

SOWERBY'S BEAKED WHALE (*Mesoplodon bidens*): Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Within the genus *Mesoplodon*, there are four species of beaked whales in the northwest Atlantic. These include: Sowerby's beaked whale, *Mesoplodon bidens*; True's beaked whale, *M. mirus*; Gervais' beaked whale, *M. europaeus*; and Blainville's beaked whale, *M. densirostris*. These species are difficult to identify to the species level at sea; therefore, much of the available characterization for beaked whales is to genus level only.

The distribution of *Mesoplodon* spp. in the northwest Atlantic is known principally from stranding records (Mead 1989; Lien et al. 1990). Off the northeast U.S. coast, beaked whale (*Mesoplodon* spp.) sightings have occurred principally along the southern edge of Georges Bank (including cow/calf pairs) (CeTAP 1982; Nicolas et al. 1993; NMFS unpublished data). Most sightings were in late spring and summer. In addition, beaked whales were also sighted in Gulf Stream features during NEFSC 1990-1994 surveys (NMFS unpublished data).

Sowerby's beaked whales have been reported from New England waters north to the ice pack, and individuals are seen along the Newfoundland coast in summer (Leatherwood et al. 1976; Mead 1989). Furthermore, a single stranding occurred off the Florida west coast (Mead 1989). This species is considered rare in Canadian waters (Lien et al. 1990).

POPULATION SIZE

Population size can presently be described only for undifferentiated *Mesoplodon* spp. The total number of beaked whales (*Mesoplodon* spp.) along the eastern U.S. or Canadian coasts is unknown, though several estimates from select regions of the habitat do exist. Seasonal abundance estimates are available from an aerial line transect survey program conducted in the continental shelf waters between Cape Hatteras, North Carolina, and Nova Scotia from 1978 to 1982 (CeTAP 1982), just after cessation of extensive foreign fishing operations in this region. An abundance estimate based on CeTAP summer data is 120 (CV = 0.71). This estimate was not corrected for $g(0)$, the probability of detecting an animal group on the trackline.

Abundance estimates were also derived using data collected during the autumn 1991 aerial survey in the CeTAP study area (NMFS unpublished data), which included an interplatform experiment between a Twin Otter and an AT-11, and from several fine-scale ship line transect surveys (August 1990, June-July 1991, June-July 1993, and August 1994) conducted in continental shelf edge and deeper oceanic waters (NMFS unpublished data). For the aerial and shipboard surveys, sightings were almost exclusively in the continental shelf edge and continental slope water areas. The data were analyzed using DISTANCE (Buckland et al. 1993; Laake et al. 1993) where the CV was estimated using the bootstrap lognormal method. Abundance estimates from the 1991 aerial survey were 612 (CV = 0.73) and 370 (CV = 0.65), respectively, for the AT-11 and Twin Otter. Data were not pooled, because the interplatform calibration analysis has not been conducted. Furthermore, these estimates are not fully comparable to the CeTAP estimates, because the 1991 data are from a single survey, August to October, while the CeTAP estimates were based on data pooled over several years of seasonal surveys.



Figure 1. Distribution of beaked whale sightings from NEFSC shipboard surveys during the summer in 1990-1994. Isobaths are at 100 m and 1,000 m.

An abundance estimate from the August 1990 shipboard survey, conducted principally along the Gulf Stream north wall between Cape Hatteras and Georges Bank, was 442 (CV = 0.51). The 1991 survey estimate, based principally on sighting effort conducted between the 200 and 2,000 meter isobaths from Cape Hatteras to Georges Bank was 262 beaked whales (CV = 0.99). The estimate for the 1993 survey, conducted principally between the 200 and 2,000 meter isobaths from the southern edge of Georges Bank, across the Northeast Channel to the southwestern edge of the Scotian Shelf was 330 beaked whales (CV = 0.66). The 1994 estimate, based on survey effort within a Gulf Stream warm-core ring located in continental slope waters southeast of Georges Bank was 99 beaked whales (CV = 0.64). Because the number of beaked whale sightings in each survey were extremely low (3 to 10), and their sightability and behavior preclude pooling with other cetaceans, the estimates of abundance are based on small sample sizes. Therefore, the above abundance estimates should be viewed with caution.

Although the 1990-1994 surveys did not sample exactly the same areas or encompass the entire beaked whale habitat, they did focus on segments of known or suspected high-use habitats off the northeastern U.S. coast. The collective 1990-94 data suggest that, seasonally, at least several hundred beaked whales are occupying these waters, with highest levels of abundance in the Georges Bank region. This is consistent with the earlier CeTAP results. Recent results suggest that beaked whale abundance may be highest in association with Gulf Stream and warm-core ring features. However, at present there are no estimates of total abundance for beaked whales in the western North Atlantic.

Because the estimates presented here were not dive-time corrected, they are likely negatively biased and probably underestimate actual abundance. Given that *Mesoplodon* spp. prefers deep-water habitats (Mead 1989) the bias may be substantial.

Minimum Population Estimate

Present data are insufficient to calculate a minimum population estimate for this stock.

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 not known for this stock. The maximum net productivity rate was assumed to be 0.04 for purposes of this assessment. This value is based on theoretical calculations showing that cetacean populations may not generally grow at rates much greater than 4% given the constraints of their reproductive life history (Anon. 1994).

POTENTIAL BIOLOGICAL REMOVAL

No PBR can be estimated for this species at this time, because the minimum population size cannot be determined.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Beaked whales (many unidentified as to species) have been killed in the pelagic drift gillnet fishery off the U.S. Atlantic coast. While there are no reported takes in other continental shelf edge fisheries (i.e., pelagic pair trawl, longline), observer coverage in these fisheries is low and because beaked whales occupy this habitat, unreported takes may have occurred.

Total fishery-related mortality and serious injury cannot be estimated separately for each beaked whale species because of the uncertainty in species identification by fishery observers. The Atlantic Scientific Review Group advised adopting the risk-averse strategy of assuming that any beaked whale stock which occurred in the U.S. Atlantic Exclusive Economic Zone (EEZ) might have been subject to the observed fishery-related mortality and serious injury. Twenty-two fishery-related beaked whale mortalities were observed between 1989 and 1993. The 1989-1993 total average estimated annual fishery-related mortality of beaked whales in the U.S. EEZ was 34 (CV = 0.69). Although PBR cannot be determined, the total fishery-related mortality and serious injury for this stock is not considered to be insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

Fisheries Information

There is no historical information available that documents incidental mortality in either U.S. or Canadian Atlantic coast fisheries (Read 1994).

Current data sources include the Northeast Fisheries Science Center (NEFSC) Weigh Out Data Program and Sea Sampling Observer Program initiated in 1989. In 1986, NMFS established a mandatory logbook system for large pelagic fisheries. These logbooks are maintained at Southeast Fisheries Science Center (SEFSC). 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. Total fishery-related mortality and serious injury cannot be estimated separately for each beaked whale species because of the uncertainty in species identification by fishery observers. The Atlantic Scientific Review Group advised adopting the risk-averse strategy of assuming that any beaked whale stock which occurred in the U.S. Atlantic EEZ might have been subject to the observed fishery-related mortality and serious injury.

By-catch has been observed by NMFS Sea Samplers in the swordfish/tuna/shark drift gillnet fishery, but no mortalities have been documented in the Atlantic swordfish/tuna/shark longline, Atlantic swordfish/tuna/shark pair trawl, New England multispecies sink gillnet, or New England groundfish trawl observed fisheries.

The estimated total number of hauls in the Atlantic large pelagic drift gillnet fishery increased from 714 in 1989 to 1,144 in 1990; thereafter, with the introduction of quotas, effort was severely reduced. The estimated number of hauls in 1991, 1992, and 1993 were 233, 243, and 232 respectively. Fifty-nine different vessels participated in this fishery at one time or another between 1989 and 1993. Observer coverage, expressed as percent of sets observed, ranged from 8% in 1989, 6% in 1990, 20% in 1991, to 40% in 1992, and 42% in 1993. 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 drift gillnet fishery be stratified into two strata, a southern or winter stratum, and a northern or summer stratum. Estimates of the total by-catch, for each year, were obtained using the aggregated (pooled 1989-1993) catch rates, by strata (Northridge, in review). By-catch of beaked whales has only occurred from Georges Canyon to Hydrographer Canyon along the continental shelf break and continental slope during July to October. Twenty-two fishery-related beaked whale mortalities were observed between 1989 and 1993. The estimated annual fishery-related mortality (CV in parentheses) was 60 in 1989 (0.49), 76 in 1990 (0.56), 13 in 1991 (0.57), 9.7 in 1992 (0.53), and 12 in 1993 (0.32).

STATUS OF STOCK

The status of Sowerby's beaked whale relative to OSP in U.S. Atlantic coast waters is unknown. This species is not listed as threatened or endangered under the Endangered Species Act. In Canada, the Cetacean Protection Regulations of 1982, promulgated under the Standing Fisheries Act, prohibit the catching or harassment of all cetacean species. There are insufficient data to determine population trends and the level of human-caused mortality and serious injury is unknown because of uncertainty regarding species identification in observed fisheries. If one were to assume that the incidental fisheries mortality of the four *Mesoplodon* spp. and *Z. cavirostris* was random with respect to species (i.e., in proportion to their relative abundance), then the minimum population estimate for all of those stocks would need to sum to at least 3,400 in order for an annual mortality of 34 animals not to exceed the PBR of any one of these species. Because an assumption of unselective incidental fishing mortality is probably overly optimistic and represents a best case situation, it is likely that a combined minimum population estimate of substantially greater than 3,400 would be necessary for an annual mortality of 34 to not exceed the PBR of any one of these five stocks. The largest recent abundance estimate available for beaked whales in the western North Atlantic was 612 (CV = 0.73), which would result in a minimum population estimate of 353 beaked whales; however, this estimate does not include a correction factor for submerged animals which may be substantial. This is a strategic stock because of uncertainty regarding stock size and evidence of fishery-related mortality and serious injury.

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