ROUGH-TOOTHED DOLPHIN (*Steno bredanensis*):
Northern Gulf of Mexico Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The rough-toothed dolphin is distributed worldwide in tropical to warm temperate waters (Leatherwood and Reeves 1983; Miyazaki and Perrin 1994). Rough-toothed dolphins occur in both oceanic and continental shelf waters in the northern Gulf of Mexico (Fulling *et al.* 2003; Mullin and Fulling 2004). Rough-toothed dolphins were seen in all seasons during GulfCet aerial surveys of the northern Gulf of Mexico between 1992 and 1998 (Hansen *et al.* 1996; Mullin and Hoggard 2000). Four dolphins from a mass stranding of 62 animals in the Florida Panhandle in December 1997 were rehabilitated and released in 1998, and satellite-linked transmitters tracked for 4 - 112 days. A report after 5 months ,indicated that the animals returned to, and remained in, Gulf waters averaging about 195 m deep offshore of the original stranding site (Wells *et al.* 1999).

The Gulf of Mexico population is provisionally being considered 1 stock for management purposes, although there is currently no information to differentiate this stock from the Atlantic Ocean stock(s). Additional morphological, genetic and/or behavioral data are needed to provide further information on stock delineation.

POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland *et al.* 2001) and the computer program DISTANCE (Thomas *et al.* 1998) to sighting data. From 1991 through 1994, line-transect vessel surveys were conducted in conjunction with bluefin tuna ichthyoplankton surveys during spring in the northern Gulf of Mexico from the 200-m isobath to the seaward extent of the U.S. Exclusive Economic Zone (EEZ) (Hansen *et al.* 1995). Annual cetacean surveys were conducted along a fixed plankton sampling trackline. Survey effort-weighted estimated average abundance of rough-toothed dolphins for all surveys combined was 852 (CV= 0.31) (Hansen *et al.* 1995). This was probably an underestimate and should be considered a partial stock estimate because the continental shelf area was not entirely covered.
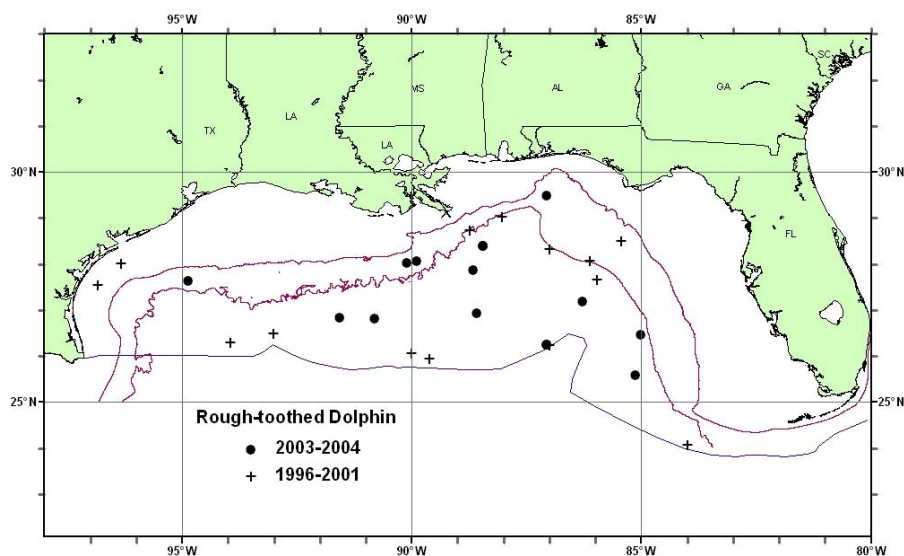

Figure 1. *Distribution of rough-toothed dolphin sightings from SEFSC spring and fall vessel surveys during 1996-2001 and from summer 2003 and spring 2004 surveys. All the on-effort sightings are shown, though not all were used to estimate abundance. Solid lines indicate the 100-m and 1,000-m isobaths and the offshore extent of the U.S. EEZ.*

Similar surveys were conducted during spring from 1996 to 2001 (excluding 1998) in oceanic waters of the northern Gulf of Mexico from 200 m to the offshore extent of the U.S. EEZ. Estimates for all oceanic strata were summed, as survey effort was not uniformly distributed, to calculate a total estimate for the entire northern Gulf of Mexico oceanic waters (Mullin and Fulling 2004). Due to limited survey effort in any given year, survey effort was pooled across all years to develop an average abundance estimate for both continental shelf and oceanic waters. The estimate of abundance for rough-toothed dolphins in oceanic waters, pooled from 1996 through 2001, was 985 (CV=0.44) (Mullin and Fulling 2004). Data were collected from 1998 to 2001 during fall plankton surveys. Tracklines, which were perpendicular to the bathymetry, covered shelf waters from 20 to 200 m deep in the fall of 1998 through 2001 (Figure 1 and Table 1; see Fulling *et al.* 2003). As recommended in the GAMMS Workshop Report (Wade and Angliss 1997), estimates using data older than 8 years are deemed unreliable, and therefore should not be used for PBR determinations. Therefore, the

estimated abundance of rough-toothed dolphins was based on data pooled from 2000 through 2001, for the outer continental shelf shipboard surveys and was 1,145 (CV=0.83) (see Fulling *et al.* 2003).

Month/Year	Area	N_{best}	CV
Fall 1999-2001	Outer Continental Shelf	1,145	0.83
Spring/Summer 2003 -2004	Oceanic	1,508	0.39
Spring/Summer & Fall	**OCS & Oceanic**	**2,653**	**0.42**

Table 1. Abundance estimates (N_{best}) and Coefficient of Variation (CV) of rough-toothed dolphins in the northern U.S. Gulf of Mexico outer continental shelf (OCS) (waters 20-200 m deep) during fall 2000-2001 and oceanic waters (200 m to the offshore extent of the EEZ) during spring/summer 2003-2004.

During summer 2003 and spring 2004, line-transect surveys dedicated to estimating the abundance of oceanic cetaceans were conducted in the northern Gulf of Mexico. During each year, a grid of uniformly-spaced transect lines from a random start were surveyed from the 200-m isobath to the seaward extent of the U.S. EEZ using NOAA Ship *Gordon Gunter*. The estimate of abundance for rough-toothed dolphins in oceanic waters from 2003 and 2004, was 1,508 (CV=0.39) (Mullin 2007).

Because most of the data for oceanic estimates prior to 2003 were older than the 8-year limit and due to the different oceanic sampling strategies, estimates from the 2003 and 2004 surveys were considered most reliable for oceanic waters. The best available abundance estimate for the rough-toothed dolphin in the northern Gulf of Mexico is the combined estimate of abundance for both the outer continental shelf and oceanic waters which is 2,653 (CV=0.42).

Minimum Population Estimate

The minimum population estimate 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 rough-toothed dolphins is 2,653 (CV=0.42). The minimum population estimate for the northern Gulf of Mexico is 1,890 rough-toothed dolphins.

Current Population Trend

There are insufficient data to determine the population trends for this species.

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 net productivity rate and a "recovery" factor (MMPA Sec. 3.16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is 1,890. 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 rough-toothed dolphin is 18.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

There has been no reported fishing-related mortality or serious injury of rough-toothed dolphins during 1992-2006 (Yeung 1999; Yeung 2001; Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007).

Fisheries Information

The level of past or current, direct, human-caused mortality of rough-toothed dolphins in the northern Gulf of Mexico

is unknown. Pelagic swordfish, tunas and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. There were no reports of mortality or serious injury to rough-toothed dolphins by this fishery in the Gulf of Mexico during 1992-2006 (Yeung 1999; Yeung 2001; Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007).

Other Mortality

There were 49 stranded rough-toothed dolphins in the northern Gulf of Mexico during 1999-2006, including a mass stranding of 19 animals in February 2001 and a mass stranding of 11 animals in March 2005 (Table 2 displays 2002-2006 data). There was no evidence of human interactions for these stranded animals. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured in fishery interactions wash ashore, not all that wash ashore are discovered, reported or investigated, nor will all of those that do wash ashore necessarily show signs of entanglement or other fishery interaction. Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of fishery interactions.

Table 2. Rough-toothed dolphin (*Steno bredanensis*) strandings along the U.S. Gulf of Mexico coast, 2002-2006.

STATE	2002	2003	2004	2005	2006	TOTAL
Alabama	0	0	0	0	0	0
Florida	1	1	12	11[a]	1	26
Louisiana	0	0	0	0	0	0
Mississippi	0	0	0	0	0	0
Texas	0	0	1	1	1	3
TOTAL	1	1	13	12	2	29

[a] Florida mass stranding of 11 animals in March 2005

STATUS OF STOCK

The status of rough-toothed dolphins in the northern Gulf of Mexico, relative to OSP, is unknown. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine the population trends for this species. The total level of U.S. Gulf of Mexico fishery-caused mortality and serious injury for this stock is unknown, but assumed to be less than 10% of the calculated PBR and can be considered to be insignificant and approaching zero mortality and serious injury rate. This is not a strategic stock because average annual human-related mortality and serious injury does not exceed PBR.

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