

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

### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

The dwarf sperm whale (*Kogia simus*) appears to be distributed worldwide in temperate to tropical waters (Caldwell and Caldwell 1989). There are no stranding records for the east Canadian coast (Willis and Baird 1998). Sightings of these animals in the Western North Atlantic occur primarily along the continental shelf edge and over the deeper waters off the continental shelf (Hansen et al 1994 NMFS unpublished data). Dwarf sperm whales and pygmy 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. In a recent study using hematological and stable-isotope data, Barros *et al.* (1998) speculated that dwarf sperm whales may have a more pelagic distribution than pygmy sperm whales, and/or dive deeper during feeding bouts.

### **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 for this species in the Western North Atlantic.

### **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 (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**

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.

### **Fishery Information**

Data on current incidental takes in USA 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 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

In 1996 and 1997, the NMFS issued management regulations which prohibited the operation of this fishery in 1997. Further, in January 1999 the NMFS issued a Final Rule to prohibit the use of driftnets (i.e., permanent closure) in the North Atlantic swordfish fishery (50 CFR Part 630). Fifty-nine different vessels participated in the pelagic drift gillnet fishery at one time or another between 1989 and 1993. In 1994 and 1995, respectively, there were 12 and 11 vessels in the fishery (Table 1). Observer coverage, expressed as percent of sets observed, was 8% in 1989, 6% in 1990, 20% in 1991, 40% in 1992, 42% in 1993, 87% in 1994 and 99% in 1995. Effort was concentrated 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. There was one report of mortality or serious injury to dwarf sperm whales attributable to this fishery. Estimated annual fishery-related mortality and serious injury (CV in parentheses) was 0 dwarf sperm whales from 1991-1994, and 1.0 in 1995 (CV = 0); estimated average annual mortality and serious injury related to this fishery during 1993-1997 was 0.2 dwarf sperm whales (CV = 0) (Table 1).

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 <sup>1</sup>	Data Type <sup>2</sup>	Observer Coverage <sup>3</sup>	Observed Mortality	Estimated Mortality <sup>4</sup>	Estimated CVs- <sup>†</sup>	Mean Annual Mortality
Pelagic Drift Gillnet	93-97	1994=12 1995=11	Obs. Data Logbook	.42, .87, .99, .64, NA	0, 0, 1, 0, NA	0, 0, 1.0 <sup>4</sup> , 0, NA	0	0.2 (0)
TOTAL								0.2 (0)

<sup>1</sup> 1994 and 1995 shown, other years not available on an annual basis.

<sup>2</sup> 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).

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

<sup>4</sup> 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 was taken at face value, and therefore it was assumed that 1 set was fished within this trip, and the point estimate would then increase by 0.01 animals.

### Other Mortality

Historical stranding records (1883-1988) of dwarf sperm whales in the southeastern USA (Credle 1988), and strandings recorded during 1988-1997 (Barros *et al.* 1998) indicate that this species accounts for about 17% of all *Kogia* strandings in this area. During the period 1990-October 1998, three dwarf sperm whale strandings occurred in the northeastern USA (Maryland, Massachusetts, and Rhode Island), whereas 43 strandings were documented along the USA Atlantic coast between North Carolina and the Florida

Keys in the same period. A pair of latex examination gloves was retrieved from the stomach of a dwarf sperm whale stranded in Miami in 1987 (Barros *et al.* 1990). In the period 1987-1994, one animal had possible propeller cuts on or near the flukes.

#### STATUS OF STOCK

The status of this stock relative to OSP in the USA 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.

#### 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. Nearshore vs. offshore ecotype differentiation of *Kogia breviceps* and *K. simus* based on hemoglobin, morphometric and dietary analyses. Abstracts. World Marine Mammal Science Conference. Monaco. 20-24 January.
- Barros, N.B., D.K. Odell, and G.W. Patton. 1990. Ingestion of plastic debris by stranded marine mammals from Florida. Page 746 in: Shomura, R.S. and M.L. Godfrey (eds). Proceedings of the Second International Conference on Marine Debris. NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-154.
- 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 235-260 in: S. H. Ridgway and R. Harrison, Handbook of marine mammals, Vol. 4: river dolphins and the larger toothed whales. *Academic Press*, San Diego.
- Credle, V.R. 1988. Magnetite and magnetoreception in dwarf and pygmy sperm whales, *Kogia simus* and *Kogia breviceps*. MSc. Thesis. University of Miami. Coral Gables, FL.
- Hansen, L. J., K. D. Mullin and C. L. Roden. 1994. Preliminary estimates of cetacean abundance in the U.S. Atlantic Exclusive Economic Zone from 1992 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.
- 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.
- 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.
- Willis, P.M., and R.W. Baird. 1998. Status of the dwarf sperm whale, *Kogia simus*, with special reference to Canada. *Canadian Field-Naturalist*, 112:114-125.