, such as the humpback whale, the species or stock would cease to qualify as depleted under the terms of the definition set forth in MMPA Section 3(1) if the species or stock is no longer listed as threatened or endangered. The final rule indicated that until the stock designations are reviewed considering the DPS designations, NMFS would consider stocks that do not fully or partially coincide with a listed DPS as not depleted for management purposes. Therefore, the Gulf of Maine stock is considered not depleted because it does not coincide with any ESA-listed DPS. The detected level of U.S. human-caused mortality and serious injury derived from the available records, (average of 14.6 for 2019–2023) does not exceed the calculated PBR of 18 and, therefore, this is not a strategic stock. While detected mortalities yield an estimated minimum fraction of anthropogenic mortality as 0.85, additional research on stock structure and methods for apportioning undetected mortality to causes is needed to reduce the uncertainties associated with this assessment and the determination of strategic status. The total annual commercial fishery-related mortality and serious injury for this stock derived from the available records (10.15) is likely biased low and is not less than 10% of the calculated PBR (18). Therefore, commercial fishery-related entanglement rates

cannot be considered insignificant and approaching a zero mortality and serious injury rate. The status of this stock relative to Optimum Sustainable Population (OSP) is unknown.

## **OTHER FACTORS THAT MAY BE CAUSING A DECLINE OR IMPEDING RECOVERY**

This section, which is required for strategic stocks but otherwise optional, should describe any other factors affecting the status of the stock. It should only be a summary of the issue and should reference publications. See Section 3.5 for additional guidance.

## REFERENCES CITED

Balcomb, K., & Nichols, G. (1982). Humpback whale censuses in the West Indies. *Report of the International Whaling Commission*, 32, 401–406.

Barco, S. G., McLellan, W. A., Allen, J. M., Asmutis-Silvia, R. A., Mallon-Day, R., Meacher, E. M., Pabst, D. A., Robbins, J., Seton, R. E., & Swingle, W. M. (2002). Population identity of humpback whales (*Megaptera novaengliae*) in the waters of the US mid-Atlantic states. *Journal of Cetacean Research and Management*, 4(2), 135–142. <https://journal.iwc.int/index.php/jcrm/article/view/849>

Barlow, J., & Clapham, P. J. (1997). A new birth-interval approach to estimating demographic parameters of humpback whales. *Ecology*, 78(2), 535–546. [https://doi.org/10.1890/0012-9658\(1997\)078\[0535:ANBIAT\]2.0.CO;2](https://doi.org/10.1890/0012-9658(1997)078[0535:ANBIAT]2.0.CO;2)

Barlow, J., Swartz, S. L., Eagle, T. C., & Wade, P. R. (1995). *U.S. marine mammal stock assessments: Guidelines for preparation, background, and a summary of the 1995 assessments* (p. 73) [NOAA Tech. Memo. NMFS-OPR-6].

Bettridge, S. O. M., Baker, C. S., Barlow, J., Clapham, P. J., Ford, M. J., Gouveia, D., Mattila, D. K., Pace, R. M., Rosel, P. E., Silber, G. K. (Gregory, K., & Wade, P. R. (2015). *Status review of the humpback whale (Megaptera novaeangliae) under the Endangered Species Act*. <https://repository.library.noaa.gov/view/noaa/4883>

Brandão, A., Butterworth, D. S., & Brown, M. R. (2000). Maximum possible humpback whale increase rates as a function of biological parameter values. *Journal of Cetacean Research and Management (Supplement)*, 2, 192–193.

Brown, D., Robbins, J., Sieswerda, P., Schoelkopf, R., & Parsons, E. (2018). Humpback whale (*Megaptera novaeangliae*) sightings in the New York-New Jersey Harbor Estuary - Wiley Online Library. *Marine Mammal Science*, 34(1), 250–257. <https://onlinelibrary.wiley.com/doi/10.1111/mms.12450>

Brown DM, Robbins J, Sieswerda PL, Ackerman C, Aschettino JM, Barco S, Boye T, DiGiovanni Jr RA, Durham K, Engelhaupt A, Hill A. et al. 2022 Site fidelity, population identity and demographic characteristics of humpback whales in the New York Bight apex. *Journal of the Marine Biological Association of the United Kingdom*. Mar;102(1-2):157-65.

Chavez-Rosales, S., Josephson, E., Palka, D. L., & Garrison, L. (2022). Detection of habitat shifts of cetacean species: A comparison between 2010 and 2017 habitat suitability conditions in the Northwest Atlantic Ocean. *Frontiers in Marine Science*, 9. <https://doi.org/10.3389/fmars.2022.877580>

Christensen, I., Haug, T., & Øien, N. (1992). Seasonal distribution, exploitation and present abundance of stocks of large baleen whales (Mysticeti) and sperm whales (*Physeter macrocephalus*) in Norwegian and adjacent waters. *ICES Journal of Marine Science*, 49(3), 341.

Clapham, P. J., Baraff, L. S., Carlson, C. A., Christian, M. A., Mattila, D. K., Mayo, C. A.,

Murphy, M. A., & Pittman, S. (1993). Seasonal occurrence and annual return of humpback whales, *Megaptera novaeangliae*, in the southern Gulf of Maine. *Canadian Journal of Zoology*, 71(2), 440–443. <https://doi.org/10.1139/z93-063>

Clapham, P. J., Barlow, J., Bessinger, M., Cole, T., Mattila, D., Pace, R., Palka, D. L., Robbins, J., & Seton, R. (2003). Abundance and demographic parameters of humpback whales from the Gulf of Maine, and stock definition relative to the Scotian Shelf. *Journal of Cetacean Research and Management*, 5(1), 13–22.

Clapham, P. J., Bérubé, M., & Mattila, D. K. (1995). Sex ratio of the Gulf of Maine humpback whale population. *Marine Mammal Science*, 11(2), 227–231. <https://doi.org/10.1111/j.1748-7692.1995.tb00520.x>

Clapham, P. J., Robbins, J., Brown, M., Wade, P., & Findlay, K. (2001). A note on plausible rates of population growth in humpback whales. *Journal of Cetacean Research and Management*, 3, 196–197.

Clark, C. W., & Clapham, P. J. (2004). Acoustic monitoring on a humpback whale (*Megaptera novaeangliae*) feeding ground shows continual singing into late spring. *Proceedings of the Royal Society B: Biological Sciences*, 271(1543), 1051–1057. <http://rspb.royalsocietypublishing.org/cgi/doi/10.1098/rspb.2004.2699>. <https://doi.org/10.1098/rspb.2004.2699>

Clark, C. W., & Gagnon, G. (2002). Low-frequency vocal behaviors of baleen whales in the North Atlantic: Insights from IUSS detections, locations and tracking from 1992 to 1996. *Journal of Underwater Acoustics*, 52, 609–640.

Davis, G. E., Baumgartner, M. F., Corkeron, P. J., Bell, J., Berchok, C., Bonnell, J. M., Bort Thornton, J., Brault, S., Buchanan, G. A., Cholewiak, D. M., Clark, C. W., Delarue, J., Hatch, L. T., Klinck, H., Kraus, S. D., Martin, B., Mellinger, D. K., Moors-Murphy, H., Nieukirk, S., ... Van Parijs, S. M. (2020). Exploring movement patterns and changing distributions of baleen whales in the western North Atlantic using a decade of passive acoustic data. *Global Change Biology*, 26(9), 4812–4840. <https://doi.org/10.1111/gcb.15191>

Fogarty, M., Cohen, E., Michaels, W., & Morse, W. (1991). Predation and the regulation of sand lance populations: An exploratory analysis. *ICES Marine Science Symposium*, 193, 120–124.

Garrison, L. P., & Dias, L. A. (2023). *Abundance of marine mammals in waters of the southeastern U.S. Atlantic during summer 2021*. <https://doi.org/10.25923/ce0d-9e10>

Geraci, J. R., Anderson, D. M., Timperi, R. J., Aubin, D. J. St., Early, G. A., Prescott, J. H., & Mayo, C. A. (1989). Humpback whales (*Megaptera novaeangliae*) fatally poisoned by dinoflagellate toxins. *Canadian Journal of Fisheries and Aquatic Sciences*, 46, 1895–1898. <https://doi.org/10.1139/f89-238>

Grieve, B. D., Hare, J., & Saba, V. (2017). Projecting the effects of climate change on *Calanus finmarchicus* distribution within the U.S. Northeast Continental Shelf. *Scientific Reports*,

7. <https://www.nature.com/articles/s41598-017-06524-1>

Hare, J. A., Morrison, W. E., Nelson, M. W., Stachura, M. M., Teeters, E. J., Griffis, R. B., Alexander, M. A., Scott, J. D., Alade, L., Bell, R. J., Chute, A. S., Curti, K. L., Curtis, T. H., Kircheis, D., Kocik, J. F., Lucey, S. M., McCandless, C. T., Milke, L. M., Richardson, D. E., ... Griswold, C. A. (2016). A vulnerability assessment of fish and Invertebrates to climate change on the Northeast U.S. Continental Shelf. *PLoS ONE*, 11(2), e0146756. <https://doi.org/10.1371/journal.pone.0146756>

Head, E. J. H., & Pepin, P. (2010). Spatial and inter-decadal variability in plankton abundance and composition in the Northwest Atlantic (1958–2006). *Journal of Plankton Research*, 32(12), 1633–1648. <https://doi.org/10.1093/plankt/fbq090>

Heenehan, H., Stanistreet, J.E., Corkeron, P.J., Bouveret, L., Chalifour, J., Davis, G.E., Henriquez, A., Kiszka, J.J., Kline, L., Reed, C. and Shamir-Reynoso, O., 2019. Caribbean Sea soundscapes: monitoring humpback whales, biological sounds, geological events, and anthropogenic impacts of vessel noise. *Frontiers in Marine Science*, 6, p.347.

IWC. (2002). Report of the Scientific Committee. Annex H: Report of the Sub-committee on the Comprehensive Assessment of North Atlantic humpback whales. *Journal of Cetacean Research Management*, 4(supplement), 230–260.

Jackson, J. A., Steel, D. J., Beerli, P., Congdon, B. C., Olavarria, C., Leslie, M. S., Pomilla, C., Rosenbaum, H., & Baker, C. S. (2014). Global diversity and oceanic divergence of humpback whales (*Megaptera novaeangliae*). *Proceedings of the Royal Society B: Biological Sciences*, 281(1786), 20133222. <https://doi.org/10.1098/rspb.2013.3222>

Jones, L., Allen, J., Basran, C., Berrow, S., Betancourt, L., Bouveret, L., Boye, T., Broms, F., Chosson, V., Clapham, P. and Fernald, T., 2025. Ocean basin-wide movement patterns of North Atlantic humpback whales. *J. Cetacean Res. Manage.*, 26, pp.1-19.

Katona, S. K., & Beard, J. A. (1990). Population size, migrations, and feeding aggregations of the humpback whale (*Megaptera novaeangliae*) in the western North Atlantic ocean. *Reports of the International Whaling Commission, (Special Issue)* 12(295–306).

Kennedy, A. S., Zerbini, A. N., Vásquez, O. V., Gandilhon, N., Clapham, P. J., & Adam, O. (2014). Local and migratory movements of humpback whales () satellite-tracked in the North Atlantic Ocean. *Canadian Journal of Zoology*, 92(1), 9–18. <https://doi.org/10.1139/cjz-2013-0161>

King, C.D., Chou, E., Rekdahl, M.L., Trabue, S.G. and Rosenbaum, H.C., 2021. Baleen whale distribution, behaviour and overlap with anthropogenic activity in coastal regions of the New York Bight. *Marine Biology Research*, 17(4), pp.380-400.

Laake, J. L., & Borchers, D. L. (2004). Methods for incomplete detection at distance zero. In S. T. Buckland, D. R. Andersen, K. P. Burnham, J. L. Laake, & L. Thomas (Eds.), *Advanced distance sampling* (pp. 108–189). Oxford University Press.

Levenson, C., & Leapley, W. T. (1978). Distribution of Humpback Whales (*Megaptera*

novaeangliae) in the Caribbean Determined by a Rapid Acoustic Method. *Journal of the Fisheries Research Board of Canada*, 35(8), 1150–1152. <https://doi.org/10.1139/f78-180>

Lubansky, T.M., Mashintonio, A.F., Taylor, J., Stephenson, T., Jones, L.S. and Todd, S., 2026. Long-Term Opportunistic Sightings Reveal Shifting Optimal Habitat Locations for Humpback Whales (*Megaptera novaeangliae*) in the Gulf of Maine. *Marine Mammal Science*, 42(2), p.e70134.

Mattila, D. K., & Clapham, P. J. (1989). Humpback whales, \* *Megaptera novaeangliae* \*, and other cetaceans on Virgin Bank and in the northern Leeward Islands, 1985 and 1986. *Canadian Journal of Zoology*, 67(9), 2201–2211. <https://doi.org/10.1139/z89-311>

Mattila, D. K., Clapham, P. J., Katona, S. K., & Stone, G. S. (1989). Population composition of humpback whales, *Megaptera novaeangliae*, on Silver Bank, 1984. *Canadian Journal of Zoology*, 67(2), 281–285. <https://doi.org/10.1139/z89-041>

Mattila, D. K., Clapham, P. J., Vásquez, O., & Bowman, R. S. (1994). Occurrence, population composition, and habitat use of humpback whales in Samana Bay, Dominican Republic. *Canadian Journal of Zoology*, 72(11), 1898–1907. <https://doi.org/10.1139/z94-258>

Murray, A., Rice, A. N., & Clark, C. W. (2014). Extended seasonal occurrence of humpback whales in Massachusetts Bay. *Journal of the Marine Biological Association of the United Kingdom*, 94(6), 1117–1125. <https://doi.org/10.1017/S0025315412001968>

Northeast & Southeast Fisheries Science Center. (2022). 2021 Annual Report of a Comprehensive Assessment of Marine Mammal, Marine Turtle, and Seabird Abundance and Spatial Distribution in US waters of the Western North Atlantic Ocean – AMAPPS III. *Northeast Fisheries Science Center*. <https://doi.org/10.25923/JAZW-5467>

Nye, J. A., Link, J. S., Hare, J. A., & Overholtz, W. J. (2009). Changing spatial distribution of fish stocks in relation to climate and population size on the Northeast United States continental shelf. *Marine Ecology Progress Series*, 393, 111–129. <https://doi.org/10.3354/meps08220>

Palka, D. L. (2020). *Cetacean Abundance in the US Northwestern Atlantic Ocean: Summer 2016* (Northeast Fish Sci Cent Ref Doc. 20-05; p. 60). <https://doi.org/10.25923/1mrt-tn89>

Palka, D. L., Aichinger Dias, L., Broughton, E., Chavez-Rosales, S., Cholewiak, D., Davis, G., DeAngelis, A., Garrison, L., Haas, H., Hatch, J., Hyde, K., Jech, M., Josephson, E., Mueller-Brennan, L., Orphanides, C., Pegg, N., Sasso, C., Sigourney, D., Soldevilla, M., & Walsh, H. (2021). *Atlantic Marine Assessment Program for Protected Species: FY15-FY19*. <https://repository.library.noaa.gov>

Palsbøll, P. J., Allen, J., Anderson, T., Bérubé, M., Clapham, P. J., Feddersen, T., Friday, N., Hammond, P., Jørgensen, H., Katona, S., Larsen, A., Larsen, F., Lien, J., Matila, D., Nygaard, F., Robbins, J., Sponer, R., Sears, R., Sigurjónsson, J., ... Øien, N. (2001). *Scientific Committee Meeting Document SC/53/NAH11*.

Palsbøll, P. J., Allen, J., Bérubé, M., Clapham, P. J., Feddersen, T. P., Hammond, P. S.,

Hudson, R. R., Jørgensen, H., Katona, S., Larsen, A. H., Larsen#, F., Lien, J., Mattila, D. K., Sigurjónsson, J., Sears, R., Smith, T., Sponer, R., Stevick, P., & Øien, N. (1997). Genetic tagging of humpback whales. *Nature*, 388(6644), 767–769. <https://doi.org/10.1038/42005>

Palsbøll, P. J., Clapham, P. J., Mattila, D. K., Larsen, F., Sears, R., Siegismund, H. R., Sigurjónsson, J., Vasquez, O., & Arctander, P. (1995). Distribution of mtDNA haplotypes in North Atlantic humpback whales: the influence of behaviour on population structure. *Marine Ecology Progress Series*, 116(1), 1–10. <https://www.int-res.com/articles/meps/116/m116p001.pdf>

Paquet, D., Haycock, C., & Whitehead, H. (1997). Numbers and seasonal occurrence of humpback whales (*Megaptera novaeangliae*) off Brier Island, Nova Scotia. *Canadian Field Naturalist*, 111, 548–552.

Payne, P. M., Nichols, J. R., O'Brien, L., & Powers, K. D. (1986). The distribution of the humpback whale, *Megaptera novaeangliae*, on Georges Bank and in the Gulf of Maine in relation to densities of the sand eel, *Ammodytes americanus*. *Fishery Bulletin*, 84, 271–277. <https://spo.nmfs.noaa.gov/content/distribution-humpback-whale-megaptera-novaeangliae-georges-bank-and-gulf-maine-relation-t0>

Payne, P. M., Wiley, D. N., Young, S. B., Pittman, S., Clapham, P. J., & Jossi, J. W. (1990). *Fishery Bulletin*, 88(4), 687–696.

Pinsky, M. L., Worm, B., Fogarty, M. J., Sarmiento, J. L., & Levin, S. A. (2013). Marine taxa track local climate velocities. *Science*, 341(6151), 1239–1242. <https://doi.org/10.1126/science.1239352>

Price, W. (1985). Whaling in the Caribbean: historical perspective and update. *Reports of the International Whaling Commission*, 35, 413–420.

Reiner, F., dos Santos, M., Wenzel, F., & Whale, A. (2006). Cetaceans of the Cape Verde Archipelago. *Marine Mammal Science*, 12, 434–443. <https://doi.org/10.1111/j.1748-7692.1996.tb00595.x>

Robbins, J. (2007). *Structure and dynamics of the Gulf of Maine humpback whale population* [Ph.D. thesis]. University of St. Andrews.

Robbins, J., Bérubé, M., Clapham, P. J., Mattila, D. K., Palsbøll, P. J., Asmutis-Silvia, R., Hill, A., Howes, L. J., Landry, S., Lonergan, S., Schulte, D., Tackaberry, J. E., Weinrich, M. T., & Pace, R. M. (2024). *Before and after delisting: population dynamics of North Atlantic humpback whales over two decades in the Gulf of Maine* (p. 2024.02.04.577870). bioRxiv. <https://doi.org/10.1101/2024.02.04.577870>

Roberts, S.M., Dowd, S., Thorne, L., Roberts, J.J., Halpin, P.N., Khan, C., Palka, D., Wiley, D., Smith, L.A., Smith, B.E. and Nye, J.A., 2025. Humpback whale densities are increasing in the Great South Channel: concurrent multi-trophic level shifts in abundance. *Marine Ecology Progress Series*, 754, pp.105-119.

Smith, T., & Pike, D. (2013). The enigmatic whale: the North Atlantic humpback.

NAMMCO Scientific Publications, 7, 161. <https://doi.org/10.7557/3.2712>

Stepanuk, J. E. F., Heywood, E. I., Lopez, J. F., Jr, R. A. D., & Thorne, L. H. (2021). Age-specific behavior and habitat use in humpback whales: implications for vessel strike. *Marine Ecology Progress Series*, 663, 209–222. <https://doi.org/10.3354/meps13638>

Stevick, P. T., Allen, J., Clapham, P. J., Katona, S. K., Larsen, F., Lien, J., Mattila, D. K., Palsbøll, P. J., Sears, R., Sigurjónsson, J., Smith, T. D., Vikingsson, G., Øien, N., & Hammond, P. S. (2006). Population spatial structuring on the feeding grounds in North Atlantic humpback whales (*Megaptera novaeangliae*). *Journal of Zoology*, 270(2), 244–255. <https://doi.org/10.1111/j.1469-7998.2006.00128.x>

Stevick, P. T., Berrow, S. D., Bérubé, M., Bouveret, L., Broms, F., Jann, B., Kennedy, A., López Suárez, P., Meunier, M., Ryan, C., & Wenzel, F. (2016). There and back again: multiple and return exchange of humpback whales between breeding habitats separated by an ocean basin. *Journal of the Marine Biological Association of the United Kingdom*, 96(Special Issue 04), 885–890. <https://doi.org/10.1017/S0025315416000321>

Stevick, P. T., Øien, N., & Mattila, D. K. (1998). Migration of a Humpback whale (*Megaptera novaeangliae*) between Norway and the West Indies. *Marine Mammal Science*, 14(1), 162–166. <https://doi.org/10.1111/j.1748-7692.1998.tb00701.x>

Surrey-Marsden, C., Accardo, C., White, M., George, C., Gowan, T., Hamilton, P. K., Jackson, K., Jakush, J., Pitchford, T., Taylor, C., Ward, L., & Zoodsma, B. J. (2018). *North Atlantic right whale calving area surveys: 2016/2017 results*. <https://doi.org/10.25923/ybgc-k086>

Swingle, W. M., Barco, S. G., Pitchford, T. D., Mclellan, W. A., & Pabst, D. (1993). Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. *Marine Mammal Science*, 9(3), 309–315.

Vu, E., Risch, D., Clark, C. W., Gaylord, S., Hatch, L., Thompson, M., Wiley, D., & Van Parijs, S. (2012). Humpback whale song occurs extensively on feeding grounds in the western North Atlantic Ocean. *Aquatic Biology*, 14(2), 175–183. <http://www.int-res.com/abstracts/ab/v14/n2/p175-183/>. <https://doi.org/10.3354/ab00390>

Wade, P. R., & Angliss, R. P. (1997b). *Guidelines for assessing marine mammal stocks: Report of the GAMMS Workshop April 3-5, 1996, Seattle, Washington* (p. 93) [NOAA Tech Memo NMFS-OPR-12]. <https://repository.library.noaa.gov/view/noaa/15963>

Wade, P. R., & Angliss, R. P. (1997a). *Guidelines for assessing marine mammal stocks: Report of the GAMMS Workshop April 3-5, 1996, Seattle, Washington*.

Weinrich, M., Martin, M., Griffiths, R., Bove, J., & Schilling, M. (1997). A shift in distribution of humpback whales, *Megaptera novaeangliae*, in response to prey in the southern Gulf of Maine. *Fishery Bulletin*, 95, 826–836. [https://www.researchgate.net/publication/287426437\\_A\\_shift\\_in\\_distribution\\_of\\_humpback\\_whales\\_Megaptera\\_novaeangliae\\_in\\_response\\_to\\_preyn\\_in\\_the\\_southern\\_Gulf\\_of\\_Maine](https://www.researchgate.net/publication/287426437_A_shift_in_distribution_of_humpback_whales_Megaptera_novaeangliae_in_response_to_preyn_in_the_southern_Gulf_of_Maine)

Wells, R. S., Allen, J. B., Lovewell, G., Gorzelany, J., Delynn, R. E., Fauquier, D. A., & Barros, N. B. (2014). Carcass-recovery rates for resident bottlenose dolphins in Sarasota Bay, Florida. *Marine Mammal Science*, 31(1), 355–368. <https://doi.org/10.1111/mms.12142>

Wenzel, F. W., Allen, J., Berrow, S., Hazevoet, C. J., Jann, B., Seton, R. E., Steiner, L., Stevick, P., Suárez, P. L., & Whooley, P. (2009). Current knowledge on the distribution and relative abundance of humpback whales (*Megaptera novaeangliae*) off the Cape Verde Islands, Eastern North Atlantic. *Aquatic Mammals*, 35(4), 502–510. <https://doi.org/10.1578/am.35.4.2009.502>

Whitehead, H., & Moore, M. J. (1982). Distribution and movements of West Indian humpback whales in winter. *Canadian Journal of Zoology*, 60(9), 2203–2211. <https://doi.org/10.1139/z82-282>

Wiley, D., Asmutis, R., Pitchford, T., & Gannon, D. (1995). Stranding and mortality of humpback whales, *Megaptera novaeangliae*, in the mid-Atlantic and southeast United States. *Fisheries Bulletin*, 93, 196–205.

Wiley, D.N., Moller, J.C. and Zilinskas, K.A., 2003. The distribution and density of commercial fisheries and baleen whales within the Stellwagen Bank National Marine Sanctuary: July 2001–June 2002. *Marine Technology Society Journal*, 37(1), pp.35-53.

Winn, H. E., Edel, R. K., & Taruski, A. G. (1975). Population estimate of the humpback whale (*Megaptera novaeangliae*) in the West Indies by visual and acoustic techniques. *Journal of the Fisheries Research Board of Canada*, 32(4), 499–506. <https://doi.org/10.1139/f75-061>

Zerbini, A. N., Clapham, P. J., & Wade, P. R. (2010). Assessing plausible rates of population growth in humpback whales from life-history data. *Marine Biology*, 157(6), 1225–1236. <http://www.springerlink.com/content/j80k78k748124518/>. <https://link.springer.com/article/10.1007/s00227-010-1403-y>

Zoodsma, B. J., Howe, K., White, M., Jakush, J., George, C., Gowan, T., Hamilton, P., Jackson, K., Pitchford, T., Taylor, C., & Ward, L. (2016). North Atlantic right whale calving area surveys: 2014/2015 results. *U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office*. <https://doi.org/10.7289/V5/TM-NMFS-SER-4>

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