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BRYDE'S WHALE (*Balaenoptera edeni*): Northern Gulf of Mexico Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Bryde's whales are considered the tropical and sub-tropical baleen whale of the world's oceans. In the western Atlantic, Bryde's whales are reported from off the southeastern United States and the southern West Indies to Cabo Frio, Brazil (Leatherwood and Reeves 1983). Most of the sighting records of Bryde's whales in the Gulf of Mexico are from NMFS abundance surveys that were conducted during the spring (Figure 1; Hansen *et al.* 1995; Hansen *et al.* 1996; Mullin and Hoggard 2000; Mullin and Fulling, in review). However, there are stranding records from throughout the year (Würsig *et al.* 2000).

The Gulf of Mexico population is provisionally being considered a separate stock for management purposes, although there is currently no information to differentiate this stock from the Atlantic stock(s). Additional morphological, genetic and/or behavioral data are needed to provide further information on stock delineation. It has been postulated that the Bryde's whales found in the Gulf of Mexico may represent a resident stock (Schmidly 1981; Leatherwood and Reeves 1983), but there is no information on stock differentiation.

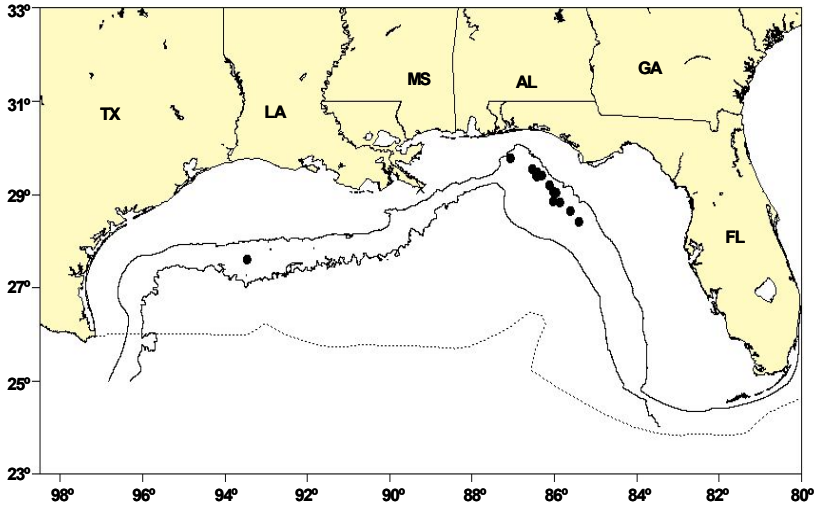

Figure 1. Distribution of Bryde's whale sightings from SEFSC spring vessel surveys during 1996-2001. All the on-effort sightings are shown, though not all were used to estimate abundance. Solid lines indicate the 100 m and 1000 m isobaths and the dotted line indicates the offshore extent of the U.S.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

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 Bryde's whales for all surveys combined from 1991 through 1994 was 35 (CV=1.10) (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 (Fig. 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 Bryde's whales in oceanic waters, pooled from 1996 to 2001, is 40 (CV=0.61) (Mullin and Fulling, in review), which is the best available abundance estimate for this species in the northern Gulf of Mexico.

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 Bryde's whales is 40 (CV=0.61). The minimum population estimate for the northern Gulf of Mexico is 25 Bryde's 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 25. 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. PBR for the northern Gulf of Mexico Bryde's whale is 0.3.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

There has been one reported longline fishing-related entanglement of a Bryde's whale (Yeung 1999; Yeung 2001), but the line was removed and the animal released alive. Observed fishery-related mortality and serious injury for Bryde's whales is less than 10% of PBR and can be considered insignificant and approaching zero mortality and serious injury rate for this stock.

Fisheries Information

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

Other Mortality

There were no reported strandings of Bryde's whales in the Gulf of Mexico between 1997 and 2002. 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 Bryde's whales 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 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 not a strategic stock because average annual fishery-related mortality and serious injury has not exceeded PBR for the last two years..

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