FRASER'S DOLPHIN (*Lagenodelphis hosei*): Northern Gulf of Mexico Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Fraser's dolphins are distributed worldwide in tropical waters (Perrin *et al.* 1994), and they have more recently been reported from temperate and subtropical areas of the North Atlantic (Gomes-Pereira *et al.* 2013). They are generally oceanic in distribution but may be seen closer to shore where deep water can be found near the shore, such as in the Lesser Antilles of the Caribbean Sea (Dolar 2009). Sightings occur only sporadically during vessel surveys in the northern Gulf of Mexico (i.e., U.S. Gulf of Mexico) and are generally confined to oceanic waters (>200 m) (Figure 1; Maze-Foley and Mullin 2006) and they have been observed in all seasons (Leatherwood *et al.* 1993, Hansen *et al.* 1996, Mullin and Hoggard 2000).

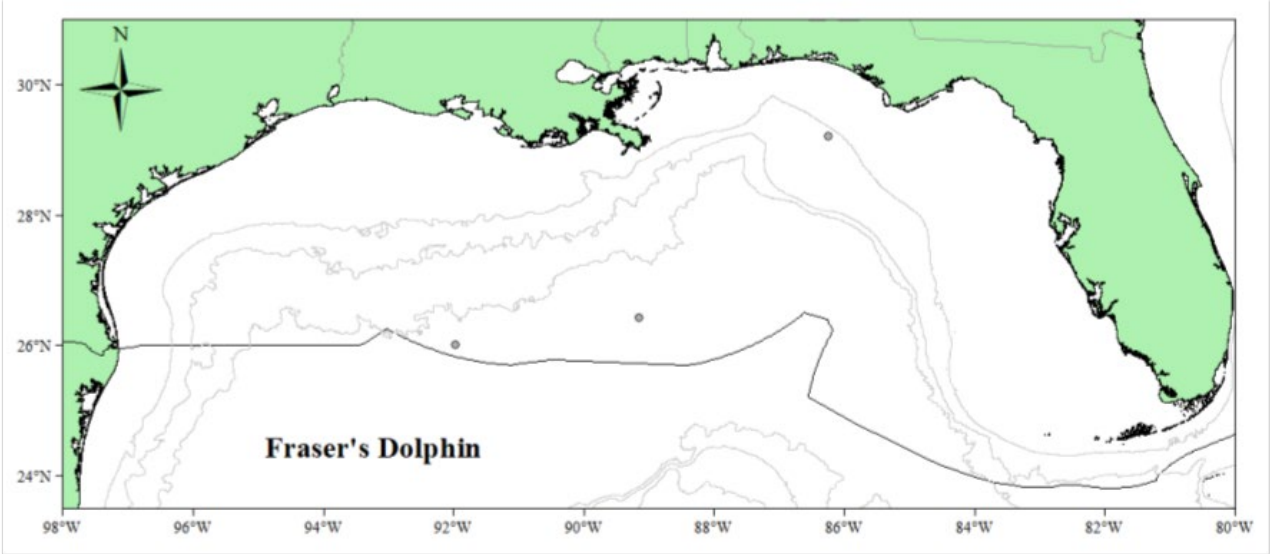

Figure 1. Distribution of Fraser's dolphin on-effort sightings from SEFSC vessel surveys during spring 1996–2001, summer 2003, spring 2004, summer 2009, summer 2017, and summer/fall 2018. Isobaths are the 200-m, 1,000-m, and 2,000-m depth contours. The darker line indicates the U.S. EEZ.

All the cetacean species found in the oceanic northern Gulf of Mexico almost certainly occur in similar habitat beyond U.S. boundaries in the southern Gulf. There are fewer cetacean sighting and stranding records in the southern Gulf due to more limited effort. Nevertheless there are records for most oceanic species in the southern Gulf (e.g., Jefferson and Schiro 1997; Ortega Ortiz 2002; Ortega-Argueta *et al.* 2005; Jefferson *et al.* 2008; Vázquez Castán *et al.* 2009; Whitt *et al.* 2011). This is therefore likely a transboundary stock with Cuba and/or Mexico. Because U.S. waters only comprise about 40% of the entire Gulf of Mexico and 35% of the oceanic (i.e., >200 m) Gulf of Mexico (Mullin and Fulling 2004), abundance and stock boundaries of oceanic species are poorly known.

Fraser's dolphins in the northern Gulf of Mexico are managed separately from those in the western North Atlantic. Although there have been no directed studies of the degree of demographic independence between the two areas, this management structure is consistent with the fact that the Gulf of Mexico and western North Atlantic belong to distinct marine ecoregions (Spalding *et al.* 2007, Moore and Merrick 2011). Due to the paucity of sightings in the northern Gulf of Mexico, there are insufficient data to determine whether the northern Gulf of Mexico stock comprises multiple demographically independent populations. Additional morphological, acoustic, genetic, and/or behavioral data are needed to further delineate population structure within the Gulf of Mexico and across the broader geographic area.

POPULATION SIZE

The best abundance estimate (Nest) for northern Gulf of Mexico Fraser's dolphins is 213 (CV=1.03; Table 1). This estimate is from summer 2017 and summer/fall 2018 oceanic surveys covering waters from the 200-m isobath to the seaward extent of the U.S. EEZ (Garrison *et al.* 2020).

Earlier Abundance Estimates

During surveys conducted in 2003, 2004, and 2009, there were no sightings of Fraser's dolphins.

Recent Surveys and Abundance Estimates

An abundance estimate for Fraser's dolphins was generated from vessel surveys conducted in the northern Gulf of Mexico from the continental shelf edge (~200-m isobath) to the seaward extent of the U.S. EEZ (Garrison *et al.* 2020). One survey was conducted from 2 July to 25 August 2017 and consisted of 7,302 km of on-effort trackline, and the second survey was conducted from 11 August to 6 October 2018 and consisted of 6,473 km of on-effort trackline within the surveyed strata. Both surveys used a double-platform data-collection procedure to allow estimation of the detection probability on the trackline using the independent observer approach assuming point independence (Laake and Borchers 2004). However, this species was observed during tracklines when only one survey team was on effort. Therefore, abundance estimates were derived using MCDS distance sampling methods that accounted for the effects of covariates (e.g., sea state, glare) on detection probability within the surveyed strip (Thomas *et al.* 2010) implemented in package mrds (version 2.21; Laake *et al.* 2020) in the R statistical programming language. The estimated detection probability on the trackline for similar species was then applied to develop the final abundance estimate. The abundance estimate for this stock included sightings of unidentified dolphins that were apportioned among species based on their relative density within the survey strata (Garrison *et al.* 2020). The surveys were conducted in "passing mode" (e.g., Schwarz *et al.* 2010) while all prior surveys in the Gulf of Mexico have been conducted in "closing mode." Passing mode eliminates the problems of fragmented tracklines associated with using closing mode in areas with high densities of animals. When using the closing mode with the two-team method, both teams must be allowed the opportunity to see a mammal group and allow it to pass behind the ship before turning to close on it, making it difficult to reacquire the group and resulting in long periods spent chasing the group, with the increased potential for off-effort sightings. For passive acoustics, in closing mode the vessel often turns before the acoustic team is able to achieve a good localization. This is especially important for deep-diving species where visual surveys are less optimal for abundance estimates. However, passing mode can result in increased numbers of unidentified sightings and may have affected group size estimation for distant groups of dolphins and small whales. There were sightings of Fraser's dolphins in 2017 but there were none in 2018. The 2017 and 2018 estimates were N=427 (CV=1.03) and N=0 (CV=NA), respectively. The inverse variance weighted mean abundance for Fraser's dolphins in oceanic waters during 2017 and 2018 was 213 (CV=1.03; Table 1; Garrison *et al.* 2020). Unlike previous abundance estimates, this estimate was corrected for the probability of detection on the trackline.

Table 1. Most recent abundance estimate (N_{est}) and coefficient of variation (CV) of northern Gulf of Mexico Fraser's dolphins in oceanic waters (200 m to the offshore extent of the EEZ) based on the inverse variance weighted mean from summer 2017 and summer/fall 2018 vessel surveys.

Years	Area	N_{est}	CV
2017, 2018	Gulf of Mexico	213	1.03

Minimum Population Estimate

The minimum population estimate (Nmin) is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate. This is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by Wade and Angliss (1997). The best estimate of abundance for Fraser's dolphins is 213 (CV=1.03). The minimum population estimate for the northern Gulf of Mexico Fraser's dolphin is 104 (Table 2).

Current Population Trend

There are insufficient data to determine the population trends for this species. No Fraser's dolphins were sighted during 2003, 2004, 2009, and 2018 surveys. The fluctuations in total abundance of Fraser's dolphins are probably due to a number of factors. Fraser's dolphin is most certainly a resident species in the Gulf of Mexico but probably occurs in low numbers and the survey effort is not sufficient to estimate the abundance of uncommon or rare species with precision. Also, because this is likely a transboundary stock, the temporal changes in abundance estimates are difficult to interpret without a Gulf of Mexico-wide understanding of Fraser's dolphin distribution and abundance.

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 the 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 104. 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 the stock is of unknown status. PBR for the northern Gulf of Mexico Fraser's dolphin is 1.0 (Table 2).

Table 2. Best and minimum abundance estimates for northern Gulf of Mexico Fraser's dolphins with Maximum Productivity Rate (R_{max}), Recovery Factor (F_r) and PBR.

N_{est}	CV	N_{min}	F_r	R_{max}	PBR
213	1.03	104	0.5	0.04	1.0

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Total annual estimated fishery-related mortality and serious injury to this stock during 2014–2018 was presumed to be zero, as there were no reports of mortalities or serious injuries to Fraser's dolphins in the Gulf of Mexico (Table 3). Mean annual mortality and serious injury during 2014–2018 due to other human-caused actions (e.g., the *Deepwater Horizon* oil spill) was unknown (see Habitat Issues section). The minimum total mean annual human-caused mortality and serious injury for this stock during 2014–2018 was, therefore, unknown.

Table 3. Total annual estimated fishery-related mortality and serious injury for northern Gulf of Mexico Fraser's dolphins.

Years	Source	Annual Avg.	CV
2014–2018	U.S. fisheries using observer data	0	-

Fisheries Information

There are two commercial fisheries that interact, or that could potentially interact, with this stock in the Gulf of Mexico. These are the Category I Atlantic Highly Migratory Species (high seas) longline fishery and the Category I Atlantic Ocean, Caribbean, Gulf of Mexico large pelagics longline fishery (Appendix III). Percent observer coverage (percentage of sets observed) for this fishery for each year during 2014–2018 was 18, 19, 23, 13 and 20, respectively. There is very little effort within the Gulf of Mexico by the Atlantic Highly Migratory Species (high seas) longline fishery, and no takes of Fraser's dolphins within high seas waters of the Gulf of Mexico have been observed or reported thus far. Pelagic swordfish, tunas and billfish are the targets of the longline fishery operating in the northern Gulf of Mexico. During 2014–2018 there were no observed mortalities or serious injuries to Fraser's dolphins by this fishery (Garrison and Stokes 2016, 2017, 2019, 2020a, 2020b).

Other Mortality

There was one mass stranding of five Fraser's dolphins in the Gulf of Mexico during 2014–2018 (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 21 May 2019). The mass stranding occurred off Florida in July 2017, and it could not be determined if there was evidence of human interaction

for any of the dolphins. Stranding data probably underestimate the extent of human and fishery-related mortality and serious injury because not all of the whales 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). In particular, oceanic stocks in the Gulf of Mexico are less likely to strand than nearshore coastal stocks or shelf stocks (Williams *et al.* 2011). 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.

An Unusual Mortality Event (UME) was declared for cetaceans in the northern Gulf of Mexico beginning 1 March 2010 and ending 31 July 2014 (Litz *et al.* 2014; https://www.fisheries.noaa.gov/national/marine-life-distress/2010-2014-cetacean-unusual-mortality-event-northern-gulf-mexico). It included cetaceans that stranded prior to the *Deepwater Horizon* (DWH) oil spill (see "Habitat Issues" below), during the spill, and after. Exposure to the DWH oil spill was determined to be the primary underlying cause of the elevated stranding numbers in the northern Gulf of Mexico after the spill (e.g., Schwacke *et al.* 2014; Venn-Watson *et al.* 2015; Colegrove *et al.* 2016; DWH NRDAT 2016; see Habitat Issues section). However, there were no Fraser's dolphin strandings recovered within the spatial and temporal boundaries of this UME.

HABITAT ISSUES

The DWH MC252 drilling platform, located approximately 80 km southeast of the Mississippi River Delta in waters about 1,500 m deep, exploded on 20 April 2010. The rig sank, and over 87 days ~3.2 million barrels of oil and gas were discharged from the wellhead until it was capped on 15 July 2010 (DWH NRDAT 2016). Shortly after the oil spill, the Natural Resource Damage Assessment (NRDA) process was initiated under the Oil Pollution Act of 1990. A variety of NRDA research studies were conducted to determine potential impacts of the spill on marine mammals. These studies did not include Fraser's dolphins regarding impacts of the spill due to insufficient data to determine the overlap of the DWH oil spill footprint and the range of Fraser's dolphins (DWH MMIQT 2015). The impact of the spill on Fraser's dolphins is unknown.

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.

STATUS OF STOCK

Fraser's dolphins are not listed as threatened or endangered under the Endangered Species Act, and the northern Gulf of Mexico 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 Fraser's dolphins in the northern Gulf of Mexico, relative to OSP, is unknown. There are insufficient data to determine the population trends for this stock.

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