SPERM WHALE (*Physeter macrocephalus*): Northern Gulf of Mexico Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Sperm whales are found throughout the world's oceans in deep waters to the edge of the ice at both poles (Leatherwood and Reeves 1983; Rice 1989; Whitehead 2002). Seasonal aerial surveys confirm that sperm whales are present in the northern Gulf of Mexico in all seasons (Mullin *et al.* 1994; Hansen *et al.* 1996; Mullin and Hoggard 2000).

There has been speculation, based on year-round occurrence of strandings, opportunistic sightings, and whaling catches, that sperm whales in the Gulf of Mexico may constitute a distinct stock (Schmidly 1981). Recent research supports distinct stock status for the Gulf of Mexico. Genetic analysis of skin biopsies from 89 Gulf sperm whales indicates that of four mtDNA haplotypes found in the Gulf, two are unique to the Gulf on a global scale (D. Engelhaupt, pers. comm.; Mullin *et al.* 2003). A satellite-tagged sperm whale tracked for 137 days in 2001, remained in the Gulf of Mexico the entire time (Mate 2002). Results of photo-identification studies showed that four sperm whales identified in 1994 were sighted in 2001 at distances between resightings of 26.4 to 111.8 km (C. Cates, pers. comm.; Mullin *et al.* 2003). The Gulf of Mexico population is provisionally being considered a separate stock for management purposes. Additional morphological, genetic and/or behavioral data are needed to provide further information on stock delineation.

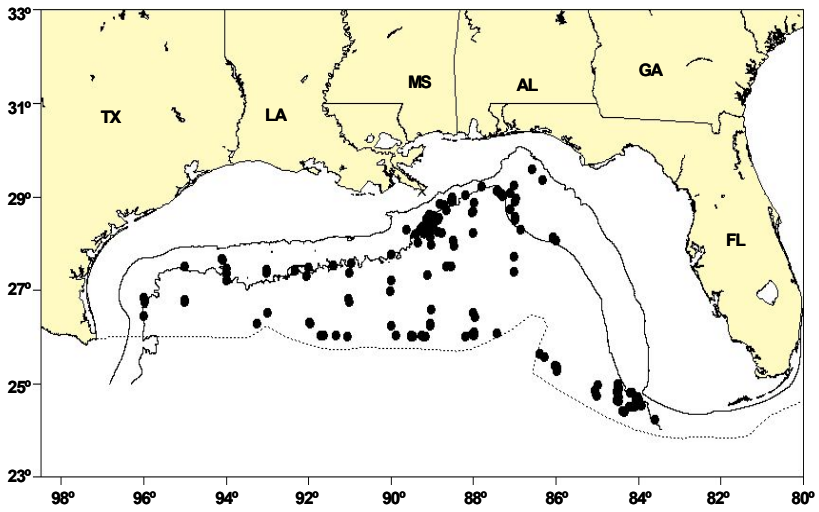

Figure 1. Distribution of sperm whale sightings from SEFSC spring vessel surveys during 1996-2001. All the on-effort sightings are shown, though not all were used to estimate abundance. Solid lines indicate the 100 m and 1000 m isobaths and the dotted line indicates the offshore extent of the U.S. EEZ.

Disturbance by anthropogenic noise may prove to be an important habitat issue in some areas of this population's range, notably in areas of oil and gas activities or where shipping activity is high. Limited studies are currently being conducted to address this issue and its impact, if any, on this and other marine species. The potential impact, if any, of coastal pollution may be an issue for this species in portions of its habitat, though little is known on this to date.

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 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). Survey effort-weighted estimated average abundance of sperm whales for all surveys combined was 530 (CV=0.31) (Hansen *et al.* 1995). As recommended in the GAMMS Workshop Report (Wade and Angliss 1997), estimates older than eight years are deemed unreliable, and therefore should not be used for PBR determinations.

Similar surveys were conducted during April/May from 1996 to 2001 (excluding 1998) in oceanic waters of the northern Gulf of Mexico, using NOAA ships *Oregon II* (1996, 1997, 1999) and *Gordon Gunter* (2000, 2001). 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 (Figure 1; Mullin and Fulling, in review). 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 sperm whales in oceanic waters, pooled from 1996 to 2001, is 1,349 (CV=0.23) (Mullin and Fulling, in review), which is the best available abundance estimate for this species in the northern Gulf of Mexico. A re-analysis of the 1991-1994 data using the same spatial stratification of survey effort as Mullin and Fulling (in review) resulted in an estimate of 805 sperm whales (CV=0.27) (SEFSC unpublished).

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 sperm whales is 1,349 (CV=0.23). The minimum population estimate for the northern Gulf of Mexico is 1,114 sperm whales.

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 1,114 (CV=0.23). 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 0.1 because sperm whales are an endangered species. PBR for the northern Gulf of Mexico sperm whale is 2.2.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

There has been no reported fishing-related mortality of a sperm whale between 1997 and 2001 (Yeung 1999; Yeung 2001).

A commercial fishery for sperm whales operated in the Gulf of Mexico in deep waters between the Mississippi River delta and DeSoto Canyon during the late 1700's to the early 1900's (Mullin *et al.* 1991), but the exact number of whales taken is not known (Townsend 1935; Lowery 1974). Townsend (1935) reported many records of sperm whales from April through July in the north-central Gulf (Petersen and Hoggard 1996).

Fisheries Information

The level of past or current, direct, human-caused mortality of sperm whales 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 sperm whales by this fishery.

Other Mortality

A total of 17 sperm whale strandings were documented in the northern Gulf of Mexico between 1997 and 2002. One of the whales had deep, parallel cuts posterior to the dorsal ridge that were believed to be caused by the propeller of a large vessel. This trauma was assumed to be the proximate cause of this stranding. However, there have been no recent strandings with indications of human interactions. Petersen and Hoggard (1996) indicated a total of 22 sperm whale strandings were recorded in Texas, Louisiana, and Florida prior to 1992. In addition, one three-year old female live stranded in Mississippi in March 1994, and was subsequently euthanized to prevent further suffering due to its compromised body condition (Peterson and Hoggard 1996). 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.

STATUS OF STOCK

The status of sperm whales in the northern Gulf of Mexico, relative to OSP, is unknown. This species is listed as endangered under the Endangered Species Act (ESA). There are insufficient data to determine the population trends for this species. The total fishery-related 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 a strategic stock because the sperm whale is listed as an endangered species under the ESA.

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