

BOTTLENOSE DOLPHIN (*Tursiops truncatus*): Northern Gulf of Mexico Oceanic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Thirty-eight stocks have been provisionally identified for northern Gulf of Mexico (i.e., U.S. Gulf of Mexico) bottlenose dolphins (Waring *et al.* 2001). Northern Gulf of Mexico inshore habitat has been separated into 33 bay, sound and estuarine stocks. Three northern Gulf of Mexico coastal stocks include nearshore waters from the shore to the 20 m isobath. The northern Gulf of Mexico continental shelf stock encompasses waters from 20 to 200 m deep. The northern Gulf of Mexico oceanic stock encompasses the waters from the 200-m isobath to the seaward extent of the U.S. Exclusive Economic Zone (EEZ; Figure 1).

Both “coastal/nearshore” and “offshore” ecotypes of bottlenose dolphins (Hersh and Duffield 1990) occur in the Gulf of Mexico (LeDuc and Curry 1998) but the distribution of each is not known. The offshore and nearshore ecotypes are genetically distinct using both mitochondrial and nuclear markers (Hoelzel *et al.* 1998). In the northwestern Atlantic Ocean, Torres *et al.* (2003) found a statistically significant break in the distribution of the ecotypes at 34 km from shore. The offshore ecotype was found exclusively seaward of 34km and in waters deeper than 34 m. The continental shelf is much wider in the Gulf of Mexico and these results may not apply. Ongoing research is aimed at defining these boundaries in the Gulf of Mexico.

Based on research currently being conducted on bottlenose dolphins in the northern Gulf of Mexico, as well as the western North Atlantic Ocean, the structure of these stocks is uncertain, but appears to be complex. The multi-disciplinary research programs conducted over the last 37 years (e.g., Wells 1994) are beginning to shed light on stock structures of bottlenose dolphins, though additional analyses are needed before stock structures can be elaborated on in the northern Gulf of Mexico. As research is completed, it may be necessary to revise stocks of bottlenose dolphins in the northern Gulf of Mexico.

The northern Gulf of Mexico oceanic stock of bottlenose dolphins is provisionally being considered separate from the Atlantic Ocean stocks of bottlenose dolphins for management purposes. One line of evidence to support this decision comes from (Baron *et al.* 2008), who found that Gulf of Mexico bottlenose dolphin whistles (collected from oceanic waters) were significantly different from those in the western North Atlantic Ocean (collected from continental shelf and oceanic waters) in duration, number of inflection points and number of steps.

POPULATION SIZE

The best abundance estimate available for the northern Gulf of Mexico oceanic stock of bottlenose dolphins is 3,708 (CV=0.42) (Mullin 2007; Table 1). This estimate is pooled from summer 2003 and spring 2004 oceanic surveys covering waters from the 200m isobath to the seaward extent of the U.S. EEZ.

Earlier abundance estimates

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. Surveys were conducted in conjunction with bluefin tuna ichthyoplankton surveys during spring from 1996 to 2001

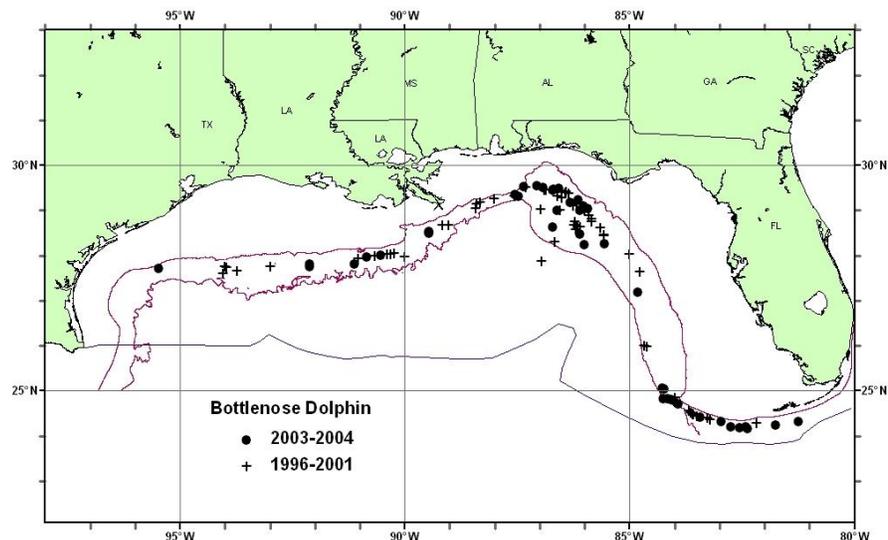


Figure 1. Distribution of bottlenose dolphin sightings from SEFSC shipboard surveys during spring 1996-2001 and from summer 2003 and spring 2004 surveys. All the on-effort sightings are shown, though not all were used to estimate abundance. Solid lines indicate the 100-m and 1,000-m isobaths and the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

(excluding 1998) in oceanic waters of the northern Gulf of Mexico. Tracklines, which were perpendicular to the bathymetry, covered the waters from 200m to the offshore extent of the U.S. EEZ. Due to limited survey effort in any given year, survey effort was pooled across all years to develop an average abundance estimate. The estimate of abundance for bottlenose dolphins in oceanic waters, pooled from 1996 to 2001, was 2,239 (CV=0.41) (Mullin and Fulling 2004; Table 1).

Recent surveys and abundance estimates

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* (Mullin 2007).

As recommended in the GAMMS Workshop Report (Wade and Angliss 1997), estimates older than 8 years are deemed unreliable, and therefore should not be used for PBR determinations. Because most of the data for estimates prior to 2003 were older than this 8-year limit and due to the different sampling strategies, estimates from the 2003 and 2004 surveys were considered most reliable. The estimate of abundance for bottlenose dolphins in oceanic waters, pooled from 2003 to 2004, was 3,708 (CV=0.42) (Mullin 2007; Table 1), which is the best available abundance estimate for this species in the northern Gulf of Mexico.

Table 1. Summary of abundance estimates for the northern Gulf of Mexico oceanic stock of bottlenose dolphins. Month, year and area covered during each abundance survey, and resulting abundance estimate (N_{best}) and coefficient of variation (CV).			
Month/Year	Area	N_{best}	CV
Apr-Jun 1996-2001 (excluding 1998)	Oceanic waters	2,239	0.41
Jun-Aug 2003, Apr-Jun 2004	Oceanic waters	3,708	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 bottlenose dolphins is 3,708 (CV=0.42) taken from Mullin and Fulling (2004). The minimum population estimate for the northern Gulf of Mexico oceanic stock is 2,641 bottlenose dolphins.

Current Population Trend

There are insufficient data to determine the population trends for this species. The pooled abundance estimate for 2003 to 2004 of 3,708 (CV=0.42) and that for 1996-2001 of 2,239 (CV=0.41) are not significantly different ($P>0.05$), but due to the imprecision of the estimates, the power to detect a difference is low. These temporal abundance estimates are difficult to interpret without a Gulf of Mexico-wide understanding of bottlenose dolphin abundance and stock structure. The Gulf of Mexico is composed of waters belonging to the U.S., Mexico and Cuba. U.S. waters only comprise about 40% of the entire Gulf of Mexico, and 65% of oceanic waters are south of the U.S. EEZ. The oceanography of the Gulf of Mexico is quite dynamic, and the spatial scale of the Gulf is small relative to the ability of most cetacean species to travel. Studies based on abundance and distribution surveys restricted to U.S. waters are unable to detect temporal shifts in distribution beyond U.S. waters that might account for any changes in abundance.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum productivity rates are unknown for this stock. For purposes of this assessment, the maximum 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 level (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 2,641. 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 Gulf of Mexico oceanic bottlenose dolphin is 26.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Annual human-caused mortality and serious injury is unknown for this stock.

Fisheries Information

The level of past or current, direct, human-caused mortality of bottlenose dolphins in the Gulf of Mexico is unknown; however, interactions between bottlenose dolphins and fisheries have been observed in the Gulf of Mexico. Pelagic swordfish, tunas and billfish are the targets of the longline fishery operating in the northern Gulf of Mexico. There were no reports of mortality or serious injury to bottlenose dolphins by this fishery in the northern Gulf of Mexico during 1998-2007 (Yeung 1999; 2001; Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007; Fairfield and Garrison 2008). However, during 2007, 1 bottlenose dolphin was observed entangled and released alive in the northern Gulf of Mexico. All gear was removed and the animal was presumed to have no serious injuries (Fairfield and Garrison 2008). This animal could have belonged to the continental shelf or oceanic stock. Fishery interactions have previously been reported to occur between bottlenose dolphins and the longline swordfish/tuna fishery in the northern Gulf of Mexico (SEFSC unpublished logbook data), with annual fishery-related mortality and serious injury to bottlenose dolphins estimated to be 2.8 per year (CV=0.74) during 1992-1993. This could include bottlenose dolphins from the continental shelf and oceanic stocks. One animal was hooked in the mouth and released by the pelagic longline fishery in 1998 (Yeung 1999). There have been no reports of incidental mortality or injury associated with the shrimp trawl fishery in this area. A trawl fishery for butterfish was monitored by NMFS observers for a short period in the 1980s with no records of incidental take of marine mammals (Burn and Scott 1988; NMFS unpublished data), although an experimental set by NMFS resulted in the death of 2 bottlenose dolphins (Burn and Scott 1988). There are no other data available with regard to this fishery.

Other Mortality

A total of 1,425 bottlenose dolphins were found stranded in the northern Gulf of Mexico from 2003 through 2007 (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 16 September 2008). Of these, 82 showed evidence of human interactions as the cause of death (e.g., gear entanglement, mutilation, gunshot wounds). The vast majority of stranded bottlenose dolphins are assumed to belong to one of the coastal stocks or to bay, sound and estuarine stocks. Nevertheless, it is possible that some of the stranded bottlenose dolphins belonged to the continental shelf or oceanic stocks and that they were among those strandings with evidence of human interactions. (Strandings do occur for other cetacean species whose primary range in the Gulf of Mexico is outer continental shelf or oceanic waters.)

The use of explosives to remove oil rigs in portions of the continental shelf in the western Gulf of Mexico has the potential to cause serious injury or mortality to marine mammals. These activities have been closely monitored by NMFS observers since 1987 (Gitschlag and Herczeg 1994). There have been no reports of either serious injury or mortality to bottlenose dolphins in the oceanic Gulf of Mexico (NMFS unpublished data).

STATUS OF STOCK

The status of bottlenose dolphins, relative to OSP, in the northern Gulf of Mexico oceanic waters 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. Total human-caused mortality and serious injury for this stock is not known. There is insufficient information available to determine whether the total fishery-related mortality and serious injury for this stock is insignificant and approaching zero mortality and serious injury rate. This is not a strategic stock because it is assumed that the average annual human-related mortality and serious injury does not exceed PBR.

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