

DWARF SPERM WHALE (*Kogia simus*): Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The dwarf sperm whale (*Kogia simus*) and the pygmy sperm whale (*K. breviceps*) appear to be distributed worldwide in temperate to tropical waters (Caldwell and Caldwell 1989). Sightings of these animals in the northern Gulf of Mexico occur primarily along the continental shelf edge and over the deeper waters off the continental shelf (Mullin *et al.* 1991; NMFS unpublished data). Recent analyses of hemoglobin, morphometric and dietary data from Florida strandings of both species (Barros *et al.* 1998) suggests that habitat partitioning may exist between the two species, *K. simus* occupies more offshore and oceanic waters, whereas *K. breviceps* inhabits more mid-shelf waters. Interestingly, a recent analysis of South Africa stranding data indicates that in that region *K. simus* is the nearshore species (Plön *et al.* 1998). Pygmy sperm whales and dwarf sperm whales are difficult to distinguish and sightings of either species are often categorized as *Kogia* sp. There is no information on stock differentiation for the Atlantic population.

POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland *et al.* 1993) and the computer program DISTANCE (Laake *et al.* 1993) to sighting data collected during a 1992 winter, visual sampling, line-transect vessel survey of the U.S. Atlantic Exclusive Economic Zone (EEZ) waters between Miami, Florida, and Cape Hatteras, North Carolina. Abundance was estimated for both species combined because the majority of sightings were not identified to species, and both species are known to occur in the area. The estimated abundance of dwarf sperm whales and pygmy sperm whales combined for the 1992 surveys was 420 animals (coefficient of variation, CV = 0.60) (Hansen *et al.* 1994). Dwarf sperm whale abundance alone cannot be estimated due to uncertainty of species identification of sightings.

Minimum Population Estimate

A best and minimum population size could not be estimated because of the uncertainty in species identification.

Current Population Trend

No information was available evaluate trends in population size.

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 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 unknown. 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 this stock is of unknown status. PBR for the western North Atlantic dwarf sperm whale is unknown because the minimum population size cannot be estimated.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Total annual estimated average fishery-related mortality or serious injury to this stock during 1992-1996 was 0.2 dwarf sperm whales (CV = 0; Table 1).

Fishery Information

The level of past or current, direct, human-caused mortality of dwarf sperm whales in the U.S. Atlantic EEZ is unknown. Available information indicates there is likely little fisheries interaction with dwarf sperm whales in the U.S. Atlantic EEZ. 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 may wash ashore, nor will all of those that do wash ashore necessarily show signs of entanglement or other fishery-interaction.

Data on current incidental takes in U.S. fisheries are available from several sources. In 1986, NMFS established a mandatory logbook system for large pelagic fisheries. The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program initiated in 1989, and since that year several fisheries have been covered by the program. In late 1992 and in 1993 the SEFSC provided observer coverage of pelagic longline vessels fishing off the Grand Banks (Tail of the Banks) and currently provides observer coverage of vessels fishing south of Cape Hatteras.

By-catch has been observed by NMFS Sea Samplers in the pelagic drift gillnet fishery, but no mortalities or serious injuries have been documented in the pelagic longline, pelagic pair trawl, New England multispecies sink gillnet, mid-Atlantic coastal sink gillnet, and North Atlantic bottom trawl fisheries.

Pelagic Drift Gillnet

The estimated total number of hauls in the pelagic drift net fishery increased from 714 in 1989 to 1144 in 1990; thereafter, with the introduction of quotas, effort was severely reduced. The estimated number of hauls in 1991, 1992, 1993, 1994, 1995, and 1996 were 233, 243, 232, 197, 164, and 149 respectively. Fifty-nine vessels participated in this fishery between 1989 and 1993. Since 1994, between 10 to 12 vessels have participated in the fishery (Table 2). Observer coverage, percent of sets observed, was 8% in 1989, 6% in 1990, 20% in 1991, 40% in 1992, 42% in 1993, 87% in 1994, 99% in 1995, and 64% in 1996. The greatest concentrations of effort were located along the southern edge of Georges Bank and off Cape Hatteras. Examination of the species composition of the catch and locations of the fishery throughout the year, suggested that the pelagic drift gillnet fishery be stratified into two strata, a southern or winter stratum, and a northern or summer stratum. Estimates of total by-catch, for each year from 1989 to 1993, were obtained using the aggregated (pooled 1989-1993) catch rates, by strata, assuming the 1990 injury was a mortality (Northridge 1996). Estimated annual fishery-related mortality and serious injury (CV in parentheses) was 0 dwarf sperm whales from 1991-1994, 1.0 in 1995 (CV = 0), and 0 in 1996. Estimated average annual mortality and serious injury related to this fishery during 1992-1996 was 0.2 dwarf sperm whales (CV = 0) (Table 1). The 1992-1996 time period provides a better characterization of the current fishery.

Table 1. Summary of the incidental mortality of the dwarf sperm whale (*Kogia simus*), by commercial fishery including the years sampled (Years), the number of vessels active within the fishery (Vessels), the type of data used (Data Type), the annual observer coverage (Observer Coverage), the mortalities recorded by on-board observers (Observed Mortality), the estimated annual mortality (Estimated Mortality), the estimated CV of the annual mortality (Estimated CVs) and the mean annual mortality (CV in parentheses).

Fishery	Years	Vessels ¹	Data Type ²	Observer Coverage ³	Observed Mortality	Estimated Mortality ⁴	Estimated CVs ⁴	Mean Annual Mortality
Pelagic Drift Gillnet	92-96	1994=12 1995=11 1996=10	Obs. Data Logbook	.40, .42, .87, .99, .64	0, 0, 0, 1, 0	0, 0, 0, 1 ⁵ , 0	0	0.2 (0)
TOTAL								0.2 (0)

¹ 1994 to 1996 shown, other years not available on an annual basis.

² Observer data (Obs. Data) are used to measure bycatch rates, and the data are collected within the Northeast Fisheries Science Center (NEFSC) Sea Sampling Program. Logbook (Logbook) data are used to measure total effort, and the data are collected at the Southeast Fisheries Science Center (SEFSC).

³ The observer coverage and unit of effort for the Pelagic Drift Gillnet is a set.

⁴ For 1991-1993, pooled bycatch rates were used to estimate bycatch in months that had fishing effort but did not have observer coverage. This method is described in Northridge (1996). In 1994 and 1995, observer coverage increased substantially, and bycatch rates were not pooled for this period.

⁵ One vessel was not observed and recorded 1 set in a 10 day trip in the SEFSC mandatory logbook. If you assume the vessel fished 1.4 sets per day as estimated from the 1995 SS data, the point estimate may increase by 0.08 animals. However, the SEFSC mandatory logbook data were taken at face value, and therefore it was assumed that one set was fished within this trip, and the point estimate would then increase by 0.01 animals.

Other Mortality

At least 23 dwarf sperm whale strandings have been documented along the U.S. Atlantic coast between Cape Hatteras, North Carolina, and Miami, Florida, during 1987-1996). Three of the stranded animals had plastic, or a plastic bag or bags in their stomachs, and one of these three had possible propeller cuts on or near the flukes.

STATUS OF STOCK

The status of this stock relative to OSP in the U.S. Atlantic EEZ is unknown. This species is not listed as endangered or threatened under the Endangered Species Act. There is insufficient information with which to assess population trends. It is not known whether total fishery-related mortality and serious injury for this stock is less than 10% of PBR and therefore cannot be considered insignificant and approaching zero mortality and serious injury rate, because PBR cannot be calculated. Upon the advice of the Atlantic Scientific Review Group this stock has been designated a strategic stock because PBR cannot be determined and there is an unknown amount of possible human-caused mortality from the ingestion of marine debris such as plastic bags and from possible boat strikes.

REFERENCES

- Barlow, J., S.L. Swartz, T.C. Eagle, and P.R. Wade. 1995. U.S. Marine Mammal Stock Assessments: Guidelines for Preparation, Background, and a Summary of the 1995 Assessments. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-6, 73 pp.
- Barros, N.B., D.A. Duffield, P.H. Ostrom, D.K. Odell and V.R. Cornish. 1998. Near-shore vs. off-shore ecotype differentiation of *Kogia breviceps* and *K. simus* based on hemoglobin, morphometric and dietary analyses. The World Marine Mammal Conference, 20-24 January 1998, Monaco (Abstract).

- Buckland, S. T., D. R. Anderson, K. P. Burnham and J. L. Laake. 1993. Distance Sampling: estimating abundance of biological populations. *Chapman & Hall*, London, 446 pp.
- Caldwell, D. K. and M. C. Caldwell. 1989. Pygmy sperm whale *Kogia breviceps* (de Blainville, 1838): dwarf sperm whale *Kogia simus* Owen, 1866. Pages 235-26. In: S. H. Ridgway and R. Harrison (eds.). Handbook of marine mammals, Vol. 4: river dolphins and the larger toothed whales. *Academic Press*, San Diego.
- Hansen, L. J., K. D. Mullin and C. L. Roden. 1994. Preliminary estimates of cetacean abundance in the northern Gulf of Mexico from vessel surveys. Southeast Fisheries Science Center, Miami Laboratory, Contribution No. MIA-93/94-58.
- Laake, J. L., S. T. Buckland, D. R. Anderson, and K. P. Burnham. 1993. DISTANCE user's guide, V2.0. Colorado Cooperative Fish & Wildlife Research Unit, Colorado State University, Ft. Collins, Colorado, 72 pp.
- Mullin, K., W. Hoggard, C. Roden, R. Lohofener, C. Rogers and B. Taggart. 1991. Cetaceans on the upper continental slope in the north-central Gulf of Mexico. OCS Study/MMS 91-0027. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Regional Office, New Orleans, Louisiana, 108 pp.
- Northridge, S. 1996. Estimation of cetacean mortality in the U.S. Atlantic swordfish and tuna drift gillnet and pair trawl fisheries. Final report to the Northeast Fisheries Science Center, Contract No.40ENNF500045. 18p.
- Plön, S.E.E., R.W. Harris, P.M. Illgner and V.G.C. Cockcroft. 1998. Analysis of pygmy *Kogia breviceps* and dwarf *Kogia simus* sperm whale strandings along the South African coastline using a geographic information system. The World Marine Mammal Conference, 20-24 January 1998, Monaco (Abstract).
- Wade P.R., and R.P. Angliss. 1997. Guidelines for assessing marine mammal stocks: Report of the GAMMS Workshop April 3-5, 1996, Seattle, Washington. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-12, 93 pp.