ROUGH-TOOTHED DOLPHIN (*Steno bredanensis*): Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Rough-toothed dolphins (*Steno bredanensis*) are distributed worldwide in the Atlantic, Pacific and Indian Oceans, generally in warm temperate, subtropical, or tropical waters. They are commonly reported in a wide range of water depths, from shallow, nearshore waters to oceanic waters (West et al. 2011). Most shipboard sightings from the U.S. East Coast have occurred in oceanic waters at depths greater than 1,000 m (Figure 1). Sightings of rough-toothed dolphins along the East Coast of the U.S. are much less common than in the Gulf of Mexico (CETAP 1982; NMFS 1999; Mullin and Fulling 2003). Because there are confirmed sightings within waters of the Bahamas, this is likely a transboundary stock (e.g., Halpin et al. 2009; Dunn 2013).

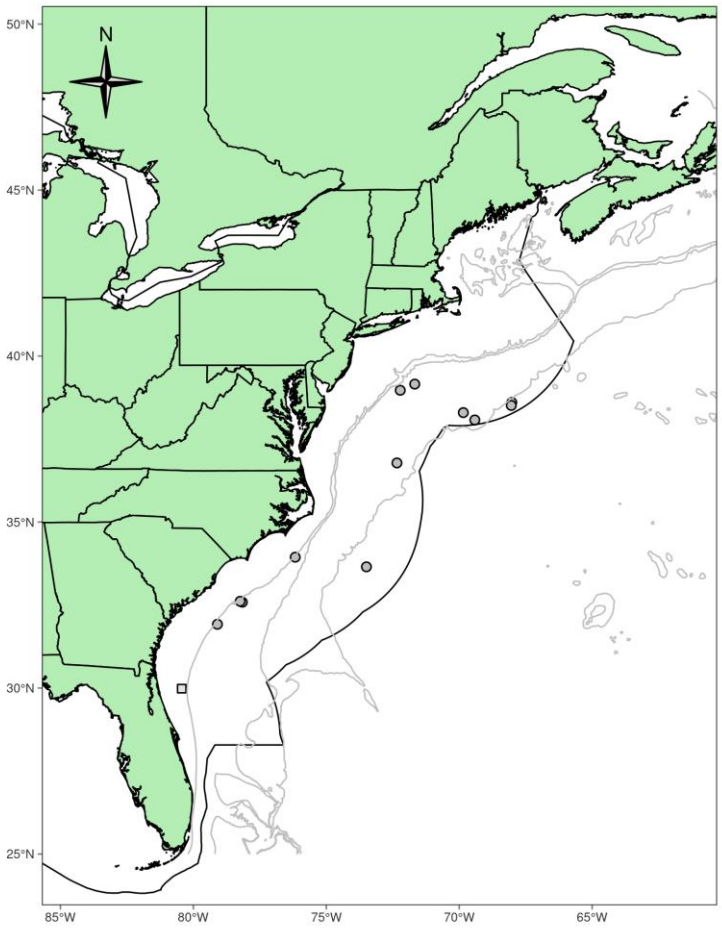

Figure 1. Distribution of rough-toothed dolphin sightings from NEFSC and SEFSC shipboard (circles) and aerial (squares) surveys during 1995, 1998, 1999, 2002, 2004, 2006, 2007, 2008, 2010, 2011, 2016 and 2021. Isobaths are the 200-m, 1,000-m, and 4,000-m depth contours. The darker line indicates the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

In the western North Atlantic, tracking of five rough-toothed dolphins that were rehabilitated and released following a mass stranding on the east coast of Florida in 2005, demonstrated a variety of ranging patterns (Wells et al. 2008). All tagged rough-toothed dolphins moved through a large range of water depths averaging greater than 100 m, though each of the five tagged dolphins transited through very shallow waters at some point. These five rough-toothed dolphins moved through waters ranging from 17° to 31°C, with temperatures averaging 21° to 30°C. Recorded dives were rarely deeper than 50 m, with the tagged dolphins staying fairly close to the surface. It is not known how representative of normal species patterns any of these movements are.

Analyses of worldwide genetic differentiation in *Steno* indicate animals in the western Atlantic Ocean are strongly differentiated from those in the Pacific and Indian Oceans (da Silva et al. 2015; Albertson et al. 2022). Albertson et al. (2022) illustrated that this species exhibits population structure within the North Atlantic and da Silva et al. (2015) provided evidence for multiple populations in the western South Atlantic. However, to date there has been no examination of stock structure for this species within the western North Atlantic or the Gulf of Mexico. For management purposes, rough-toothed dolphins observed off the eastern U.S. coast are considered a separate stock from those in the northern Gulf of Mexico. There are insufficient data to determine whether multiple demographically-independent populations exist with the western North Atlantic Stock. Additional morphological, acoustic, genetic and/or behavioral data are needed to further delineate population structure in this region.

POPULATION SIZE

The number of rough-toothed dolphins off the U.S. Atlantic coast is unknown since it has been rarely sighted during surveys. Neither of the two most recent shipboard surveys during summer 2016 and summer 2021, covering waters from central Florida to the lower Bay of Fundy, observed this species (NEFSC and SEFSC 2018; NEFSC and SEFSC 2022). The most recent sightings occurred during 2011 (NMFS 2011). See Appendix IV for a summary of earlier abundance estimates and survey descriptions.

Minimum Population Estimate

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

Current Population Trend

A trend analysis cannot be conducted for this stock due to the small number of sightings in any single year.

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 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 rough-toothed dolphins is undetermined (Table 1).

Table 1. Best and minimum abundance estimates for the western North Atlantic rough-toothed dolphin (*Steno bredanensis*) 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	Undetermined

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 rough-toothed 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 currently no U.S. fisheries in the western North Atlantic with evidence of interactions that have resulted in incidental mortality or serious injury of rough-toothed dolphins. There has been documented serious injury of rough-toothed dolphins by the Category I large pelagics longline fishery in the northern Gulf of Mexico (Garrison and Stokes 2016). In addition, there has been documented mortality and serious injury of rough-toothed dolphins in the Hawaii shallow-set longline fishery and the American Samoa pelagic longline fishery in the U.S. Pacific (Carretta et al. 2017; Carretta et al. 2018). Rough-toothed dolphins have been taken incidentally in the tuna purse seine nets in the eastern tropical Pacific, and in gillnets off Sri Lanka, Brazil and the offshore North Pacific (Jefferson 2002). A small number of this species are taken in directed fisheries in the Caribbean countries of St. Vincent and the Lesser Antilles, as well as in countries in the Pacific and off Ghana in the eastern north Atlantic Ocean (Northridge 1984; Argones 2001; Jefferson 2002; Reeves et al. 2003).

STATUS OF STOCK

Rough-toothed 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 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 rough-toothed dolphins in the U.S. EEZ relative to optimum sustainable population is unknown. Given the limited number of sightings of rough-toothed dolphins over the years, the abundance estimate for this stock is unknown and there are insufficient data to determine population trends for this stock. Although there are currently no known habitat issues or other factors causing a decline or impeding recovery, potential sources of human-caused mortality for this stock are poorly understood.

OTHER FACTORS THAT MAY BE AFFECTING THE STOCK

Strandings

Although there have been several mass strandings of rough-toothed dolphins along the U.S. east coast in the past, during 2017–2021 no rough-toothed dolphin strandings 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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