October 2007

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

STOCK DEFINITION AND GEOGRAPHIC RANGE

The short-finned pilot whale is distributed worldwide in tropical to warm temperate waters (Leatherwood and Reeves 1983). There are two species of pilot whales in the western North Atlantic - the Atlantic or long-finned pilot whale, *Globicephala melas*, and the short-finned pilot whale, *G. macrorhynchus*. These species are difficult to differentiate at sea; therefore, much of the descriptive material below refers to *Globicephala* sp. and is identified as such. Sightings of these animals in the U.S. Atlantic EEZ occur in oceanic waters (Mullin and Fulling 2003) and along the continental shelf and continental slope in the northern Gulf of Mexico (Hansen *et al.* 1996; Mullin and Hoggard 2000; Mullin and Fulling 2003). Information on stock differentiation for the Atlantic population based on morphological, genetic and/or behavioral data is in progress. Pending these results, the western North Atlantic *Globicephala* sp. population(s) are provisionally being considered a separate stock from the northern Gulf of Mexico stock(s).

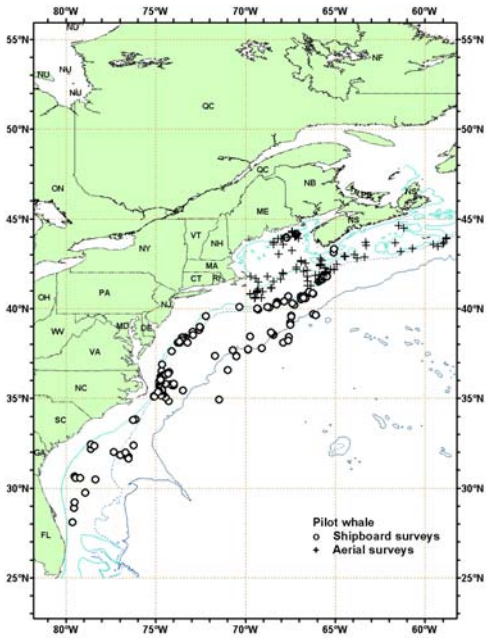

Figure 1. *Distribution of pilot whale sightings from NEFSC and SEFSC vessel and aerial summer surveys during 1998, 1999, 2002, 2004 and 2006. Isobaths are at the 100 m, 1,000 m, and 4,000 m depth contours.*

POPULATION SIZE

The total number of short-finned pilot whales off the eastern U.S. and Canadian Atlantic coast is unknown, although several abundance estimates are available from selected regions for select time periods. Sightings were almost exclusively in the continental shelf edge and continental slope areas (Figure 1). Because long-finned and short-finned pilot whales are difficult to identify at sea, seasonal abundance estimates are reported for *Globicephala* sp., both long-finned and short-finned pilot whales. The best abundance estimate for *Globicephala* sp. is the sum of the estimates from the two 2004 U.S. Atlantic surveys. This joint estimate (15,728 + 15,411 = 31,139 whales) is considered best because these two surveys together have the most complete coverage of the species' habitat.

Mitchell (1974) used cumulative catch data from the 1951-1961 drive fishery off Newfoundland to estimate the initial population size (ca. 50,000 animals). Mercer (1975) used population models to estimate a population in the same region of between 43,000 and 96,000 long-finned pilot whales, with a range of 50,000-60,000. An abundance estimate of 11,120 (CV=0.29) *Globicephala* sp. was obtained from an aerial survey program conducted from 1978 to 1982 in continental shelf and shelf edge waters between Cape Hatteras, North Carolina and Nova Scotia (CETAP 1982). An abundance estimate of 3,636 (CV=0.36) *Globicephala* sp. was obtained from a June and July 1991 shipboard line-transect sighting survey conducted primarily between the 200 and 2,000 m isobaths from Cape Hatteras to Georges Bank (Waring *et al.* 1992; Waring 1998). Abundances estimates of 3,368 (CV=0.28) and 5,377 (CV=0.53) *Globicephala* sp. were derived from line-transect aerial surveys conducted from August to September 1991 using the Twin Otter and AT-11 aircrafts (NMFS 1991). An abundance estimate of 668 (CV=0.55) *Globicephala* sp. was obtained from a June and July 1993 shipboard line-transect sighting survey conducted principally between the 200 and 2,000 m isobaths from the southern edge of Georges Bank, across the Northeast Channel, to the southeastern edge of the Scotian Shelf (NMFS 1993a). A 1995 abundance estimate of 9,776 (CV=0.55) *Globicephala* sp. was generated from the sum of the estimates of 8,176 (CV=0.65) *Globicephala* sp.

from the U.S. July to September 1995 sighting survey conducted by two ships and an airplane that covered waters from Virginia to the mouth of the Gulf of St. Lawrence, and 1,600 (CV=0.65) *Globicephala* sp. from Canadian aerial surveys in late August and early September in the Gulf of St. Lawrence in 1995 and 1998 (Kingsley and Reeves 1998). An abundance estimate of 14,909 (CV = 0.26) *Globicephala* sp. was obtained from the sum of the estimate of 9,800 *Globicephala* sp. (CV=0.34) from a line-transect sighting survey conducted during 6 July to 6 September 1998 by a ship and plane that surveyed 15,900 km of track line in waters north of Maryland (38ºN) (Palka 2006), and the estimate of 5,109 (CV = 0.41) *Globicephala* sp., estimated from a shipboard line-transect sighting survey conducted between 8 July and 17 August 1998 that surveyed 4,163 km of track line in waters south of Maryland (38ºN) (Mullin and Fulling 2003). As recommended in the GAMMS Workshop Report (Wade and Angliss 1997), estimates older than 8 years are deemed unreliable and should not be used for PBR determinations. Further, due to changes in survey methodology, the earlier data should not be used to make comparisons with more current estimates.

Recent surveys and abundance estimates

An abundance estimate of 5,408 (CV=0.56) *Globicephala* sp. was obtained from an aerial survey conducted in July and August 2002 which covered 7,465 km of trackline over waters from the 1000 m depth contour on the southern edge of Georges Bank to Maine (Table 1; Palka 2006). The value of g(0) used for this estimation was derived from the pooled data of 2002, 2004 and 2006 aerial survey data.

An abundance estimate of 15,728 (CV=0.34) *Globicephala* sp. was obtained from a line-transect sighting survey conducted during 12 June to 4 August 2004 by a ship and plane that surveyed 10,761 km of track line in waters north of Maryland (38ºN) to the Bay of Fundy (45ºN) (Table 1; Palka 2006). Shipboard data were collected using the two independent team line-transect method and analyzed using the modified direct duplicate method (Palka 1995) accounting for biases due to school size and other potential covariates, reactive movements (Palka and Hammond 2001), and *g(0)*, the probability of detecting a group on the track line. Aerial data were collected using the Hiby circle-back line transect method (Hiby 1999) and analyzed accounting for *g(0)* and biases due to school size and other potential covariates (Palka 2005).

A shipboard survey of the U.S. Atlantic outer continental shelf and continental slope (water depths>50m) between Florida and Maryland (27.5 and 38ºN latitude) was conducted during June-August 2004. The survey employed two independent visual teams searching with 50x bigeye binoculars. Survey effort was stratified to include increased effort along the continental shelf break and Gulf Stream front in the Mid-Atlantic. The survey included 5,659 km of trackline, and accomplished a total of 473 cetacean sightings. Sightings were most frequent in waters north of Cape Hatteras, North Carolina along the shelf break. Data were corrected for visibility bias *g(0)* and group-size bias and analyzed using line-transect distance analysis (Palka, 1995; Buckland *et al.* 2001). The resulting abundance estimate for *Globicephala* sp. between Florida and Maryland was 15,411 animals (CV =0.43).

An abundance estimate of 26,535 (CV=0.35) *Globicephala* sp. was obtained from an aerial survey conducted in August 2006 which covered 10,676 km of trackline in the region from the 2000 m depth contour on the southern edge of Georges Bank to the upper Bay of Fundy and to the entrance of the Gulf of St. Lawrence. (Table 1; Palka pers. comm.)

Table 1. Summary of abundance estimates for the western North Atlantic *Globicephala* sp. by month, year, and area covered during each abundance survey, and resulting abundance estimate (N_{best}) and coefficient of variation (CV).

Month/Year	Area	N_{best}	CV
Aug 2002	S. Gulf of Maine to Maine	5,408	0.56
Jun-Aug 2004	Maryland to Bay of Fundy	15,728	0.34
Jun-Aug 2004	Florida to Maryland	15,411	0.43
Jun-Aug 2004	Florida to Bay of Fundy (COMBINED)	31,139	0.27

Aug 2006	S. Gulf of Maine to upper Bay of Fundy to Gulf of St. Lawrence	26,535	0.35

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 *Globicephala* sp. is 31,139 animals (CV=0.27) derived from the 2004 surveys. The minimum population estimate for *Globicephala* sp. 24,866.

Current Population Trend

There are insufficient data to determine population trends for *Globicephala* sp.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. Life history parameters that could be used to estimate net productivity obtained from animals taken in the Newfoundland drive fishery include: calving interval 3.3 years; lactation period about 21-22 months; gestation period 12 months; births mainly from June to November; length at birth is 177 cm; mean length at sexual maturity is 490 cm for males and 356 cm for females; age at sexual maturity is 12 years for males and 6 years for females; mean adult length is 557 cm for males and 448 cm for females; and maximum age was 40 for males and 50 for females (Sergeant 1962; Kasuya *et al.* 1988). Analysis of data from animals taken in the Faroe Islands drive fishery produced higher values for all parameters (Bloch *et al.* 1993; Desportes *et al.* 1993; Martin and Rothery 1993). These differences are likely related, at least in part, to larger sample sizes and different analytical techniques.

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 for *Globicephala* sp. is 24,866. 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 the CV of the average mortality estimate is less than 0.3 (Wade and Angliss 1997). PBR for the western North Atlantic *Globicephala* sp. is 249. It is not possible to determine the PBR for only short-finned pilot whales.

ANNUAL HUMAN-CAUSED MORTALITY

Fishery Information

Detailed fishery information is reported in Appendix III. 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.

Earlier Interactions

Prior to 1977, there was no documentation of marine mammal bycatch in distant-water fleet (DWF) activities off the northeast coast of the U.S. A fishery observer program, which has collected fishery data and information on incidental bycatch of marine mammals, was established in 1977 with the implementation of the Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA).

During 1977-1991, observers in this program recorded 436 pilot whale mortalities in foreign-fishing activities (Waring *et al.* 1990; Waring 1995). A total of 391 pilot whales (90%) was taken in the mackerel fishery, and 41 (9%) occurred during *Loligo* and *Illex* squid-fishing operations. This total includes 48 documented takes by U.S. vessels involved in joint-venture fishing operations in which U.S. captains transfer their catches to foreign

processing vessels. Due to temporal fishing restrictions, the bycatch occurred during winter/spring (December to May) in continental shelf and continental shelf edge waters (Fairfield *et al.* 1993; Waring 1995); however, the majority of the takes occurred in late spring along the 100m isobath. Two animals were also caught in both the hake and tuna longline fisheries (Waring *et al.* 1990).

Between 1989 and 1998, 87 mortalities were observed in the large pelagic drift gillnet fishery. 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), 9.1 in 1995 (0), 11 in 1996 (0.17), no fishery in 1997 and 12 in 1998 (0).

Five pilot whale (*Globicephala* sp.) mortalities were reported in the self-reported fisheries information for the Atlantic tuna pair trawl in 1993. In 1994 and 1995 observers reported 1 and 12 mortalities, respectively. 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.

Two interactions with pilot whales in the Atlantic tuna purse seine fishery were observed in 1996. In one interaction, the net was actually pursed around one pilot whale, the rings were released and the animal escaped alive, condition unknown. This set occurred east of the Great South Channel and just north of the Cultivator Shoals region on Georges Bank. In a second interaction, 5 pilot whales were encircled in a set. The net was opened prior to pursing to let the whales swim free, apparently uninjured. This set occurred on the Cultivator Shoals region on Georges Bank. No trips were observed during 1997 through 1999. Four trips were observed in September 2001. No marine mammals were observed taken during these trips.

No pilot whales were taken in observed mid-Atlantic Coastal Gillnet trips during 1993-1997. One pilot whale was observed taken in 1998, 0 during 1999-2003. Observed effort was scattered between New York and North Carolina from 1 to 50 miles off the beach. All bycatches were documented during January to April. Using the observed takes, the estimated annual mortality (CV in parentheses) attributed to this fishery was 7 in 1998 (1.10).

One pilot whale take was observed in the *Ilex* squid portion of the Southern New England/Mid-Atlantic Squid, Mackerel, Butterfish Trawl fisheries in 1996 and 1 in 1998. The estimated fishery-related mortality to pilot whales in the U.S. Atlantic attributable to this fishery was 45 in 1996 (CV=1.27), 0 in 1997, 85 in 1998 (CV=0.65) and 0 in 1999. However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage. After 1999 this fishery is included as a component of the mid-Atlantic bottom trawl fishery.

One pilot whale take was observed in the *Loligo* squid portion of the Southern New England/Mid-Atlantic Squid, Mackerel, Butterfish Trawl fisheries in 1999. The estimated fishery-related mortality to pilot whales in the U.S. Atlantic attributable to this fishery was 0 between 1996 and 1998 and 49 in 1999 (CV=.97). However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage. After 1999 this fishery is included as a component of the mid-Atlantic bottom trawl fishery.

There was one observed take in the Southern New England/mid-Atlantic Bottom Trawl fishery reported in 1999. The estimated fishery-related mortality for pilot whales attributable to this fishery was 0 in 1996-1998, and 228 (CV= 1.03) in 1999. After 1999 this fishery is included as a component of the mid-Atlantic bottom fishery.

For more details on the earlier fishery interactions see Waring *et al.* 2007.

Pelagic Longline

Most of the estimated marine mammal bycatch is from U.S. Atlantic EEZ waters between South Carolina and Cape Cod (Johnson *et al.* 1999; Yeung 2001; Garrison 2003, 2005; Garrison and Richards 2004; Fairfield-Walsh and Garrison 2006). Pilot whales are frequently observed to feed on hooked fish, particularly big-eye tuna (NMFS unpublished data). Between 1992 and 2005, 109 pilot whales were released alive, including 61 that were considered seriously injured and 4 mortalities were observed (Johnson *et al.* 1999; Yeung 2001; Garrison 2003, 2005; Garrison and Richards 2004; Fairfield-Walsh and Garrison 2006). January-March bycatch was concentrated on the continental shelf edge northeast of Cape Hatteras. Bycatch 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 bycatch occurred between the 20 and 50 fathom isobaths between Barnegat Bay and Cape Hatteras. The estimated fishery-related mortality to pilot whales in the U.S. Atlantic (excluding the Gulf of Mexico) attributable to this fishery was: 127 in 1992 (CV=1.00), 0 from 1993-1998, 93 in 1999 (CV=1.00), 24 in 2000 (CV=1.0), 20 (CV = 1.0) in 2001, 2 (CV =1.0) in 2002, 0 in 2003-2005. The estimated serious injuries were 40 (CV=0.71) in 1992, 19 (CV=1.00) in 1993, 232 (CV=0.53) in 1994, 345 (CV= 0.51) in 1995, (includes 37 estimated short-finned pilot whales in 1995 (CV=1.00), 0

from 1996 to 1998, 288 (CV=0.74) in 1999, 109 (CV=1.00) in 2000, 50 in 2001 (CV = 0.58), 51 in 2002 (CV = 0.48), 21 in 2003 (CV = 0.78), 74 in 2004 (CV=0.42), and 212 in 2005 (CV=0.21). The average 'combined' annual mortality in 2001-2005 was 86 pilot whales (CV=0.16) (Table 2).

Mid-Atlantic Bottom Trawl

Two pilot whales were observed taken in the Mid-Atlantic bottom trawl in 2000 and four in 2005. The estimated fishery-related mortality to pilot whales in the U.S. Atlantic attributable to this fishery was: 47 (CV=0.32) in 2000, 39 (CV=0.31) in 2001, 38(CV=0.36) in 2002, 31 (CV=0.31) in 2003, 35 (CV=0.33) in 2004, and 31 (0.31) in 2005. The 2001-2005 average mortality attributed to the Mid-Atlantic bottom trawl was 38 animals (CV=0.15).

Northeast Bottom Trawl

Two pilot whales were observed taken in the Northeast bottom trawl in 2004 and four in 2005. The estimated fishery-related mortality to pilot whales in the U.S. Atlantic attributable to this fishery was: 18 (CV=0.29) in 2000, 30 (CV=0.27) in 2001, 22 (CV=0.26) in 2002, 20 (CV=0.26) in 2003, 15 (CV=0.29) in 2004, and 15 (0.30) in 2005. The 2001-2005 average mortality attributed to the northeast bottom trawl was 19 animals (CV=0.12).

GOM/GB Herring Mid-Water Trawl JV and TALFF

A U.S. joint venture (JV) mid-water (pelagic) trawl fishery was conducted on Georges Bank from August to December 2001. Eight pilot whales were incidentally captured in a single mid-water trawl during JV fishing operations. Three pilot whales were incidentally captured in a single mid-water trawl during foreign fishing operations (TALFF) (Table 2). The 2001-2005 average mortality attributed to the Atlantic herring mid-water trawl fishery was 11 animals (Table 2).

Northeast Mid-Water Trawl – Including Pair Trawl

The observer coverage in this fishery was highest after 2003, though a few trips in earlier years were observed (Table 2). A pilot whale was observed taken in the single trawl fishery on the northern edge of Georges Bank (off of Massachusetts) in a haul that was targeting (and primarily caught) herring in 2004. Due to small sample sizes, the bycatch rate model used the 2003 to September 2006 observed mid-water trawl data, including paired and single, and Northeast and Mid-Atlantic mid-water trawls (Palka, pers. com.). The model that best fit these data was a Poisson logistic regression model that included latitude, bottom depth, and whether a kite panel was used on pair-trawl haulsas significant explanatory variables, and soak duration as the unit of effort. Estimated annual fishery-related mortalities (CV in parentheses) were: unknown in 2001-2002, 1.9 (0.56) in 2003, and 1.4 (0.58) in 2004, and 1.1(.68) (Table 2; Palka pers. comm.). The average annual estimated fishery-related mortality during 2001-2005 was 1 (0.35).

Mid-Atlantic Mid-water Trawl Fishery (Including Pair Trawl)

The observer coverage in this fishery was highest after 2003, though a few trips in other years were observed (Table 2). No pilot whales were observed bycaught in this fishery between 2001-2005, though because of data pooling, estimates were still generated. Due to small sample sizes, the bycatch rate model used the 2003 to September 2006 observed mid-water trawl data, including paired and single, and Northeast and mid-Atlantic mid-water trawls (Palka, pers. com.). The model that best fit these data was a Poisson logistic regression model that included latitude, bottom depth, and whether a kite panel was used on pair-trawl hauls as significant explanatory variables, and soak duration as the unit of effort. Estimated annual fishery-related mortalities (CV in parentheses) were unknown in 2001-2002, 3.9 (0.46) in 2003, 8.1 (0.38) in 2004, and 7.5 (.76) in 2005 (Table 2; Palka pers. com.). The average annual estimated fishery-related mortality during 2001-2005 was 7 (0.34).

CANADA

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).

Between January 1993 and December 1994, 36 Spanish deep-water trawlers, covering 74 fishing trips (4,726 fishing days and 14,211 sets), were observed in NAFO Fishing Area 3 (off the Grand Banks) (Lens 1997). A total of 47 incidental catches were recorded, which included 1 long-finned pilot whale. The incidental mortality rate for

pilot whales was 0.007/set.

In Canada, the fisheries observer program places observers on all foreign fishing vessels, on between 25% and 40% of large Canadian vessels (greater than 100 ft), and on approximately 5% of small vessels (Hooker *et al.* 1997). Fishery observer effort off the coast of Nova Scotia during 1991-1996 varied on a seasonal and annual basis, reflecting changes in fishing effort (see Figure 3, Hooker *et al.* 1997). During the 1991-1996 periods, long-finned pilot whales were bycaught (number of animals in parentheses) in bottom trawl (65); midwater trawl (6); and longline (1) gear. Recorded bycatches by year were: 16 in 1991, 21 in 1992, 14 in 1993, 3 in 1994, 9 in 1995 and 6 in 1996. Pilot whale bycatches occurred in all months except January-March and September (Hooker *et al.* 1997).

There was one record of incidental catch in the offshore Greenland halibut fishery that involved one long-finned pilot whale in 2001 although no expanded bycatch estimate was calculated (Benjamins *et al.* in press).

Table 2. Summary of the incidental mortality and serious injury 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 observed mortalities and serious injuries recorded by on-board observers, the estimated annual mortality and serious injury, the combined annual estimates of mortality and serious injury (Estimated Combined Mortality), the estimated CV of the combined estimates (Estimated CVs) and the mean of the combined estimates (CV in parentheses).

Fishery	Years	Vessels[a]	Data Type[b]	Observer Coverage[c]	Observed Serious Injury	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Estimated Combined Mortality	Estimated CVs	Mean Annual Mortality
Mid-Atlantic Bottom Trawl[d]	01-05	unk	Obs. Data Dealer	.01, .01, .01, .03, .03	0, 0, 0, 0, 0	0, 0, 0, 0, 4	0, 0, 0, 0, 0	39, 38, 31, 35, 31	39, 38, 31, 35, 31	.31, .36, .31, .33, .31	38(.15)
Northeast Bottom Trawl[d]	01-05[d]	unk	Obs. Data Dealer Data VTR Data	.01, .03, .04, .05, .12	0, 0, 0, 0, 0	0, 0, 0, 0, 2, 4	0, 0, 0, 0, 0	21, 22, 20, 15, 15	21, 22, 20, 15, 15	.27, .26, .26, .29, .30	19(.12)
GOM/GB Herring Mid-Water Trawl JV and TALFF[e]	2001	10[f]	Obs. Data	1[g]	0	11	0	11	11	NA	11 (NA)
Mid-Altlantic Mid-Water Trawl - Including Pair Trawl[j]	01-05	23, 20, 23, 25, 31	Obs. Data Dealer Data VTR Data	0, .003, .018, .064, .084	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	unk, unk, 3.9, 8.1, 7.5	unk, unk, 3.9, 8.1, 7.5	unk, unk, .46, .38, .76	7 (.34)
Northeast Mid-Water Trawl - Including Pair Trawl[j]	01-05	24, 27, 28, 22, 25	Obs. Data Dealer Data VTR Data	.001, 0, .031, .126, .199	0, 0, 0, 0, 0	0, 0, 0, 1, 0	0, 0, 0, 0, 0	unk, unk, 1.9, 1.4, 1.1	unk, unk, 1.9, 1.4, 1.1	unk, unk, .56, .58, .68	1 (.35)
Pelagic Longline (excluding NED-E)[h]	01-05	98, 87, 63, 60, 60	Obs. Data Logbook	.04, .05, .09, .09, .06	4, 4, 2, 6, 9	1, 0, 0, 0, 0	50, 52, 21, 74, 212	20, 2, 0, 0, 0	70, 54, 21, 74, 212	.50, .46, .77, .42, .21	86 (.16)
Pelagic Longline - NED-E area	01-03	9, 14, 11	Obs. Data	1, 1, 1	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	0

only[h]			Logbook								
2005 Pelagic Longline experimental fishery[i]	05	6	Obs. Data	1	1	0	1	0	1	na	1(na)
TOTAL											163(.09)

a. Number of vessels in the fishery is based on vessels reporting effort to the pelagic longline logbook.
b. Observer data (Obs. Data) are used to measure bycatch rates, and the data are collected within the Northeast Fisheries Observer Program. Mandatory logbook data were used to measure total effort for the longline fishery. These data are collected at the Southeast Fisheries Science Center (SEFSC).
c. Observer coverage of the Mid-Atlantic coastal gillnet fishery is a ratio based on tons of fish landed. Observer coverage for the longline fishery is a ratio based on sets. The trawl fisheries are ratios based on trips.
d. A new method was used to develop preliminary estimates of mortality for the Mid-Atlantic and Northeast trawl fisheries during 2000-2005. They are a product of bycatch rates predicted by covariates in a model framework and effort reported by commercial fishermen on mandatory vessel logbooks. This method differs from the previous method used to estimate mortality in these fisheries prior to 2000. Therefore, the estimates reported prior to 2000 can not be compared to estimates during 2000-2005. In addition, the fisheries listed in Table 2 reflect definitions defined by the List of Fisheries for 2005 (FR Vol. 69, No. 231, 2004). The 'North Atlantic bottom trawl' fishery is now referred to as the 'Northeast bottom trawl. The Illex, Loligo and Mackerel fisheries are now part of the 'Mid-Atlantic bottom trawl fishery'.
e. NA=No joint venture or TALFF fishing effort for Atlantic herring.
f. Three foreign vessels and seven American vessels.
g. During joint venture fishing operations, nets that are transferred from the domestic vessel to the foreign vessels for processing are observed on board the foreign vessel. There may be nets fished by domestic vessels that do not get transferred to a foreign vessel for processing and therefore would not be observed. During TALFF fishing operations all nets fished by the foreign vessel are observed.
h. An experimental program to test effects of gear characteristics, environmental factors, and fishing practices on marine turtle bycatch rates in the Northeast Distant (NED-E) water component of the fishery was conducted from June 1, 2001-December 31, 2003. Observer coverage was 100% during this experimental fishery. Summaries are provided for the pelagic longline EXCLUDING the NED-E area in one row and for ONLY the NED in the second row. No mortalities or serious injuries were observed for pilot whales in the NED-E, though 1 pilot whale was caught alive and released without injury (Garrison, 2003; Garrison and Richards, 2004).
i. A cooperative research program conducted during quarters 2 and 3 in 2005 (Fairfield-Walsh and Garrison 2006).
j. The data used to predict bycatch rates to estimate annual mortality were pooled over the years 2001-2005. The data are treated as one data set and assumed to represent average fishing practices during the time period. Regression techniques within a model framework were applied to the pooled data set. Therefore, if there was no observed bycatch reported for any one given year, this does not imply that there was no bycatch during that year. The exception would be if year was selected by the model as an important factor associated with observing bycatch.

Other Mortality

Pilot whales have a propensity to mass strand throughout their range, but the role of human activity in these events is unknown. Between 2 and 168 pilot whales have stranded annually, either individually or in groups, along the eastern U.S. seaboard since 1980 (NMFS 1993b, stranding databases maintained by NMFS NER, NEFSC and SEFSC). From 2001-2005, 76 short-finned pilot whales (*Globicephala macrorhynchus*), 139 long-finned pilot whales (*Globicephala melas*), and 9 pilot whales not specified to the species level (*Globicephala* sp.) were reported stranded between Maine and Florida, including Puerto Rico and the Exclusive Economic Zone (EEZ) (Table 3). This includes several mass strandings as follows: 11 long-finned pilot whales mass stranded in Nantucket, MA in 2000 and 57 in 2002 in Dennis, MA; 28 short-finned pilot whales stranded in Content Passage, Monroe County, FL (ocean side) on April 18, 2003; and 18 pilot whales (including one pregnant female) were part of a multi-species mass stranding in Barnstable County, MA on 10 December, 2005. Two juvenile animals that live stranded in Chatham, Massachusetts in 1999 were rehabilitated, satellite tagged and released (Nawojchik *et al.* 2003). Both animals were released off eastern Long Island, New York and tracked for four months in the Gulf of Maine. Four of 6 animals from one live stranding event in Massachusetts in 2000 were rehabilitated and released. However, certain studies have shown that frequently animals that are returned to the water swim away and strand someplace else (Fehring and Wells 1976; Irvine *et al.* 1979; Odell *et al.* 1980). The fate of the animals is footnoted in Table 3, when recorded.

A Virginia Coastal Small Cetacean Unusual Mortality Event (UME) occurred along the coast of Virginia from 1 May to 31 July 2004, when 66 small cetaceans stranded mostly along the outer (eastern) coast of Virginia's barrier islands including 1 pilot whale (*Globicephala* sp.). Human interactions were implicated in 17 of the strandings (1 common and 16 bottlenose dolphins), other potential causes were implicated in 14 strandings (1 Atlantic white-sided dolphin, 2 harbor porpoises and 11 bottlenose dolphins), and no cause could be determined for the remaining

strandings, including the pilot whale. A final report on this UME is pending (Barco in prep.).

A Mid-Atlantic Offshore Small Cetacean UME, was declared when 33 small cetaceans stranded from Maryland to Georgia between July and September 2004. The species involved are generally found offshore and are not expected to strand along the coast. One short-finned pilot whale (*Globicephala macrorhynchus*) was involved in this UME. A mass stranding of thirty-three short-finned pilot whales, including five pregnant females, occurred near Cape Hatteras, NC from 15-16 January 2005. Gross necropsies were conducted and samples were collected for pathological analyses (Hohn *et al.* 2006), though no single cause for the UME was determined. The authors could not "definitively conclude that there was or was not a causal link between anthropogenic sonar activity or environmental conditions (or a combination of these factors) and the strandings".

Table 3. Pilot whale (*Globicephala macrorhynchus* (SF), *Globicephala melas* (LF) and *Globicephala* sp. (Sp) strandings along the Atlantic coast, 2001-2005. Strandings which were not reported to species have been reported as Globicephala sp. The level of technical expertise among stranding network personnel varies, and given the potential difficulty in correctly identifying stranded pilot whales to species, reports to specific species should be viewed with caution.

STATE	2001			2002			2003			2004			2005			TOTALS		
	SF	LF	Sp	SF	LF	Sp	SF	LF	Sp	SF	LF	Sp	SF	LF	Sp	SF	LF	Sp
Nova Scotia[a]	0	0	3[b]	0	0	7[c]	0	0	2	0	0	3	0	0	2	0	0	17
Maine	1	5[d]	0	0	2	0	0	1	0	0	4	0	0	2	0	1	14	0
New Hampshire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Massachusetts	0	3	0	0	65[e]	0	0	5	0	0	1	0	0	22[o]	0	0	96	0
Rhode Island	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	1	3	0
Connecticut	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New York	0	1	0	0	0	0	0	0	0	0	3	0	0	1	0	0	5	0
New Jersey	0	0	0	0	0	0	0	6[f]	0	0	0	0	0	0	2	0	6	2
Delaware	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maryland	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0
Virginia	0	0	0	0	0	0	0	3	0	0	0	1[g]	0	4[p]	0	0	7	1
North Carolina	1	0	1	0	0	0	2	0	1	1[h]	1	1[h]	35[m,n]	1	2	39	2	5
South Carolina	1	0	0	0	0	0	0	1[i]	0	0	0	0	0	0	0	1	1[i]	0
Georgia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Florida	0	0	0	0	0	0	29[j,k]	0	0	4	0	0	0	0	0	33	0	0
Puerto Rico	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
EEZ	0	0	0	0	0	0	0	1[l]	0	0	0	0	0	0	1	0	1	1
TOTALS - U.S., Puerto Rico, & EEZ	5	9	1	0	68	0	31	18	1	5	10	2	35	34	5	76	139	9

a. Data supplied by Tonya Wimmer, Nova Scotia Marine Animal Response Society (pers. comm.).

b. Three mass live stranded animals at Judique, Inverness County on July 19, 2001 - all returned to sea.

c. Includes 4 mass strandings at Point Tupper, Inverness County on January 11, 2002 - fate unreported.

d. Includes one long finned pilot whale stranded with possible propeller marks in Maine in September 2001.

e. Includes mass stranding of 57 long-finned pilot whales in Dennis, MA in July 2002 – majority of pod refloated and released, but rebeached 1-2 days later; ~30 animals euthanized, and ~11 animals died during the strandings.

f. Two long-finned pilot whales stranded dead separately in April 2003 off New Jersey with rope tied around the flukes.

g. One pilot whale stranded in Virginia in 2004 during an Unusual Mortality Event but was not identified to species (decomposed and decapitated).

h. One short-finned pilot whale (September 2004) and one pilot whale (November 2004) not identified to species stranded in North Carolina during an Unusual Mortality Event (UME). A long-finned pilot whale also stranded in North Carolina in February, not related to any UME.

i. Only moderate confidence on species identification as long-finned pilot whale.
j. Includes mass live stranding of 28 short-finned pilot whales in Content Passage, Monroe County, FL (Ocean side) on April 19, 2003 - 12 animals died or were euthanized at the scene, 9 were returned to sea, 7 were taken into rehabilitation of which 2 subsequently died and 5 were released to sea on August 10, 2003.
k. Signs of human interaction reported on 1 stranded short-finned pilot whale (not part of the live mass stranding), which stranded in May 2003 in Florida.
l. One long-finned pilot whale floating dead on Georges Bank offshore.
m. Includes Unusual Mortality Event mass stranding of 33 short-finned pilot whales in Dare, NC on 15-16 January, 2005, including five pregnant females. Six animals had fishery interaction marks, which were healed and not the cause of death.
n. Signs of fishery interaction observed on a short-finned pilot whale stranded in May in NC.
o. Includes 18 pilot whales which were part of a multi-species mass stranding in Barnstable County, MA on 10 December, 2005. This includes one pregnant female.
p. Sign of human interaction (a line on the flukes) observed in both animals, and one animal was a pregnant female.

Short-finned pilot whales strandings (*Globicephala macrorhynchus*) have been reported stranded as far north as Nova Scotia (1990) and Block Island, Rhode Island (2001), though the majority of the strandings occurred from North Carolina southward (Table 3). Long-finned pilot whales (*Globicephala melas*) have been reported stranded as far south as Florida, when 2 long-finned pilot whales were reported stranded in Florida in November 1998, though their flukes had been apparently cut off, so it is unclear where these animals actually may have died. One additional long-finned pilot whale stranded in South Carolina in 2003, though the confidence in the species identification was only moderate. Most of the remaining long-finned pilot whale strandings were from North Carolina northward (Table 3).

In eastern Canada, 37 strandings of long-finned pilot whales (173 individuals) were reported on Sable Island, Nova Scotia from 1970 to 1998 (Lucas and Hooker 1997; Lucas and Hooker 2000). This included 130 animals that mass stranded in December 1976, and 2 smaller groups (<10 each) in autumn 1979 and summer 1992. Fourteen strandings were also recorded along Nova Scotia in 1991-1996 (Hooker et al. 1997). Several mass live strandings occurred in Nova Scotia recently - 14 pilot whales live mass stranded in 2000 and 3 in 2001 in Judique, Inverness County and 4 pilot whales live mass stranded at Point Tupper, Inverness County, in 2002, though no specification to species was made.

Between 2001-2005, human and/or fishery interactions were documented as follows: one long-finned pilot whale stranded with possible propeller marks in Maine in September 2001, two long-finned pilot whales stranded dead separately in April 2003 off New Jersey with rope tied around the flukes, and signs of human interaction were reported (but no specifics recorded in database) on 1 short-finned pilot whale which stranded in May 2003 in Florida. During a UME in Dare, NC in January 2005, six of the 33 short-finned pilot whales which mass stranded had fishery interaction marks (specifics not given) which were healed and determined not to be the cause of death. A short-finned pilot whale stranded in May 2005 in NC had net marks around the leading edge of the dorsal fin from the top to bottom, and had net marks on both fluke lobes. Two long-finned pilot whales stranded in Virginia in April 2005, one with a line on its flukes and another with human interactions noted but specifics not given.

Stranding data probably underestimate the extent of fishery-related mortality and serious injury because all of the marine mammals that die or are seriously injured may not wash ashore, nor will all of those that do wash ashore necessarily show signs of entanglement or other fishery-interaction. Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of fishery interaction.

A potential human-caused source of mortality is from polychlorinated biphenyls (PCBs) and chlorinated pesticides (DDT, DDE, dieldrin, etc.), moderate levels of which have been found in pilot whale blubber (Taruski *et al.*1975; Muir *et al.* 1988; Weisbrod *et al.* 2000). Weisbrod *et al.* (2000) reported that bioaccumulation levels were more similar in whales from the same stranding group than animals of the same sex or age. Also, high levels of toxic metals (mercury, lead, cadmium) and selenium were measured in pilot whales harvested in the Faroe Island drive fishery (Nielsen *et al.* 2000). Similarly, Dam and Bloch (2000) found very high PCB levels in pilot whales in the Faroes. The population effect of the observed levels of such contaminants is unknown.

STATUS OF STOCK

The status of short-finned pilot whales relative to OSP in the U.S. Atlantic EEZ is unknown. There are

insufficient data to determine population trends for this species. The species is not listed under the Endangered Species Act. The total fishery-related mortality and serious injury for *Globicephala* sp. 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 not a strategic stock because the 2001-2005 estimated average annual human related mortality does not exceed PBR. However, the continuing inability to distinguish between species of pilot whales raises concerns about the possibility of mortalities of one stock or the other exceeding PBR.

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