

## SHORT-FINNED PILOT WHALE (*Globicephala macrorhynchus*): Western North Atlantic Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

There are two species of pilot whales in the Western Atlantic: the Atlantic or long-finned pilot whale, *Globicephala melas*, and the short-finned pilot whale, *G. macrorhynchus*. These species are difficult to identify to the species level at sea; therefore, some of the descriptive material below refers to *Globicephala* spp. and is identified as such. The species boundary is considered to be in the New Jersey to Cape Hatteras area. Sightings north of this area are likely *G. melas*.

The short-finned pilot whale is distributed worldwide in tropical to warm temperate waters (Leatherwood and Reeves 1983). The northern extent of the range of this species within the U.S. Atlantic Exclusive Economic Zone (EEZ) is generally thought to be Cape Hatteras, North Carolina (Leatherwood and Reeves 1983). Sightings of these animals in U.S. Atlantic EEZ occur primarily within the Gulf Stream [Southeast Fisheries Science Center (SEFSC) unpublished data], and primarily along the continental shelf and continental slope in the northern Gulf of Mexico (Mullin *et al.* 1991; SEFSC unpublished data). 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 EEZ waters between Miami, Florida, and Cape Hatteras, North Carolina. The estimated abundance of short-finned pilot whales for the 1992 survey was 749 (coefficient of variation, CV = 0.64) (Hansen *et al.* 1994).

### Minimum Population Estimate

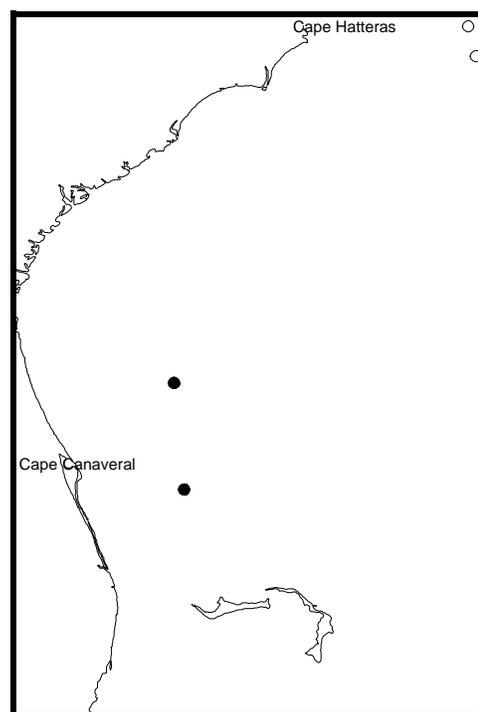
The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed best abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The best estimate of abundance for short-finned pilot whales is 749 (CV=0.64). The minimum population estimate for the western North Atlantic short-finned pilot whale is 457 (CV=0.64).

### 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



**Figure 1.** Sightings of short-finned pilot whales (filled circles) and unidentified pilot whales (unfilled circles) during NOAA Ship Oregon II marine mammal survey cruise in winter 1992.

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 457 (CV=0.64). 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) was set at 0.40 because of the high variance associated with the estimate of total annual fishery-related mortality and serious injury for *Globicephala* spp. PBR for the western North Atlantic short-finned pilot whales is 3.7.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of short-finned pilot whales in the U.S. Atlantic EEZ is unknown. The short-finned pilot whale has been taken in the pelagic longline fishery in Atlantic waters off the southeastern U.S. (Lee *et al.* 1994; SEFSC unpublished data). Pilot whales have been taken in fisheries operating in the deeper, offshore waters off the northeastern U.S. waters north of the presumed range of this stock. The pilot whales taken in these fisheries may have been the long-finned pilot whale, *G. melas* (Waring *et al.* 1990); however, total fishery-related mortality and serious injury cannot be estimated separately for the two species of pilot whales because of the uncertainty in species identification by fishery observers.

Foreign fishery observers documented 436 pilot whale mortalities in Atlantic mackerel and squid fisheries (Waring *et al.* 1990; Waring 1995). Between 1989 and 1995, sixty-eight mortalities were observed in the large pelagic drift gillnet fishery, twenty-nine in the pelagic pair trawl fishery (1989-1995), and one each in the pelagic longline and groundfish trawl fisheries (NMFS unpublished data; see below). Although only one mortality has been observed in the U.S. large pelagic longline fishery, 24 pilot whales were released alive, two injured, after becoming entangled or hooked in this gear. Pilot whales are frequently observed to feed on hooked fish, particularly big-eye tuna (NMFS unpublished data). One mortality was observed in New England groundfish trawl fisheries in 1990 and one released alive and uninjured in 1993. Two were released alive and injured in 1992 and 1993 in the pelagic drift gillnet fishery. There were no takes in the New England multispecies sink gillnet fishery. An unknown number of pilot whales have also been taken in Newfoundland and Labrador, and Bay of Fundy, groundfish gillnets, Atlantic Canada and Greenland salmon gillnets, and Atlantic Canada cod traps (Read 1994).

Total fishery-related mortality and serious injury cannot be estimated separately for the two species of pilot whales in the U.S. Atlantic EEZ because of the uncertainty in species identification by fishery observers. The Atlantic Scientific Review Group advised adopting the risk-averse strategy of assuming that either species might have been subject to the observed fishery-related mortality and serious injury. Total estimated annual fishery-related mortality of pilot whales from NMFS-observed fisheries was the sum of integer-rounded annual mortality estimates across the pelagic longline (1992-1993), pelagic drift gillnet (1991-1995), pelagic pair trawl (1992-1995), and North Atlantic bottom trawl fisheries (1991-1995) and was 42 pilot whales, *Globicephala* spp. (CV = 0.11) (Table 1).

### **Fisheries Information**

Data on current incidental takes in U.S. fisheries are available from several sources. In 1986, NMFS established a mandatory self-reported fisheries information system for large pelagic fisheries. Data files are maintained at the Southeast Fisheries Science Center (SEFSC). The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program was 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, pelagic longline, and pelagic pair trawl fisheries, but no mortalities or serious injuries have documented in the New England multispecies sink gillnet or mid-Atlantic coastal sink gillnet.

The estimated total number of hauls in the 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, 1993, 1994 and 1995 were 233, 243, 232, 197 and 164 respectively. Fifty-nine different vessels participated in this fishery at one time or another between 1989 and 1993. In 1995 there were 11 vessels in the fishery (Table 1). Observer

coverage, expressed as percent of sets observed, ranged from 8% in 1989, 6% in 1990, 20% in 1991, to 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. Estimates of the total by-catch, from 1989 to 1993, were obtained using the aggregated (pooled 1989-1993) catch rates, by strata (Northridge 1996). Estimates of total annual by-catch for 1994 and 1995 were estimated from the sum of the observed caught and the product of the average bycatch per haul and the number of unobserved hauls as recorded in self-reported fisheries information. Variances were estimated using bootstrap re-sampling techniques (Bisack, in prep.). The annual fishery-related mortality (CV in parentheses) was 77 in 1989 (0.24), 132 in 1990 (0.24), 30 in 1991 (0.26), 33 in 1992 (0.16), 31 in 1993 (0.19), 20 in 1994 (0.06), and 9.1 in 1995 (0); average annual mortality between 1991-1995 was 24.6 pilot whales (0.09) (Table 1). The 1991-1995 period provides a better characterization of this fishery (i.e., fewer vessels and increased observer coverage). Table 2 summarizes the number of animals released alive and classified as injured or non-injured. It also includes the ratio of observed to estimated mortalities for this fishery. Because animals released alive may have subsequently died due to injuries received during entanglement, pilot whales that were released were included in the mortality estimates. Pilot whales were taken along the continental shelf edge, northeast of Cape Hatteras in January and February. Takes were recorded at the continental shelf edge east of Cape Charles, Virginia, in June. Pilot whales were taken from Hydrographer Canyon along the Great South Channel to Georges Bank from July-November. Takes occurred at the Oceanographer Canyon continental shelf break and along the continental shelf northeast of Cape Hatteras in October-November.

Effort in the pelagic pair trawl fishery has increased during the period 1989 to 1993, from zero hauls in 1989 and 1990, to an estimated 171 hauls in 1991, and then to an estimated 536 hauls in 1992, 586 in 1993, 407 in 1994, and 440 in 1995, respectively. The fishery operated from August-November in 1991, from June-November in 1992, from June-October in 1993, and from mid-summer to November in 1994 and 1995. Sea sampling began in October 1992, and 48 sets (9% of the total) were sampled in that season, 102 hauls (17% of the total) were sampled in 1993. In 1994 and 1995, 52% and 54%, respectively, of the sets were observed. Twelve vessels have operated in this fishery. The fishery extends from 35°N to 41°N, and from 69°W to 72°W. Approximately 50% of the total effort was within a one degree square at 39°N, 72°W, around Hudson Canyon. Examination of the locations and species composition of the by-catch, showed little seasonal change for the six months of operation and did not warrant any seasonal or areal stratification of this fishery (Northridge 1996). Five pilot whale (*Globicephala* spp.) mortalities were reported in the self-reported fisheries information in 1993. In 1994 and 1995 observers reported one and twelve mortalities, respectively (Table 1). The estimated fishery-related mortality to pilot whales in the U.S. Atlantic attributable to this fishery in 1994 was 2.0 (CV=0.49) and 22 (CV=0.33) in 1995 (Bisack, in prep.). The average mortality between 1992 and 1995 was 6 (CV=0.31) for this fishery. Table 2 summarizes the number of animals released alive and classified as injured or non-injured. It also includes the ratio of observed to estimated mortalities for this fishery.

Interactions between the pelagic longline fishery and pilot whales have been reported; however, a vessel may fish in more than one statistical reporting area and it is not possible to separate estimates of fishing effort other than to subtract Gulf of Mexico effort from Atlantic fishing effort, which includes the Caribbean Sea. This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. Total effort for the pelagic longline fishery (Atlantic, including the Caribbean), based on mandatory self-reported fisheries information, was 11,279 sets in 1991, 10,605 sets in 1992, and 11,538 in 1993 (Cramer 1994). The fishery has been observed nearly year round within every statistical reporting area within the EEZ and beyond. Twenty-four animals were released alive, but two were injured. One mortality was observed between 1990 and 1993. January-March by-catch was concentrated on the continental shelf edge northeast of Cape Hatteras. By-catch was recorded in this area during April-June, and takes also occurred north of Hydrographer Canyon off the continental shelf in water over 1,000 fathoms during April-June. During the July-September period, takes occurred on the continental shelf edge east of Cape Charles, Virginia, and on Block Canyon slope in over 1,000 fathoms of water. October-December by-catch occurred along the 20 to 50 fathom contour lines between Barnegatt Bay and Cape Hatteras. Estimated take was based on a generalized linear model (Poisson error assumption) fit to the available observed incidental take and self-reported incidental take and effort data for the fishery (SEFSC unpublished data). The estimated fishery-related mortality to pilot whales in the U.S. Atlantic attributable to this fishery occurred in 1992 and was 22 (CV = 0.23); average annual mortality between 1992-1993 was eleven pilot whales (0.33) (Table 1). Table 2 summarizes the number of animals released alive and classified as injured or non-injured. It also includes the ratio of observed to estimated mortalities for this fishery.

Vessels in the North Atlantic bottom trawl fishery, a Category III fishery under the MMPA, were observed in order to meet fishery management needs, rather than marine mammal management needs. An average of 970 (CV = 0.04) vessels (full and part time) participated annually in the fishery during 1989-1993. The fishery is active in New England in all seasons. One mortality was documented in 1990 and one animal was released alive and uninjured in 1993. Table 2 summarizes the number of animals released alive and classified as injured or non-injured. It also includes the ratio of observed to estimated mortalities for this fishery.

The mid-Atlantic mackerel and squid trawl fisheries were combined into the Atlantic mid-water trawl fishery in the revised proposed list of fisheries in 1995. The fishery occurs along the U.S. mid-Atlantic continental shelf region between New Brunswick, Canada, and Cape Hatteras year around. The mackerel trawl fishery was classified as a Category II fishery since 1990 and the squid fishery was originally classified as a Category II fishery in 1990, but was reclassified as a Category III fishery in 1992. The combined fishery was reclassified as a Category II fishery in 1995. Three fishery-related mortality of pilot whales were reported in self-reported fisheries information from the mackerel trawl fishery between 1990-1992.

Table 1. Summary of the incidental mortality of pilot whales (*Globicephala sp*) 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	Data Type <sup>1</sup>	Observer Coverage <sup>2</sup>	Observed Mortality	Estimated Mortality	Estimated CVs	Mean Annual Mortality
Pelagic Drift Gillnet	91-95	1994=12 <sup>3</sup> 1995=11	Obs. Data Logbook	.20, .40, .42, .87, .99	4, 14, 11 <sup>4</sup> , 17, 9	30, 33, 31, 20, 9.1 <sup>5</sup>	.26, .16, .19, .06, 0	24.6 (.09)
Pelagic Pair Trawl	92-95	12	Obs. Data Logbook	.09, .17, .52, .54	0, 0 <sup>6</sup> , 1, 12	0, 0, 2, 22	0, 0, .49, .33	6.0 (.31)
Longline <sup>7</sup>	92-93		Obs. Data Logbook	.05	1	22	.23	11 (.33)
TOTAL								41.6 (.11)

<sup>1</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. Mandatory logbook (Logbook) data are used to measure total effort for the pelagic drift gillnet and longline fishery, and these data are collected at the Southeast Fisheries Science Center (SEFSC).

<sup>2</sup> Observer coverage for the pelagic drift gillnet, pair trawl and longline fishery are in terms of sets.

<sup>3</sup> 1994 and 1995 shown, other years not available on an annual basis.

<sup>4</sup> 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 (Bisack, in prep).

<sup>5</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 0.84 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 0.06 animals.

<sup>6</sup> In 1993, 5 pilot whales were taken on a tow without an observer. An estimate could not be made based on unobserved tows.

<sup>7</sup> Assessments for 1994 and 1995 are not completed but are expected to be in the marine mammal stock assessment report next year.

Table 2. Summary of pilot whales (*Globicephala sp*) released alive, by commercial fishery, years sampled (Years), ratio of observed mortalities recorded by on-board observers to the estimated mortality (Ratio), the number of observed animals released alive and injured (Injured), and the number of observed animals released alive and uninjured (Uninjured).

Fishery <sup>1</sup>	Years	Ratio	Injured	Uninjured
Pelagic Drift Gillnet	91-95	4/30, 14/33, 11/31, 17/20,9/9.1	0, 1 <sup>2</sup> , 1 <sup>3</sup> , 0, 0	0
North Atlantic Bottom Trawl	91-95	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 1, 0, 0

<sup>1</sup>Pilot whales have been caught and released alive in the longline fishery. However, assessments have not been completed at this time but are expected by next year.

<sup>2</sup> Released alive with moderate injury.

<sup>3</sup> Released alive with condition unknown.

### Other Mortality

There were 190 short-finned pilot whale strandings documented during 1987- August 1996 along the U.S. Atlantic coast between Cape Hatteras, North Carolina, and Miami, Florida; four of these were classified as likely caused by fishery interactions. From 1992-1995, eight short-finned pilot whales stranded along beaches north of Cape Hatteras (Virginia to New Jersey) (NMFS unpublished data).

### STATUS OF STOCK

The status of the short-finned pilot whale relative to OSP in U.S. Atlantic EEZ is unknown. There are insufficient data to determine the population trends for this stock. They are not listed under the Endangered Species Act. The total fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. This is a strategic stock because the 1991-95 estimated average annual fishery-related mortality to pilot whales, *Globicephala* spp., will likely exceed PBR when the 1994-95 longline data analyses are complete.

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