FALSE KILLER WHALE (*Pseudorca crassidens*): Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The false killer whale is distributed worldwide throughout warm temperate and tropical oceans (Jefferson et al. 2008). This species is usually sighted in offshore waters but in some cases inhabits waters closer to shore, particularly around oceanic islands (e.g., Hawaii, Baird et al. 2013). While sightings from the U.S. western North Atlantic have been uncommon (Figure 1), the combination of sighting, stranding and bycatch records indicates that this species routinely occurs in the western North Atlantic. False killer whales have been sighted in U.S. Atlantic waters from southern Florida to Maine (Schmidly 1981). There are periodic records (primarily stranding) from southern Florida to Cape Hatteras dating back to 1920 (Schmidly 1981). Most of the records are from the southern half of Florida and include a mass stranding in 1970 that may have numbered as many as 175 individuals (Caldwell et al. 1970; Schmidly 1981). Because there are confirmed sightings within waters of Canada and the Bahamas, this is likely a transboundary stock (e.g., Halpin et al. 2009; Dunn 2013; DFO 2017; Emery 2020; Figure 1).

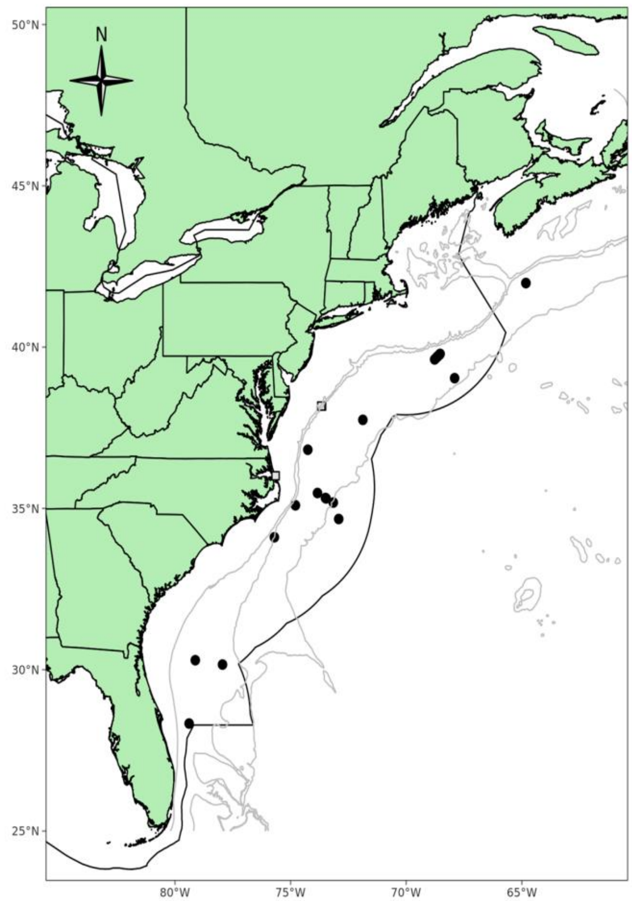

Figure 1. Distribution of false killer whale sightings from NEFSC and SEFSC shipboard (circles) and aerial (squares) surveys during 1995, 1998, 1999, 2002, 2004, 2006, 2007, 2008, 2010, 2011, 2016, and 2021. Isobaths are the 200-m, 1,000-m, and 4,000-m depth contours. The darker line indicates the U.S.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

Genetic analyses (Chivers et al. 2007; Martien et al. 2014) indicate false killer whales exhibit significant population structuring in the Pacific, with restricted gene flow among whales sampled near the main Hawaiian Islands, the Northwestern Hawaiian Islands, and pelagic waters of the eastern and the central North Pacific. Martien et al. (2014) also found their two Atlantic samples to be genetically divergent from those in the Pacific. False killer 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 further supported because the two stocks occupy distinct marine ecoregions (Spalding et al. 2007; Moore and Merrick 2011). Given the paucity of sightings, 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.

POPULATION SIZE

The best available abundance estimate for western North Atlantic false killer whales is 1,298 (CV=0.72; Table 1; Garrison and Dias 2023; Palka 2023). This estimate is from summer 2021 surveys covering waters from central Florida to the lower Bay of Fundy.

Earlier Abundance Estimates

Please see Appendix IV for a summary of abundance estimates, including earlier estimates and survey descriptions.

Recent Surveys and Abundance Estimates

Abundance estimates of 1,182 (CV=0.63) and 609 (CV=1.08) false killer whales were generated from vessel surveys conducted in U.S. waters of the western North Atlantic during the summer of 2016 (Table 1; Garrison 2020; Palka 2020). One survey was conducted from 27 June to 25 August in waters north of 38ºN latitude and consisted of 5,354 km of on-effort trackline along the shelf break and offshore to the U.S. EEZ (NEFSC and SEFSC 2018). The second vessel survey covered waters from Central Florida to approximately 38ºN latitude between the 100-m isobaths and the U.S. EEZ during 30 June–19 August. A total of 4,399 km of trackline was covered on effort (NEFSC and SEFSC 2018). Both surveys utilized two visual teams and an independent observer approach to estimate detection probability on the trackline (Laake and Borchers 2004). Mark-recapture distance sampling was used to estimate abundance. It should be noted that the abundance estimate from the second vessel survey was based on a single sighting and therefore has a very high uncertainty.

More recent abundance estimates of 753 (CV=1.13) and 545 (CV=0.68) false killer whales were generated from vessel surveys conducted in U.S. waters of the western North Atlantic during the summer of 2021 (Table 1; Garrison and Dias 2023; Palka 2023). One survey was conducted from 16 June to 23 August in waters north of 36ºN latitude and consisted of 5,871 km of on-effort trackline along the shelf break and offshore to the outer edge of the U.S. EEZ (NEFSC and SEFSC 2022). The second vessel survey covered waters from central Florida (25ºN latitude) to approximately 38ºN latitude between the 200-m isobaths and the outer edge of the U.S. EEZ during 12 June–31 August. A total of 5,659 km of trackline was covered on effort (NEFSC and SEFSC 2022). Both surveys utilized two visual teams and an independent observer approach to estimate detection probability on the trackline (Laake and Borchers 2004). Mark-recapture distance sampling was used to estimate abundance. Estimates from the two surveys were combined and CVs pooled to produce a species abundance estimate for the stock area.

Table 1. Summary of abundance estimates for the western North Atlantic false killer whale* (Pseudorca crassidens) *by month, year, and area covered during each abundance survey, and resulting abundance estimate (N_{best}) and coefficient of variation (CV). The estimate considered best is in bold font.

Month/Year	Area	N_{best}	CV
Jun–Aug 2016	New Jersey to lower Bay of Fundy	1,182	0.63
Jun–Aug 2016	Central Florida to New Jersey	609	1.08
Jun–Aug 2016	Central Florida to lower Bay of Fundy (COMBINED)	1,791	0.56
Jun–Aug 2021	New Jersey to lower Bay of Fundy	753	1.13
Jun–Aug 2021	Central Florida to New Jersey	545	0.68
Jun–Aug 2021	**Central Florida to lower Bay of Fundy (COMBINED)**	1,298	0.72

Minimum Population Estimate

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally 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 false killer whales is 1,298 (CV=0.72). The minimum population estimate for false killer whales is 755 (Table 2).

Current Population Trend

There are three available coastwide abundance estimates for false killer whales from the summers of 2011, 2016, and 2021. Each of these is derived from surveys with similar survey designs and all three used the two-team independent observer approach to estimate abundance. The resulting estimates were 442 (CV=1.06) in 2011; 1,791 (CV=0.56) in 2016; and 1,298 (CV=0.72) in 2021 (Garrison 2020; Garrison and Dias 2023; Palka 2020; Palka 2023). A generalized linear model did not indicate a statistically significant (p=0.786) trend in these estimates. The high level of uncertainty in these estimates limits the ability to detect a statistically significant trend. A key uncertainty in this assessment of trend is that interannual variation in abundance may be caused by either changes in spatial distribution associated with environmental variability or changes in the population size of the stock.

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 (PBR) is the product of minimum population size, one-half the maximum net productivity rate, and a recovery factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is 755. 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 false killer whale stock is 7.6 (Table 2).

Table 2. Best and minimum abundance estimates for the western North Atlantic false killer whale with Maximum Productivity Rate (R_{max}), Recovery Factor (F_r) and PBR.

N_{est}	CV N_{est}	N_{min}	F_r	R_{max}	PBR
1,298	0.72	755	0.5	0.04	7.6

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 false killer whales in the western North Atlantic. Recorded takes of false killer whales in fisheries in the western North Atlantic are extremely rare. However, observer coverage in the fisheries is relatively low. Furthermore, the likelihood is low that a dolphin killed at sea due to a fishery interaction or vessel strike will be recovered (Williams et al. 2011). These factors introduce some uncertainty into estimating the true level of human-caused mortality and serious injury for this stock.

Fishery Information

There are two commercial fisheries that interact, or that could potentially interact, with this stock in the Atlantic Ocean. These are the Category I Atlantic Highly Migratory Species longline and the Atlantic Ocean, Caribbean, Gulf of Mexico large pelagics longline fisheries (Appendix III). Percent observer coverage (percentage of sets observed) for these longline fisheries in the Atlantic for each year during 2017–2021 was 11, 10, 10, 9, and 8, respectively.

The Atlantic Highly Migratory Species longline fishery operates outside the U.S. EEZ. No takes of false killer whales within high seas waters of the Atlantic Ocean have been observed or reported thus far.

The Atlantic Ocean, Caribbean, Gulf of Mexico large pelagics longline fishery operates in the U.S. Atlantic (including Caribbean) and Gulf of Mexico EEZ, and pelagic swordfish, tunas and billfish are the target species. There were no observed mortalities or serious injuries to false killer whales by this fishery in the Atlantic Ocean during 2017–2021 (Garrison and Stokes 2020a; 2020b; 2021; 2023a; 2023b).

STATUS OF STOCK

False killer 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 in recent years; therefore, total fishery-related mortality and serious injury can be considered insignificant and approaching the zero mortality and serious injury rate. The status of false killer whales in the U.S. EEZ relative to optimum sustainable population is unknown. There was no statistically significant trend in population size for this species; however, the high level of uncertainty in the estimates limits the ability to detect a statistically significant trend.

OTHER FACTORS THAT MAY BE AFFECTING THE STOCK

Strandings

Historically, there have been intermittent false killer whale strandings along the U.S. East Coast, however, during 2017–2021, none were reported (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 13 October 2022 (Southeast Region) and 18 September 2022 (Northeast Region)).

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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