

MELON-HEADED WHALE (*Peponocephala electra*): Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The melon-headed whale is distributed worldwide in tropical and subtropical waters (Jefferson et al. 1994). However, sightings of this species in the western North Atlantic are extremely rare. Most stranding records are from Florida and South Carolina, with a few from Virginia and one from New Jersey. There have been two sightings during NMFS vessel surveys between 1992 and 2016. Melon-headed whales in the western North Atlantic are managed separately from those in the northern Gulf of Mexico. Although there have been no directed studies of the degree of demographic independence between the two areas, this management structure is consistent with evidence for strong population structuring in other areas (Martien et al. 2014) and is further supported because the two stocks occupy distinct marine ecoregions (Spalding et al. 2007; Moore and Merrick 2011). Due to the paucity of sightings in the western North Atlantic, there are insufficient data to determine whether the western North Atlantic stock comprises multiple demographically independent populations. Additional morphological, acoustic, genetic, and/or behavioral data are needed to further delineate population structure within the western North Atlantic and across the broader geographic area. Because there are confirmed sightings within waters of the Bahamas, this is likely a transboundary stock (e.g., Halpin et al. 2009; Dunn 2013).

POPULATION SIZE

The number of melon-headed whales off the U.S. Atlantic coast is unknown because they were rarely seen in any surveys. A single group of melon-headed whales was sighted off of Cape Hatteras, North Carolina, in waters >2500 m deep during both a summer 1999 (20 whales) and a winter 2002 (80 whales) vessel survey of the western North Atlantic (Figure 1; NMFS 1999; NMFS 2002). Abundances have not been estimated from these single sightings. Therefore the population size of melon-headed whales is unknown. No confirmed sightings of melon-headed whales have been observed in any other NMFS surveys. Several cruises—a winter 2002 cruise (NMFS 2002), a summer 2005 cruise (NMFS 2005), a summer 2016 cruise (NEFSC and SEFSC 2016), and a summer 2021 cruise (NEFSC and SEFSC 2022)—each had one or two sightings of pygmy killer or melon-headed whales (identity was not confirmed), and these groups were recorded off Cape Hatteras or off the North Carolina/South Carolina border. However, there have been at least two additional sightings of melon-headed whales off Cape Hatteras (Halpin et al. 2009; McLellan 2014).

Minimum Population Estimate

Present data are insufficient to calculate a minimum population estimate for this stock (Table 1).

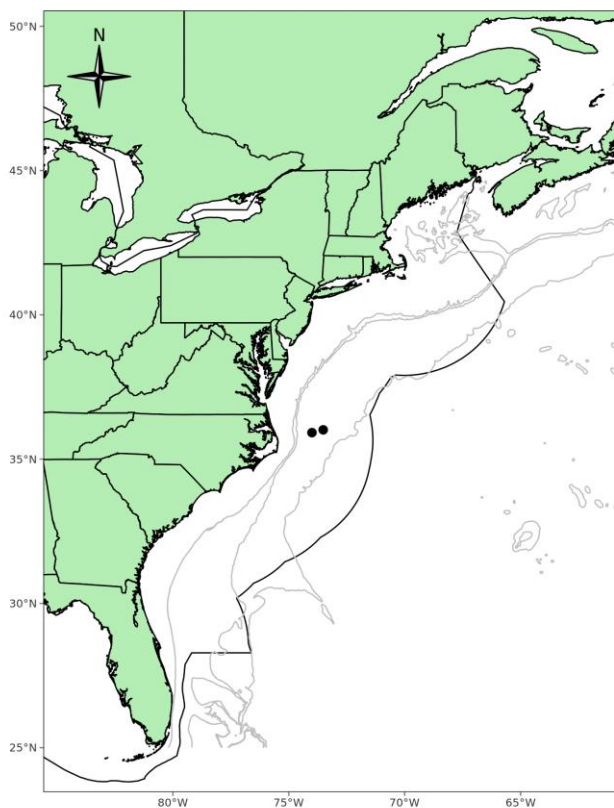


Figure 1. Distribution of melon-headed whale sightings from NEFSC and SEFSC shipboard and aerial surveys during 1995, 1998, 1999, 2002, 2004, 2006, 2007, 2008, 2010, 2011, 2016, and 2021. Isobaths are the 200-m, 1,000-m, and 4,000-m depth contours. The darker line indicates the U.S. EEZ.

Current Population Trend

There are insufficient data to determine the population trends for this stock because no estimates of population size are available.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. For purposes of this assessment, the maximum net productivity rate was assumed to be 0.04. This value is based on theoretical modeling showing that cetacean populations may not grow at rates much greater than 4% given the constraints of their reproductive history (Barlow et al. 1995).

POTENTIAL BIOLOGICAL REMOVAL

Potential Biological Removal level (PBR) is the product of the minimum population size, one-half the maximum productivity rate, and a recovery factor (MMPA Sec. 3.16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is unknown. The maximum productivity rate is 0.04, the default value for cetaceans. The “recovery” factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP), is assumed to be 0.5 because this stock is of unknown status. PBR for the western North Atlantic stock of melon-headed whales is unknown because the minimum population size is unknown (Table 1).

Table 1. Best and minimum abundance estimates for the western North Atlantic melon-headed whale (Peponocephala electra) with Maximum Productivity Rate (R_{max}), Recovery Factor (F_r) and PBR.

N_{est}	CV N_{est}	N_{min}	F_r	R_{max}	PBR
Unknown	-	Unknown	0.5	0.04	Unknown

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Total annual estimated human-caused mortality and serious injury to this stock during 2017–2021 was presumed to be zero, as there were no reports of mortalities or serious injuries to melon-headed whales in the western North Atlantic. This species is rare and as a result the likelihood of observing a take is very low. Survey effort and observer effort are insufficient to effectively estimate takes for this species.

Fishery Information

There is one commercial fishery that could potentially interact with this stock in the Atlantic Ocean, the Category I Atlantic Ocean, Caribbean, Gulf of Mexico large pelagics longline fishery (Appendix III). Pelagic swordfish, tunas and billfish are the target species of the longline fishery. Percent observer coverage (percentage of sets observed) for this fishery in the Atlantic for each year during 2017–2021 was 11, 10, 10, 9, and 8, respectively. There were no observed mortalities or serious injuries to melon-headed whales by this fishery in the Atlantic Ocean during 2017–2021 (Garrison and Stokes 2020a; 2020b; 2021; 2023a; 2023b).

STATUS OF STOCK

Melon-headed whales are not listed as threatened or endangered under the Endangered Species Act, and the Western North Atlantic stock is not considered strategic under the Marine Mammal Protection Act. No fishery-related mortality or serious injury has been observed during recent years; however, because this stock is rare, it is unknown whether total fishery-related mortality and serious injury can be considered insignificant and approaching the zero mortality and serious injury rate. The status of melon-headed whales in the western U.S. Atlantic EEZ relative to optimum sustainable population is unknown. There are insufficient data to determine the population trends for this species.

OTHER FACTORS THAT MAY BE AFFECTING THE STOCK

Strandings

During 2017–2021, three melon-headed whales were reported stranded along the U.S. East Coast (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 13 October 2022 (Southeast Region) and 18 September 2022 (Northeast Region)). Two strandings occurred in Florida (one in 2018, one in 2020), and the remaining stranding occurred in South Carolina (in 2020). No evidence of human interaction

was detected for one stranding, and for the remaining two strandings, it could not be determined if there was evidence of human interaction.

Stranding data underestimate the extent of human and fishery-related mortality and serious injury because not all of the marine mammals that die or are seriously injured in human interactions wash ashore, or, if they do, they are not all recovered (Peltier et al. 2012; Wells et al. 2015; Carretta et al. 2016). In particular, shelf and slope stocks in the western North Atlantic are less likely to strand than nearshore coastal stocks. Additionally, not all carcasses will show evidence of human interaction, entanglement or other fishery-related interaction due to decomposition, scavenger damage, etc. (Byrd et al. 2014). Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of human interaction.

Habitat Issues

Anthropogenic sound in the world's oceans has been shown to affect marine mammals, with vessel traffic, seismic surveys, and active naval sonars being the main anthropogenic contributors to low- and mid-frequency noise in oceanic waters (e.g., Nowacek et al. 2015; Gomez et al. 2016; NMFS 2018). The long-term and population consequences of these impacts are less well-documented and likely vary by species and other factors. Impacts on marine mammal prey from sound are also possible (Carroll et al. 2017), but the duration and severity of any such prey effects on marine mammals are unknown.

The chronic impacts of contaminants (polychlorinated biphenyls [PCBs] and chlorinated pesticides [DDT, DDE, dieldrin, etc.]) on marine mammal reproduction and health are of concern (e.g., Schwacke et al. 2002; Jepson et al. 2016; Hall et al. 2018), but research on contaminant levels for this stock is lacking.

Climate-related changes in spatial distribution and abundance, including poleward and depth shifts, have been documented in or predicted for plankton species and commercially important fish stocks (Nye et al. 2009; Pinsky et al. 2013; Poloczanska et al. 2013; Grieve et al. 2017; Morley et al. 2018) and cetacean species (e.g., MacLeod 2009; Sousa et al. 2019). There is uncertainty in how, if at all, the changes in distribution and population size of cetacean species may interact with changes in distribution of prey species and how the ecological shifts will affect human impacts to the species.

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