SPINNER DOLPHIN (*Stenella longirostris longirostris*): Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Spinner dolphins are distributed in tropical oceanic and coastal waters worldwide (Leatherwood et al. 1976). The species is found in offshore, deep-waters (Schmidly 1981; Perrin and Gilpatrick 1994) but island associated populations are documented in the Pacific (Karczmarski et al. 2005; Andrews et al. 2010) and the Indian Oceans (Oremus et al. 2007; Viricel et al. 2016), where they often use shallower waters for resting during the day. Restricted levels of gene flow have been documented among some island populations (Oremus et al. 2007; Viricel et al. 2016) and among pelagic populations in eastern tropical Pacific (Leslie and Morin 2016). The species' distribution in the western North Atlantic is very poorly known. Spinner dolphin sightings have occurred almost exclusively in deeper (>2,000 m) oceanic waters (CETAP 1982; Waring et al. 1992) off the northeast U.S. coast. There was one sighting during summer 2011 in oceanic waters off North Carolina, and two additional sightings during summer 2016 in oceanic waters off Virginia (Figure 1). They are more commonly sighted in the Gulf of Mexico than the western North Atlantic. Stranding records exist from North Carolina, South Carolina, Florida, and Puerto Rico in the Atlantic, and in Texas, Louisiana, Alabama, and Florida in the Gulf of Mexico.

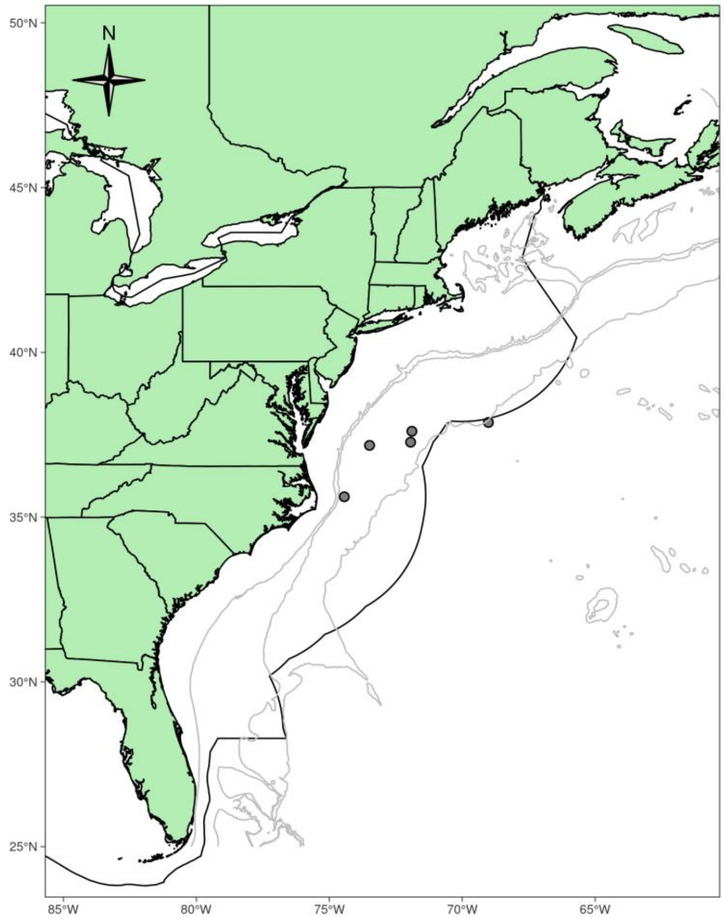

Figure 1. Distribution of spinner dolphin sightings from NEFSC and SEFSC shipboard (circles) and aerial (squares) surveys during 1995, 1998, 1999, 2002, 2004, 2006, 2007, 2008, 2010, 2011, 2016 and 2021. Isobaths are the 200-m, 1,000-m, and 4,000-m depth contours. The darker line indicates the U.S. EEZ.

Spinner dolphins 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 population structure in other areas, including more pelagic waters of the eastern tropical Pacific (Leslie and Morin 2016), 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, 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 abundance estimate available for spinner dolphins in the western North Atlantic is 3,181 (CV=0.65;

Garrison and Dias 2023; Palka 2023). This estimate is from summer 2021 surveys covering waters from central Florida to the lower Bay of Fundy.

Recent Surveys and Abundance Estimates

Abundance estimates of 160 (CV=0; based on a single sighting) and 3,942 (CV=1.03) spinner dolphins were generated from vessel surveys conducted in U.S. waters of the western North Atlantic during the summer of 2016 (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. Estimates from the two surveys were combined and CVs pooled to produce a species abundance estimate for the stock area.

More recent abundance estimates of 3,181 (CV=0.65) and 0 spinner dolphins 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 spinner dolphin (*Stenella longirostris*) 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 Bay of Fundy	160	0
Jun–Aug 2016	Central Florida to New Jersey	3,942	1.03
Jun–Aug 2016	Central Florida to Bay of Fundy (COMBINED)	4,102	0.99
Jun–Aug 2021	New Jersey to lower Bay of Fundy	3,181	0.65
Jun–Aug 2021	Central Florida to New Jersey	0	-
Jun–Aug 2021	**Central Florida to lower Bay of Fundy (COMBINED)**	**3,181**	**0.65**

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 spinner dolphins is 3,181 (CV=0.65). The minimum population estimate for spinner dolphins is 1,930 (Table 2).

Current Population Trend

Spinner dolphins are rarely sighted during abundance surveys, and only two estimates of population size are available. The resulting estimates of abundance are both highly variable between years and highly uncertain. The rare encounter rates limit the ability to assess or interpret trends in population size.

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 life history (Barlow et al. 1995).

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 and Angliss 1997). The minimum population size is 1,930. 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 spinner dolphin is 19 (Table 2).

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

N_{est}	CV N_{est}	N_{min}	F_r	R_{max}	PBR
3,181	0.65	1,930	0.5	0.04	19

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 spinner dolphins 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 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 spinner dolphins 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 spinner dolphins by this fishery in the Atlantic Ocean during 2017–2021 (Garrison and Stokes 2020a; 2020b; 2021; 2023a; 2023b).

STATUS OF STOCK

Spinner dolphins 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 this stock relative to optimum sustainable population in the U.S. Atlantic EEZ 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, one spinner dolphin was reported stranded on the U.S. East Coast, in Florida (in 2017) (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 13 October 2022 (Southeast Region) and 18 September 2022 (Northeast Region)). No evidence of human interaction was detected.

Stranding data probably 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), and decomposition can also introduce uncertainty in visual species identification of a carcass, particularly for closely related species like those in the genus Stenella. 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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