MINKE WHALE (*Balaenoptera acutorostrata*): Canadian East Coast Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Minke whales have a cosmopolitan distribution in polar, temperate and tropical waters. In the North Atlantic there are four recognized populations — Canadian east coast, west Greenland, central North Atlantic, and northeastern North Atlantic (Donovan 1991). These four population divisions were defined by examining segregation by sex and length, catch distributions, sightings, marking data and pre-existing ICES boundaries; however, there is very little data from the Canadian east coast population.

Minke whales off the eastern coast of the United States are considered to be part of the Canadian east coast population, which inhabits the area from the eastern half of the Davis Strait out to 45°W and south to the Gulf of Mexico. The relationship between this and the other three populations is uncertain.

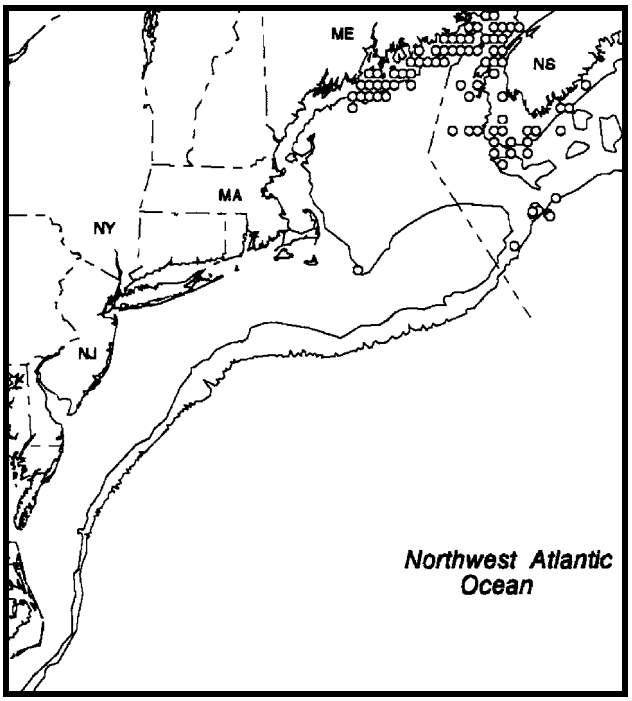

Figure 1. *Distribution of minke whale sightings from NEFSC shipboard surveys during the summer in 1990-1994. Isobaths are at 100 m and 1,000 m.*

The minke whale is the third most abundant large whale in the U.S. Atlantic Exclusive Economic Zone (EEZ). It is common and widely distributed (CeTAP 1982); however, because of its smaller size, more rapid movements, and less observable behavior, there is more uncertainty about abundance, distribution, and behavior than for other large cetaceans. There appears to be a strong seasonal component to minke whale distribution. Spring and summer are times of relatively widespread and common occurrence, and they are most abundant in New England waters during this time. The number of minke whales and the area occupied by them is reduced in the fall. In winter, the species appears to be largely absent from the area. Like most other baleen whales, the minke whale generally occupies the continental shelf proper, rather than the continental shelf edge region. Records summarized by Mitchell (1991) hint at a possible winter distribution in the West Indies and in mid-ocean south and east of Bermuda. As with several other cetacean species, the possibility of a deep-ocean component to distribution exists but remains unconfirmed.

POPULATION SIZE

The total number of minke whales in the Canadian East Coast population is unknown. However, three estimates exist for portions of the habitat — a 1978-1982 estimate (CeTAP 1982), a shipboard survey estimate from the summers of 1991 and 1992, and a shipboard estimate, from June-July 1993.

Seasonal abundance estimates are available from an aerial survey program conducted in the continental shelf and continental shelf edge waters between Cape Hatteras, North Carolina, and Nova Scotia from 1978 to 1982 (CeTAP 1982). A spring population estimate of 320 minke whales was based on CeTAP (1982) data [coefficient of variation (CV) = 0.23]. This estimate may not reflect the actual population size because a dive-time correction was not included, the data are a decade old, and survey effort was low in certain seasons and areas (e.g., the fall season on eastern and southeastern Georges Bank).

Minke whale abundance in the northern Gulf of Maine-lower Bay of Fundy region during the summers of 1991 and 1992 was estimated to be 2,650 minke whales (CV = 0.31). This is a weighted-average abundance estimate where each annual estimate is weighted by the inverse of its variance (NMFS unpublished data). The data used in

estimating minke whale abundance were obtained from two shipboard line transect sighting surveys designed to estimate abundance of harbor porpoises (Palka, in press). Two independent teams of observers on the same ship surveyed using the naked eye in non-closing mode. The abundance estimate includes an estimate of g(0), probability of detection, for both teams of 0.60 (CV = 0.12) [using each team's data separately produced a g(0) value of 0.31 (CV = 0.22)]. The g(0)-corrected abundance estimate was calculated using the product interval analytical method (Palka, in press). Variability was estimated using bootstrap resampling techniques.

The 1991-1993 estimates suggest that minke whale abundance may be an order of magnitude greater than was estimated by CeTAP in 1982; however, two qualifications to the estimate must be made. The study area was stratified by water depth and expected density of harbor porpoises, although the observed distribution of minke whales suggests that the stratification scheme was appropriate for minke whales. Secondly, this estimate has not accounted for dive times and ship avoidance. Both of these behavioral factors could significantly influence the abundance estimate, but if they were taken into account this would probably not result in a lower abundance estimate.

An abundance estimate was also derived in a limited portion of the stock range using data collected during a June-July 1993 NEFSC shipboard line transect survey conducted between the 200 and 2,000 m isobaths from the southern edge of Georges Bank, across the entrance to the Northeast Channel, and to the southwestern edge of the Scotian Shelf. The estimate for this area is 330 whales (CV = 0.66).

There are no estimates of abundance for this species in Canadian waters, which lie farther north or east of the above two surveys.

Minimum Population Estimate

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance average estimate of 2,650 whales based on the 1991-1992 surveys (CV = 0.31) (NMFS unpublished data), which is equivalent to the 20th percentile of the log-normal distribution as specified by NMFS (Anon. 1994), and was 2,053 minke whales. The 1991-1992 survey was used because it covered a larger proportion of the known habitat than that covered during the 1993 survey. The Gulf of Maine and Georges Bank abundance estimates were not combined because the June-July 1993 Georges Bank survey was conducted at a place through which minke whales migrate to spend the summer in the Gulf of Maine (the time and place of the 1991-1992 surveys).

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).

Some biological parameters that could be used to estimate this rate are as follows. Females mature when 6-8 years old; pregnancy rates are approximately 0.86 to 0.93; thus, the calving interval is between 1 and 2 years. Calves are probably born during October to March, after 10 to 11 months gestation. Nursing lasts for less than 6 months. Maximum ages are not known, but for Southern Hemisphere minke whales the maximum age appears to be about 50 years (Katona et al. 1993; IWC 1991).

POTENTIAL BIOLOGICAL REMOVAL

Potential biological removal (PBR) was specified as the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because of the stock's status relative to its OSP level is unknown. PBR for this stock is 21 whales.

ANNUAL HUMAN-CAUSED MORTALITY AND INJURY

In U.S. waters, an entanglement database maintained by NE Regional Office for 1975-1992 includes 36 records of minke whales. The gear includes unspecified fishing net, unspecified cable or line, fish trap, weirs, seines, gillnets, and lobster gear. In a review of cetaceans and fishery interactions, Read (1994) reported that a minke whale

was found dead in a Rhode Island fish trap in 1976, and that a minke whale was trapped and released alive in a herring weir off northern Maine in 1990. One minke whale was reported caught in a bluefin tuna purse seine off Stellwagen Bank in 1991 and released uninjured (D. Beach, NMFS NE Regional Office, personal communication).

The only two records of minke whales in the NEFSC Sea Sampling database were from July 1991, south of Penobscot Bay, Maine, and October 1992, off the coast of New Hampshire near Jeffreys Ledge, in the Gulf of Maine sink gillnet fishery. One was dead, one was released alive. A minke whale was caught and released in the Japanese tuna longline fishery in 3,000 m of water, south of Lydonia Canyon on Georges Bank, in September 1986 (Waring et. al 1990). An immature female minke whale, entangled with line around the tail stock, came ashore on the Jacksonville, Florida, jetty on 31 January 1990, and on 15 March 1992, a juvenile female minke whale with propeller scars was found floating east of the St. Johns channel entrance (R. Bonde, USFWS, Gainesville, FL, personal communication).

Information about minke whale interactions with fishing gear is not well quantified or recorded in most parts of Canada. The following were reported in Read (1994). Six minke whales were reported entangled in gillnets in Newfoundland and Labrador during 1989. One of these animals escaped towing gear, the rest died. Five minke whales were entrapped and died in Newfoundland cod traps during 1989. During 1980 and 1990, 15 of 17 minke whales were released alive from herring weirs in the Bay of Fundy. In 1990, ten minke whales were trapped in the Bay of Fundy weirs, but all were released alive. Salmon gillnets in Canada have taken a few minke whales. In Newfoundland in 1979, one minke whale died in a salmon net. Between 1979 and 1990, it was estimated that 15% of the minke whale takes were in salmon gillnets.

Minke whales have been and are still being hunted in the North Atlantic. From the Canadian East Coast population, documented whaling occurred from 1948 to 1972 with a total kill of 1,103 animals (IWC 1992). Animals from all other North Atlantic populations are presently still being harvested at low levels, at less than 300 animals per population.

Because minke whales inhabit coastal waters during much of the year, they may be affected by pollution. For example, the levels of polychlorinated biphenyls in blubber from minke whales in the St. Lawrence estuary in Canada were high (Gaskin 1985).

Indirect impacts on prey species are also possible. Fish in the diet of minke whales include herring, capelin, cod, pollock, salmon, mackerel and sand lance. All of these species, except sand lance, are commercially harvested; and cod and pollock are considered as fully exploited or overexploited (NMFS 1993). Consequentially, the abundance and distribution of minke whales may be affected by the commercial fishing of the above fish and squid species.

Accurate estimates of human-caused mortality are not available because it is likely that many entanglements, injuries, and mortalities go unobserved and/or unrecorded, and existing data are fragmentary. Total annual estimated average fishery-related mortality and serious injury to this stock in the Atlantic in fisheries observed by NMFS during 1990-1993 was 2.5 minke whales (CV = 1.92). The total fishery-related mortality and serious injury for this stock is greater than 10% of the calculated PBR and, therefore, cannot be 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.

Fishery Information

Prior to 1977, there was no documentation of marine mammal by-catch in distant-water fleet (DWF) activities off the northeast coast of the U.S. With implementation of the Magnuson Fisheries Conservation and Management Act in that year an observer program was established which has recorded fishery data and information of incidental by-catch of marine mammals. In 1982, there were 112 different foreign vessels; 16%, or 18, were Japanese tuna longline vessels operating along the U.S. east coast. This was the first year that the Northeast Regional Observer Program assumed responsibility for observer coverage of the longline vessels. Between 1983 and 1988, the number of Japanese longline vessels operating within the EEZ each year were 3, 5, 7, 6, 8, and 8, respectively. Observer coverage was 100%. No mortalities were observed, but one animal was released alive in September 1986 (Waring et al. 1990).

There are approximately 349 vessels (full and part time) in the New England multispecies sink gillnet fishery (Walden, in review). Observer coverage in trips has been 1%, 6%, 7.5%, and 5% for years 1990 to 1993. The fishery has been observed in the Gulf of Maine and in Southern New England. One mortality was observed in this fishery in 1991. Estimated fishery-related mortality and serious injury attributable to this fishery was ten minke whales (CV =

0.96) in 1991 (Northridge, in review). Annual estimated average fishery-related mortality and serious injury to this stock in the Atlantic during 1990-1993 attributable to the sink gillnet fishery was 2.5 minke whales (CV = 1.92).

The Canadian groundfish gillnet fishery is important and widespread. Many fisherman hold groundfish gillnet licenses but the number of active fisherman are unknown. In 1989, approximately 6,800 licenses were issued to fishermen along the southern coast of Labrador, and northeast and southern coast of Newfoundland. In the Gulf of St. Lawrence, there were about 3,900 licenses issued in 1989, while in the Bay of Fundy and southwestern Nova Scotia 659 licenses were issued.

There were 3,121 cod traps operating in Newfoundland and Labrador during 1979. That number was estimated to have grown to about 7,500 in 1980. The cod trap fishery in Newfoundland closed in 1993 due to the depleted groundfish resources.

The Atlantic Canadian and Greenland salmon gillnet fishery is seasonal, with the peak from June to September, depending on the location. In southern and eastern Newfoundland, and Labrador during 1989, there were 2,196 gear units used, where each gear unit consist of a net 91 m long. There is no effort data available for the Greenland fishery. However the fishery was stopped in 1993 as a result of an agreement between the fishermen and North Atlantic Salmon Fund (Read 1994). There was no reported fishery-related mortality or serious injury to minke whales in this fishery.

In U.S. and Canadian waters the herring weir fishery occurs from May to September each year along the southwestern shore of the Bay of Fundy, and scattered along the western Nova Scotia and northern Maine coasts. In 1990 there were 180 active weirs in western Bay of Fundy, and 56 active weirs in Maine (Read 1994). There was no reported fishery-related mortality or serious injury to minke whales in this fishery in U.S. Atlantic EEZ waters.

Ship Strikes

Minke whales inhabit coastal waters during much of the year and are subject to collision with vessels. In one record in the NE Regional Office marine mammal stranding database, on 7 July 1974, the necropsy suggested a vessel collision.

STATUS OF STOCK

The status of minke whales relative to OSP in the U.S. Atlantic EEZ is unknown. The minke whale is not listed as endangered under the Endangered Species Act (ESA). In Canada, the Cetacean Protection Regulations of 1982, promulgated under the standing Fisheries Act, prohibit the catching or harassment of all species of cetaceans, including the minke whale. The level of human-caused mortality and serious injury is not likely to be high relative to stock size because while fishery interactions do occur, most minke whales escape or are released unharmed. This is not a strategic stock because estimated fishery-related mortality and serious injury does not exceed PBR and the minke whale is not listed as a threatened or endangered species under the ESA.

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