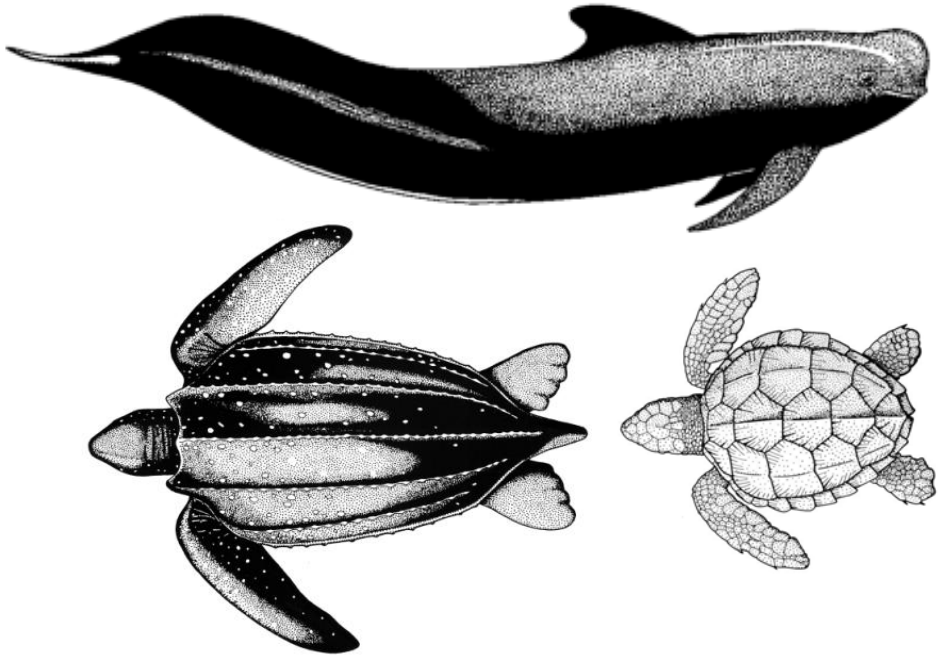
NOAA TECHNICAL MEMORANDUM NMFS-SEFSC-560

Estimated Bycatch of Marine Mammals and Turtles in the U.S. Atlantic Pelagic Longline Fleet During 2006.

Carol Fairfield-Walsh and Lance P. Garrison



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National Oceanic and Atmospheric Administration
NOAA Fisheries
Southeast Fisheries Science Center
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Abstract

The U.S. Atlantic Pelagic Longline fleet operates throughout the Northwestern Atlantic Ocean, including along the U.S. coast from the Gulf of Mexico to New England, the waters of the Caribbean, and in international waters of the North Atlantic Ocean. The Atlantic longline fleet is defined as a Category I fishery under the Marine Mammal Protection Act, and it is also the subject of management under the Endangered Species Act due to interactions with leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*) turtles. Total bycatch of marine mammals and turtles in the longline fishery was estimated for 2006 using data from the pelagic longline fishery observer program and a mandatory fishery logbook reporting program. We applied a delta-lognormal approach to estimate region specific and total annual interactions with protected species for the fishery. During 2006, there were an estimated 415 (284 – 607 95%CI) interactions with leatherback turtles and 561 (318 – 981 95%CI) interactions with loggerhead turtles. The primary marine mammal species interacting with this fishery was pilot whales (*Globicephala* sp.) with an estimated 267 (151 – 473 95% CI) interactions. Potential sources of bias and uncertainty in these bycatch estimates are discussed.

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Introduction

Pelagic longline fisheries operate throughout the world's oceans targeting large pelagic fish including swordfish, tunas, and sharks. The U.S. Atlantic Pelagic Longline fleet operates throughout the Northwestern Atlantic Ocean, including along the U.S. coast from the Gulf of Mexico to New England, the waters of the Caribbean, and in international waters of the North Atlantic Ocean. (Figure 1). The Atlantic longline fleet is defined as a Category I fishery under the Marine Mammal Protection Act (50 CFR Part 229, Federal Register Vol. 69, No. 135, 15 July 2003) due to frequently documented interactions with marine mammals.

The fishery is also the subject of management under the Endangered Species Act (ESA) due to frequent interactions with marine turtles including leatherback (*Dermochelys coriacea*) and loggerhead turtles (*Caretta caretta*). In June 2004, a Biological Opinion was issued by the NOAA Fisheries Service, Southeast Regional Office, finding that the U.S. Pelagic Longline Fleet posed a jeopardy to leatherback turtles in the Atlantic Ocean as defined under the ESA. To allow continued operation of the fishery, the Biological Opinion mandated increases in the frequency in reporting of bycatch, education and outreach programs, and instituted large-scale changes in fishing gear. Most notably, the fishery was required to exclusively use "circle" hooks (size 16/0 or greater) after August 2004. This mandate was based upon expected reductions in bycatch rate due to hook shape and size demonstrated by experimental studies conducted in the Northeast Distant Water (NED) fishing area (Watson *et al.*, 2005).

In addition to the recently mandated gear changes, several time-area closures were introduced into the fishery in 2000 and 2001 due to concerns over both finfish and protected species bycatch (NMFS 2003, 50 CFR Part 635). These include year-round closures near the Desoto canyon in the Gulf of Mexico after 1 November 2000 (Figure 1, Label A), and in waters off the Atlantic coast of Florida after 1 March 2001 (Figure 1, Label B). Seasonal closures are in effect in the Charleston Bump region between 1 February and 30 April (Figure 1, Label C) and in a bluefin tuna area off of the New Jersey coast between 1 June and 30 June (Figure 1, Label D). The NED area had been closed to non-experimental longline fishing since 2001; however, it was reopened to fishing with restrictions on gear types in June 2004.

The pelagic longline fishery has had a fishery observer program (Pelagic Observer Program, POP) in place since 1992 to document finfish bycatch, characterize fishery behavior, and quantify the interactions with protected species (Beerkircher *et al.*, 2002). In addition, a mandatory fishery logbook system (FLS) has been in place since 1992 requiring boat captains to report fishing effort, gear characteristics, and commercial catch. These data have been used to generate annual estimates of marine mammal and turtle bycatch (Johnson *et al.*, 1999; Yeung, 1999a; Yeung 1999b; Yeung, 2001; Garrison 2003; Garrison and Richards, 2004; Garrison 2005; and Fairfield-Walsh and Garrison, 2006).

In this report, marine mammal and marine turtle bycatch estimates are calculated for pelagic longline fishery effort during 2006. Bycatch rates (catch per 1000 hooks) are quantified based upon observer data by fishing area and quarter. The estimated bycatch rate is then multiplied by the total fishing effort (number of hooks) reported to the FLS

program to obtain estimates of total interactions for each species of marine mammal and turtle.

Methodology

Geographic Stratification

Fishery observer effort is allocated among 11 large geographic areas and calendar quarter based upon the historical fishing range of the fleet (Figure 1). The target annual coverage during the last several years has been 8% of the total reported sets, and observer effort is allocated randomly based upon reported fishing effort during the previous fishing year/quarter/statistical reporting area (Beerkircher *et al.*, 2002). The bycatch estimates developed for each species are stratified by geographic area and quarter to reflect the design of the observer program.

Bycatch rates for quarter-area strata with reported longline fishery sets that had no corresponding observer coverage were replaced with the mean bycatch rate observed in the quarter-area stratum between 2001 and 2005. Due to implementation of management actions under the June 2004 Biological Opinion, the pelagic longline fishery used exclusively 16/0 or 18/0 circle hooks throughout 2006. Prior to the 3rd quarter of 2004, the vast majority of fishing effort used smaller J-hooks that may have resulted in higher bycatch rates than those expected for 2006. This significant change in gear types complicates the use of historical data to correct for unobserved cells in 2006. Several options were explored as approaches to account for unobserved cells by applying data from previous years (Fairfield-Walsh and Garrison, 2006), and this analysis indicated that using the historical data remained the best alternative.

Delta Lognormal Estimator

Sets in which a portion of the longline broke away, and therefore had multiple recorded haul times, were combined into single sets. This is consistent with the approach of the most recent mortality estimates (Garrison, 2003; Garrison and Richards, 2004; Garrison, 2005; and Fairfield-Walsh and Garrison, 2006). The mean and variance of catch rates for marine mammals and turtles observed in longline sets, were calculated using a delta lognormal estimator (Pennington 1993). The delta estimator is more appropriate than the simple mean because catch rates are generally log-normally distributed and bycatch events (i.e., positive sets) are rare. The unit of effort in this analysis is the number of hooks, which is consistent with methods used to estimate total catch and bycatch of finfish and previous analyses of protected resource interactions (Johnson *et al.* 1999). The mean bycatch rate for each analytical stratum, t, is calculated as:

$$(1) \quad C_t = \frac{m_t}{n_t} e^{L_t} G\left(s_{L_t}^2/2\right),$$

where:

m_t is the number of sets with observed bycatch,

n_t is the total number of observed sets,

L_t is the mean of the log-transformed number of animals taken per 1000 hooks when bycatch occurred,

s_L^2 is the observed sample variance of the log transformed bycatch rate, and

G is the cumulative probability function from the Poisson distribution given as:

$$(2) \quad G\left(s_L^2/2\right) = 1 + \frac{m_t - 1}{m_t}\left(s_L^2/2\right) + \sum_{j=2}^{\infty} \frac{\left(m_t - 1\right)^{2j-1}}{m_t^j (m_t + 1)(m_t + 3)....(m_t + 2j - 3)} \times \frac{\left(s_L^2/2\right)^j}{j!}.$$

The series was computed numerically over j terms until meeting a convergence criterion of a change in the function value of < 0.0001 with additional terms (j). Convergence was generally achieved with <10 terms. The variance of the delta estimator is:

$$(3)\ \ \mathrm{var}(C_t) = \frac{m_t}{n_t}\left(e^{2L_t}\right)\left[\frac{m_t}{n_t}G^2\left(s_L^2/2\right) - \left(\frac{m_t - 1}{n_t - 1}\right)G\left(\frac{m-2}{m-1}s_L^2\right)\right].$$

When m_t is equal to 1, the mean bycatch rate reduces to the simple mean rate where

$$(4)\quad C_t = \frac{\exp(L_t)}{n_t},$$

and

$$(5)\ \ \mathrm{var}(C_t) = \left(\frac{\exp(L_t)}{n_t}\right)^2.$$

The C_t calculated above gives the mean number of animals caught per 1000 hooks in the observed trips. To estimate total interactions, *N*, these rates are multiplied by the total number of hooks reported to the FLS database for each analytical stratum. The stratified estimates and associated variances were summed to provide annual estimates for each species. Approximate 95% confidence intervals were calculated assuming log-normal distribution of total mortality as *N/C* and *N·C* for the lower and upper confidence bounds respectively where:

$$(6)\qquad \mathrm{C} = \exp\left[\ z_\alpha \sqrt{\mathrm{var}(\ln \mathrm{N})}\ \right],$$

and

$$(7)\ \mathrm{var}(\ln \mathrm{N}) = \ln\left[1 + \mathrm{var}(\mathrm{N})/\mathrm{N}^2\ \right],$$

where z_α is 1.96, the z score for $\alpha = 0.05$.

Sea Turtle Life History Form

Detailed information on the characteristics of longline interactions with sea turtles was recorded by the fisheries observers during 2006. These data include detailed descriptions of the type of interaction, the extent of entanglement, the location of any hook attached to the animal or swallowed, and other data (Appendix A). Information on entanglement, hooked animals, and the location of hooks are shown in Table B2.

Marine Mammal Serious Injury Determination

The Marine Mammal Protection Act (MMPA) requires that mortality and serious injury of marine mammals incidental to commercial fishing operations be reduced below Potential Biological Removal (PBR). "Serious injury" has been defined as an injury likely to result in mortality (NOAA Fisheries 50 CFR 229.2, Angliss and DeMaster, 1998). A workshop of NOAA Fisheries and external experts was convened in 1997 to evaluate the types of injuries occurring in commercial fisheries and guidelines for determining if a given marine mammal observed interacting with commercial fishing gear was seriously injured. For small cetaceans, including pilot whales and other delphinids, it was concluded that animals that ingested hooks, were released with significant amounts of trailing fishing gear, were swimming abnormally, or suffered some obvious severe external trauma, should be considered seriously injured (Angliss and DeMaster, 1998). Serious injury determinations are made on a case by case basis after reviewing the observations and comments of fishery observers. For this report,

observer comments for all takes of marine mammals from 2006 (Table B4) were reviewed and serious injury determinations were verified based upon observer comments and photographs consistent with current NOAA fisheries guidelines.

Results and Discussion

Reported Fishing Effort and Observer Coverage

The total reported pelagic longline fishing effort included 5.64 million hooks during 2006 (Table 1A). The reported fishery efforts included 7,551 sets during 2006, and of these 568 were observed by the POP program(Tables 1-2, Figure 2). The overall percent coverage was 7.5% expressed as a proportion of reported sets and 7.6% of reported hooks (Table 3). Observer coverage for specific area-quarter strata is shown in Table 3.

The area-quarter strata with reported fishing effort but with no observer coverage are identified in Table 3. Notable areas with no observer coverage during 2006 but significant levels (> 10 sets) of fishing effort include the CAR (quarter 1), FEC (quarter 4), NCA (quarters 1 and 2), SAB (quarter 4), and SAR (quarter 4) fishing areas. Observer coverage was available for the majority of these within the previous five years with the exception of the TUN area for all four quarters. There has been very little historical observer coverage of the TUN area, and therefore no bycatch estimate is possible for that region.

Observed Protected Species Interactions

There were 40 observed interactions with leatherback turtles, 46 with loggerhead turtles, and one interaction with a Kemp's ridley turtle (Table 4, Figure 3, Table B1) in 2006. One leatherback turtle was observed dead on capture. The greatest number of leatherback takes occurred in the NED during the 3rd and 4th quarters, in the GOM region during the 2nd quarter, and in the NEC during the 1st and 2nd quarters (Table 4A, Figure 3, Table B1). Loggerhead takes were observed in the greatest numbers in the NEC during the 3rd quarter and the NED during the 3rd and 4th quarters (Table 4B, Figure 3, and Table B1). The Kemp's ridley turtle was taken in the FEC area during the 3rd quarter (Table 4C, Figure 3, and Table B1).

The vast majority of the turtles were characterized as being released alive and injured (i.e., most had been hooked) based upon recorded information on the sea turtle life history form (Table 5A-5B, Table B2). Leatherback turtles were most typically hooked externally, while loggerhead turtles were primarily hooked in the mouth or beak or swallowed the hook (Table 5B). The Kemp's ridley turtle was not hooked (Table 5B). All gear was removed before release from 61 of the 87 turtles captured (Table 5).

There were 23 interactions observed with marine mammals during 2006 (Table 6, Table B3, and Figure 4). The majority of these interactions were observed in the MAB region with pilot whales. Fourteen of the observed marine mammal interactions were categorized as serious injuries, with all but three of these being pilot whales (Table 7). Three of these serious injuries, all involving pilot whales, involved being hooked in the mouth or being hooked in the mouth and entangled. The majority of the serious injuries in 2006 involved entanglement of the marine mammal. (Table 7, Table B4).

Total Estimated Bycatch and Mortality

Stratum estimates of mortality and total interactions for marine turtles are shown in Table 8. During 2006, high leatherback estimated interactions occurred in the NED in quarter 3 (92.7 animals), GOM quarter 2 (43 animals), NEC quarter 3 (39 animals), and the SAB quarter 1 (28 animals, Table 8A, Figure 3). For loggerhead turtles, the interactions were highest in the NED quarter 3 (208 animals), the NEC quarter 3 (124 animals), and MAB quarter 3 (47 animals, Table 8B, Figure 3).

The quarter-area strata estimates for marine mammal mortality, serious injury, and live releases are presented in Table 9. The majority of marine mammal serious injury occurred in the MAB region during the quarters 1, 3, and 4 and involved pilot whales (Table 9A, Figure 4).

The average bycatch rates and estimated catches in strata that were not observed during 2006 across the previous 5 years (2001-2005) are summarized in Table 10. The highest estimated take from these unobserved areas for leatherbacks included 11.5 in the SAB region in quarter 4. For loggerheads the highest take estimates for unobserved strata included 16 for the CAR area in quarter 1, 13 in the FEC in quarter 4, and 18 in the SAB area in quarter 4 (Table 10).

There were estimated to be a total of 415 (284 – 607 95% confidence interval) interactions with leatherback turtles during 2006 (Table 11A). The highest number of interactions occurred in the NED (116 [48 – 281 95% CI]) and the GOM (109 [55 – 218 95% CI]) fishing areas. For loggerhead turtles, there were an estimated total of 561 (318 – 981 95% confidence interval) interactions during 2006. The majority of these

interactions occurred in the NED (235 [73 – 756 95% CI]) and NEC (135 [84 – 218 95% CI]) fishing areas (Table 11B). The total estimated interactions with Kemp's Ridley turtles was 11 (2 – 55 95% CI).

The leatherback take estimate reached a historical high in 2004, and prior to that had increased nearly linearly since 1998 (Figure 5A). A significant decrease in the overall leatherback bycatch rate and the total estimated number of interactions with leatherback turtles occurred in 2005 (351 animals [233 – 529 95% CI]) after the implementation of regulations in August, 2004. The 2006 estimated take of leatherback turtles was slightly higher than that in 2005 but not significantly so. Loggerhead turtle interactions had also been increasing since 2000, though not to historically high levels. The estimated loggerhead interactions declined in 2005 (274 animals [195 – 384 95% CI]), but the estimated loggerhead turtle takes increased in 2006 (Figure 5B).

There was a slight (5%) decrease in the overall amount of fishing effort in 2006 compared to 2005. The fishery in the GOM did have a 14% increase in total effort, and this indicates a partial recovery from the effects of Hurricanes Katrina and Rita in 2005. However, despite this slight increase in effort, the leatherback turtle bycatch estimate for 2006 was essentially constant with that for 2005, and the estimate for loggerhead turtles increased. Dividing the total estimate by the number of hooks (x1000) provides an overall measure of the bycatch rate, and this ratio was 0.059 for leatherbacks and 0.048 for loggerheads in 2005. For 2006, these ratios were 0.074 and 0.099 reflecting a 25% increase in the bycatch rate for leatherbacks and a 106% increase in bycatch rate for loggerheads. The management actions put in place in 2004 appear to have resulted in consistent declines in bycatch rates for leatherback turtles as the estimates from 2005 and

2006 were significantly below those prior to the implementation of the regulations. However for loggerhead turtles, the 2006 bycatch rate approaches levels prior to the implementation of the regulations when the average bycatch rate from 2002-2004 was 0.102 turtles per 1000 hooks. Additional years of data and analyses will be required to fully assess the impacts of the management efforts imposed to reduce turtle bycatch in the longline fishery.

A total of 184 pilot whales were estimated to have suffered serious injury or death in the longline fishery during 2006 (Table 12). The total estimated number of interactions was 268 (151 – 474 95% CI) for pilot whales (Table 12). For pilot whales, the 2006 estimate is consistent with that from 2005 and reflects an increasing trend since 2003 (Figure 6). This is occurring despite an overall reduction in effort. However, the level of effort during 2006 increased relative to that in 2005 in the MAB where most of these interactions occur. The apparent increase in pilot whale interaction rates over the last several years is a cause for concern that requires continued monitoring. In contrast, there were no Risso's dolphin interactions observed during 2006, and this consistent with a decreasing trend occurring since 2003 (Figure 6).

Sources of Bias and Uncertainty

The fishery logbook data is a mandatory reporting program, and thus it is expected that reporting rates are generally high. Due to the intense management focus on the longline fishery, there has been close monitoring of reporting rates, and observed trips can be directly linked to reported effort. In general, the gear characteristics and amount

of observed effort is consistent with the reported effort. However, underreporting is possible in this fishery and would result in a direct negative bias in bycatch estimates.

Observer coverage in the pelagic longline fishery is generally high, particularly in comparison to that of other commercial fisheries. The sampling level, on average, is sufficient to provide reasonable quantification of interactions with protected species. The observed coefficients of variation for annual estimates of both loggerhead and leatherback turtles are <30%, which is consistent with guidelines for precision set by NOAA Fisheries. However, in some strata there is little or no coverage during particular times of year**.** During 2006, the most notable gaps in coverage occurred in the TUN which had no observer coverage except during quarter 1. In the CAR area in quarter 1, the FEC area in quarter 4, the NCA area in quarters 1 and 2, the SAB area in quarter 4, the SAR area in quarter 4 and the TUN area in quarters 2, 3 and 4 there were more than 10 longline sets reported, with no observer coverage. Applying observer data from previous years is inherently uncertain since bycatch rates can vary significantly in time and space. This is particularly problematic for this year, where the fishery effort prior to the 3rd quarter of 2004 used smaller J-hooks, and the 2006 effort included exclusively circle hooks. Estimates for those strata supplemented by previous observer coverage should therefore be treated with extreme caution.

For some strata, there has been no recent observer coverage, and thus regional and annual estimates of bycatch are potentially negatively biased. The most glaring omission is the low current and historical coverage of the offshore areas including the TUN region. The offshore strata traditionally have low levels of observer coverage, and therefore it is

currently unknown if there are significant interactions with protected species in these sectors of the longline fishery.

The delta estimator was applied to calculate bycatch rates primarily to maintain consistency with previous estimates for this fishery (Johnson *et al.*, 1999; Yeung, 1999a; Yeung, 1999b; Yeung, 2001; Garrison, 2003; Garrison and Richards, 2004; Garrison, 2005; and Fairfield-Walsh and Garrison, 2006). This approach assumes 1) that catch rates (animals per hook) are log-normally distributed and 2) that the number of hooks is an appropriate unit of effort. The first assumption was critically examined for turtles in Johnson *et al.* (1999); however, is difficult to verify for marine mammals given the generally low rate of these interactions. The delta estimator is sensitive to the assumption of log-normality, and violations of this assumption may result in biased (positive or negative) estimates of catch rate and associated variances. The second assumption has not been examined critically in previous analyses. The current approach assumes that total bycatch is linearly related to the total number of hooks fished. If this assumption is not correct, for example if there are saturation effects resulting in a non-linear relationship between the number of hooks and total catch, then there is potentially a direct bias, of unknown direction, in the estimate of total bycatch. This assumption is currently being evaluated along with other potential units of effort and statistical approaches to avoid bias and improve precision in bycatch estimates for the pelagic longline fleet.

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List of Tables and Figures

Table 1. Total amount of fishing effort reported to the pelagic longline logbook program during 2006 by quarter and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of sets.

Table 2. Total amount of fishing effort observed during 2006 by quarter and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of sets. Dashes indicate cells where no fishery effort was reported.

Table 3. Percentage of reported fishing effort observed during 2006 by quarter and fishing area by A) Number of hooks and B) Number of sets. Dashes indicate no reported fishing effort. Cells in which >10 longline sets were reported with no observer coverage are indicated in bold. Totals indicate overall percentage coverage by area and quarter.

Table 4. Total number of observed interactions with A) Leatherback turtles, B) Loggerhead turtles, C) Kemp's ridley, and D) All marine turtles in the pelagic longline fishery during 2006 by quarter and fishing area. Dashes indicate areas where there was no observed fishing effort, and an X indicates an area where no effort was reported.

Table 5. Summary of A) Release condition, B) Hook location in hooked animals, and C) Animals with all gear removed, by hook location for marine turtles in the pelagic longline fishery during 2006. Hook location information is recorded on the sea turtle life history form (Appendix A) by the observer.

Table 6. Total number of observed interactions with marine mammals in the pelagic longline fishery during 2006 by quarter and fishing area. Dashes indicate areas where there was no observed fishing effort, and an X indicates an area where no effort was reported.

Table 7. Summary of release condition and serious injury types for marine mammals in the pelagic longline fishery during 2006. Serious injury determinations were based upon written observer comments (Table B3). "Entangled" indicates that the animal was released with > 4 feet of gear remaining attached.

Table 8. Estimated interactions with marine turtles in the pelagic longline fishery during 2006 by fishing area and quarter, including: A) Observed Mortalities, B) Live Captures, and C) Total Interactions.

Table 9. Estimated A) Serious Injury, B) Live Releases, and C) Total Interactions with marine mammals in the pelagic longline fishery during 2006 by fishing area and quarter.

Table 10. Estimated interactions in the pelagic longline fishery for strata with reported fishing effort but no observer coverage during 2006. Bycatch rates are the average of the stratum rates during the previous five years (2001-2005). Estimates are shown for A)

Turtles and B) Marine Mammals. All previously observed turtle catches reported here were released alive (Injured and uninjured).

Table 11. Total estimated interactions with A) Leatherback, B) Loggerhead, and C) Kemp's Ridley turtles in the pelagic longline fishery during 2006 by fishing area. These estimates include extrapolated values for areas with no observer coverage during 2006 that had observed interactions during the past five years (Table 10).

Table 12. Total estimated interactions with marine mammals in the pelagic longline fishery during 2006. These estimates include extrapolated values for areas with no observer coverage during 2006 that had observed interactions during the past five years (Table 10).

Figure 1. Pelagic longline fishing areas in the North Atlantic Ocean indicating 11 defined fishing areas. CAR = Caribbean, GOM = Gulf of Mexico, FEC = Florida East Coast, SAB = South Atlantic Bight, SAR = Sargasso Sea, MAB = Mid-Atlantic Bight, NEC = Northeast Coastal, NED = Northeast Distant, NCA = North Central Atlantic, TUN = Tuna North, TUS = Tuna South. Pelagic longline closed areas are indicated by shaded polygons and letter labels (A-D).

Figure 2. Observed and reported pelagic longline fishing effort during 2006.

Figure 3. Observed pelagic longline fishing effort and marine turtle takes during 2006.

Figure 4. Observed pelagic longline fishing effort and marine mammal takes during 2006.

Figure 5. Historical trends in fishery effort and estimated marine turtle takes in the pelagic longline fishery between 1992 and 2006. Errors bars represent 95% confidence intervals.

Figure 6. Historic trends in fishery effort and estimated marine mammal takes in the pelagic longline fishery between 1992 and 2006. Errors bars represent 95% confidence intervals.

Table 1. Total amount of fishing effort reported to the pelagic longline logbook program during 2006 by quarter and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of sets.

A. Number of Hooks (thousands)

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	Total
1	63.8	71.1	456.2	92.3	34.3	0.0	0.0	82.2	108.1	12.9	920.9
2	7.6	97.1	682.9	161.7	30.2	75.9	6.1	369.2	1.3	47.3	1479.4
3	0.0	80.7	811.9	420.3	0.0	277.5	251.0	35.7	0.0	42.7	1919.8
4	1.6	31.1	610.6	407.5	0.0	52.8	82.4	56.1	26.2	50.1	1318.4
Total	**72.9**	**280.0**	**2561.5**	**1081.8**	**64.5**	**406.2**	**339.6**	**543.2**	**135.6**	**153.1**	**5638.5**

B. Number of Sets

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	Total
1	72	111	634	160	38	0	0	115	117	19	**1266**
2	9	208	851	288	33	85	8	460	2	50	**1994**
3	0	189	1042	583	0	310	284	73	0	53	**2534**
4	2	73	790	554	0	63	93	100	31	51	**1757**
Total	**83**	**581**	**3317**	**1585**	**71**	**458**	**385**	**748**	**150**	**173**	**7551**

Table 2. Total amount of fishing effort observed during 2006 by quarter and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of Sets. Dashes indicate cells where no fishery effort was reported.

A. Number of Hooks (thousands)

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	Total
1	0.0	8.5	39.3	10.3	0.0	-	-	7.6	14.9	6.1	86.6
2	0.0	4.5	75.5	1.7	0.0	12.8	0.0	22.0	0.0	0.0	116.5
3	-	8.0	38.2	27.3	-	27.6	12.9	2.9	-	0.0	117.0
4	0.0	0.0	49.3	25.4	-	7.4	27.4	0.0	0.0	0.0	109.6
Total	**0.0**	**21.0**	**202.2**	**64.8**	**0.0**	**47.8**	**40.4**	**32.6**	**14.9**	**6.1**	**429.7**

B. Number of Sets

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	Total
1	0	9	54	21	0	-	-	11	16	10	121
2	0	12	99	3	0	15		36	0	0	165
3	-	16	54	32	-	26	15	6	-	0	149
4	0	0	62	30	-	8	33	0	0	0	133
Total	**0**	**37**	**269**	**86**	**0**	**49**	**48**	**53**	**16**	**10**	**568**

Table 3. Percentage of reported fishing effort observed during 2006 by quarter and fishing area by A) Number of hooks and B) Number of sets. Dashes indicate no reported fishing effort. Cells in which >10 longline sets were reported with no observer coverage are indicated in bold. Totals indicate overall percentage coverage by area and quarter.

A. Number of Hooks

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	Total
1	**0.0**	11.9	8.6	11.1	**0.0**	-	-	9.2	13.8	47.2	9.4
2	0.0	4.7	11.0	1.1	**0.0**	16.8	0.0	6.0	0.0	**0.0**	7.9
3	-	9.9	4.7	6.5	-	9.9	5.2	8.2	-	**0.0**	6.1
4	0.0	**0.0**	8.1	6.2	-	14.1	33.3	**0.0**	**0.0**	**0.0**	8.3
Total	**0.0**	7.5	7.9	6.0	0.0	11.8	11.9	6.0	11.0	4.0	7.6

B. Number of Sets

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	Total
1	**0.0**	8.1	8.5	13.1	**0.0**	-	-	9.6	13.7	52.6	9.6
2	0.0	5.8	11.6	1.0	**0.0**	17.6	0.0	7.8	0.0	**0.0**	8.3
3	-	8.5	5.2	5.5	-	8.4	5.3	8.2	-	**0.0**	5.9
4	0.0	**0.0**	7.8	5.4	-	12.7	35.5	**0.0**	**0.0**	**0.0**	7.6
Total	**0.0**	6.4	8.1	5.4	0.0	10.7	12.5	7.1	10.7	5.8	7.5

Table 4. Total number of observed interactions with A) Leatherback turtles, B) Loggerhead turtles, C) Kemp's ridley and D) All marine turtles in the pelagic longline fishery during 2006 by quarter and fishing area. Dashes indicate areas where there was no observed fishing effort, and an X indicates an area where no effort was reported.

A. Leatherback Turtles

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	**Total**
1	-	1	1	0	-	X	X	3	1	0	**6**
2	-	1	5	0	-	4	-	0	-	-	**10**
3	X	0	1	0	X	4	5	0	X	-	**10**
4	-	-	3	2	X	1	8	-	-	-	**14**
Total	**-**	**2**	**10**	**2**	**-**	**9**	**13**	**3**	**1**	**0**	**40**

B. Loggerhead Turtles

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	**Total**
1	-	1	0	0	-	X	X	0	2	0	**3**
2	-	1	2	0	-	2	-	0	-	-	**5**
3	X	0	0	3	X	13	12	0	X	-	**28**
4	-	-	0	1	X	0	9	-	-	-	**10**
Total	**-**	**2**	**2**	**4**	**-**	**15**	**21**	**0**	**2**	**0**	**46**

C. Kemp's Ridley Turtles

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	**Total**
1	-	0	0	0	-	X	X	0	0	0	**0**
2	-	0	0	0	-	0	-	0	-	-	**0**
3	X	1	0	0	X	0	0	0	X	-	**1**
4	-	-	0	0	X	0	0	-	-	-	**0**
Total	**-**	**1**	**0**	**0**	**-**	**0**	**0**	**0**	**0**	**0**	**1**

Table 4 cont.

D. All Turtles

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	**Total**
1	-	2	1	0	-	X	X	3	3	0	**9**
2	-	2	7	0	-	6	-	0	-	-	**15**
3	X	1	1	3	X	17	17	0	X	-	**39**
4	-	-	3	3	X	1	17	-	-	-	**24**
Total	**-**	**5**	**12**	**6**	**-**	**24**	**34**	**3**	**3**	**0**	**87**

Table 5. Summary of A) Release condition, B) Hook location in hooked animals, and C) Animals with all gear removed, by hook location for marine turtles in the pelagic longline fishery during 2006. Hook location information is recorded on the sea turtle life history form (Appendix A) by the observer.

A. Release condition

Species	Alive, uninjured	Alive, unknown	Alive, injured	Dead	Total
Kemp's Ridley	1	0	0	0	**1**
Leatherback	6	2	31	1	**40**
Loggerhead	1	3	42	0	**46**
Total	**8**	**5**	**73**	**1**	**87**

B. Hook Location

				Internal			External	
Species	**Not Hooked**	**Unknown if Hooked**	**Hooked, Location Unknown**	**Unknown Intern/al**	**Swallowed**	**Beak/Mouth**		**Total**
Kemp's Ridley	1	0	0	0	0	0	0	**1**
Leatherback	6	3	3	0	0	0	28	**40**
Loggerhead	1	3	0	0	9	26	7	**46**
Total	**8**	**6**	**3**	**0**	**9**	**26**	**35**	**87**

C. Animals with all gear removed, by hook location

				Internal			External	
Species	**Not Hooked**	**Unknown if Hooked**	**Hooked, Location Unknown**	**Unknown Internal**	**Swallowed**	**Beak/Mouth**		**Total**
Kemp's Ridley	1	0	0	0	0	0	0	**1**
Leatherback	6	1	1	0	0	0	16	**24**
Loggerhead	1	3	0	0	0	25	7	**36**
Total	**8**	**4**	**1**	**0**	**0**	**25**	**23**	**61**

Table 6. Total number of marine mammals observed in interactions with the pelagic longline fishery during 2006 by quarter and fishing area. Dashes indicate areas where there was no observed fishing effort, and an X indicates an area where no effort was reported.

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	Total
1	-	0	0	7	-	X	X	0	0	0	7
2	-	0	1	0	-	0	-	0	-	-	1
3	X	0	0	4	X	1	0	0	X	-	5
4	-	-	0	10	X	0	0	-	-	-	10
Total	**-**	**0**	**1**	**21**	**-**	**1**	**0**	**0**	**0**	**0**	**23**

Table 7. Summary of release condition and serious injury types for marine mammals in the pelagic longline fishery during 2006. Serious injury determinations were based upon written observer comments (Table B3). "Entangled" indicates that the animal was released with > 4 feet of gear remaining attached.

Species	Alive	Dead	Serious Injury Type				Total
			Mouth hooked	Entangled	Mouth Hooked & entangled	Serious injury total	
Pilot Whale	7	1	1	9	2	12	**20**
Unidentified Dolphin	0	0	0	2	0	2	**2**
Unidentified Marine Mammal	0	1	0	0	0	0	**1**
Total	**7**	**2**	**1**	**11**	**2**	**14**	**23**

Table 8. Estimated interactions with marine turtles in the pelagic longline fishery during 2006 by fishing area and quarter, including A) Observed Mortalities, B) Live Captures, and C) Total Interactions.

A. Observed Mortalities

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
Leatherback	4	GOM	1	62	0.028	1.000	610.6	17.1

B. Released Alive

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
Kemp's Ridley	3	FEC	1	16	0.140	1.000	80.7	11.3
Leatherback	1	FEC	1	9	0.108	1.000	71.1	7.7
Leatherback	1	GOM	1	54	0.022	1.000	456.2	10.1
Leatherback	1	SAB	2	11	0.337	0.715	82.2	27.7
Leatherback	1	SAR	1	16	0.067	1.000	108.1	7.2
Leatherback	2	FEC	1	12	0.214	1.000	97.1	20.8
Leatherback	2	GOM	4	99	0.064	0.522	682.9	43.4
Leatherback	2	NEC	4	15	0.344	0.455	75.9	26.1
Leatherback	3	GOM	1	54	0.021	1.000	811.9	17.4
Leatherback	3	NEC	4	26	0.141	0.470	277.5	39.2
Leatherback	3	NED	3	15	0.369	0.609	251.0	92.7
Leatherback	4	GOM	1	62	0.036	1.000	610.6	21.9
Leatherback	4	MAB	2	30	0.074	0.695	407.5	30.1
Leatherback	4	NEC	1	8	0.149	1.000	52.8	7.9
Leatherback	4	NED	7	33	0.286	0.354	82.4	23.5

Table B. Released Alive (cont.)

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
Loggerhead	1	FEC	1	9	0.103	1.000	71.1	7.3
Loggerhead	1	SAR	2	16	0.126	0.686	108.1	13.6
Loggerhead	2	FEC	1	12	0.206	1.000	97.1	20.0
Loggerhead	2	GOM	2	99	0.024	0.710	682.9	16.6
Loggerhead	2	NEC	2	15	0.150	0.681	75.9	11.4
Loggerhead	3	MAB	3	32	0.111	0.571	420.3	46.8
Loggerhead	3	NEC	10	26	0.447	0.269	277.5	124.0
Loggerhead	3	NED	3	15	0.828	0.762	251.0	207.9
Loggerhead	4	MAB	1	30	0.056	1.000	407.5	22.6
Loggerhead	4	NED	8	33	0.324	0.326	82.4	26.7

Table 8 (cont.)
C. Total Interactions

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
Kemp's Ridley	3	FEC	1	16	0.140	1.000	80.7	11.3
Leatherback	1	FEC	1	9	0.108	1.000	71.1	7.7
Leatherback	1	GOM	1	54	0.022	1.000	456.2	10.1
Leatherback	1	SAB	2	11	0.337	0.715	82.2	27.7
Leatherback	1	SAR	1	16	0.067	1.000	108.1	7.2
Leatherback	2	FEC	1	12	0.214	1.000	97.1	20.8
Leatherback	2	GOM	4	99	0.064	0.522	682.9	43.4
Leatherback	2	NEC	4	15	0.344	0.455	75.9	26.1
Leatherback	3	GOM	1	54	0.021	1.000	811.9	17.4
Leatherback	3	NEC	4	26	0.141	0.470	277.5	39.2
Leatherback	3	NED	3	15	0.369	0.609	251.0	92.7
Leatherback	4	GOM	2	62	0.064	0.707	610.6	39.0
Leatherback	4	MAB	2	30	0.074	0.695	407.5	30.1
Leatherback	4	NEC	1	8	0.149	1.000	52.8	7.9
Leatherback	4	NED	7	33	0.286	0.354	82.4	23.5
Loggerhead	1	FEC	1	9	0.103	1.000	71.1	7.3
Loggerhead	1	SAR	2	16	0.126	0.686	108.1	13.6
Loggerhead	2	FEC	1	12	0.206	1.000	97.1	20.0
Loggerhead	2	GOM	2	99	0.024	0.710	682.9	16.6
Loggerhead	2	NEC	2	15	0.150	0.681	75.9	11.4
Loggerhead	3	MAB	3	32	0.111	0.571	420.3	46.8
Loggerhead	3	NEC	10	26	0.447	0.269	277.5	124.0
Loggerhead	3	NED	3	15	0.828	0.762	251.0	207.9
Loggerhead	4	MAB	1	30	0.056	1.000	407.5	22.6
Loggerhead	4	NED	8	33	0.324	0.326	82.4	26.7

Table 9. Estimated A) Serious Injury, B) Live Releases, and C) Total Interactions with marine mammals in the pelagic longline fishery during 2006 by fishing area and quarter.

A. Released Alive

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV CPUE	# Hooks Reported (x1000)	Estimated Catch
Pilot Whale	1	MAB	2	21	0.278	0.756	92.3	25.7
Pilot Whale	2	GOM	1	99	0.010	1.000	682.9	7.1
Pilot Whale	3	MAB	2	32	0.067	0.708	420.3	28.2
Pilot Whale	4	MAB	2	30	0.072	0.695	407.5	29.4

B. Serious Injury

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV CPUE	# Hooks Reported (x1000)	Estimated Catch
Pilot Whale	1	MAB	4	21	0.463	0.523	92.3	42.7
Pilot Whale	3	MAB	2	32	0.085	0.741	420.3	35.9
Pilot Whale	3	NEC	1	26	0.040	1.000	277.5	11.2
Pilot Whale	4	MAB	1	30	0.187	1.000	407.5	76.3
Unidentified Dolphin	4	MAB	2	30	0.065	0.695	407.5	26.5

C. Dead

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV CPUE	# Hooks Reported (x1000)	Estimated Catch
Pilot Whale	4	MAB	1	30	0.038	1.000	407.5	15.5
Unidentified Marine Mammal	4	MAB	1	30	0.031	1.000	407.5	12.6

Table 9 cont.

C. Total Interactions

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV CPUE	# Hooks Reported (x1000)	Estimated Catch
Pilot Whale	1	MAB	6	21	0.742	0.409	92.3	68.5
Pilot Whale	2	GOM	1	99	0.010	1.000	682.9	7.1
Pilot Whale	3	MAB	3	32	0.153	0.567	420.3	64.2
Pilot Whale	3	NEC	1	26	0.040	1.000	277.5	11.2
Pilot Whale	4	MAB	4	30	0.280	0.584	407.5	114.1
Unidentified Dolphin	4	MAB	2	30	0.065	0.695	407.5	26.5
Unidentified Marine Mammal	4	MAB	1	30	0.031	1.000	407.5	12.6

Table 10. Estimated interactions in the pelagic longline fishery for strata with reported fishing effort but no observer coverage during 2006. Bycatch rates are the average of the stratum rates during the previous five years (2001-2005). Estimates are shown for A) Turtles and B) Marine mammals. All previously observed turtle catches reported here were released alive (injured or uninjured).

A. Turtles

Species	Quarter	Area	# Positive Sets 2001-2005	# Observed Sets 2001-2005	Mean CPUE 2001-2005	CV CPUE 2001-2005	# Hooks Reported (X1000) - 2006	Estimated Catch - 2006
Leatherback	1	CAR	3	55	0.062	0.570	63.8	4.0
Leatherback	2	CAR	1	19	0.060	1.000	7.6	0.5
Leatherback	2	NCA	1	57	0.021	1.000	30.2	0.6
Leatherback	4	SAB	1	17	0.204	1.000	56.1	11.5
Leatherback	4	SAR	5	21	0.238	0.404	26.2	6.3
Loggerhead	1	CAR	11	55	0.245	0.275	63.8	15.6
Loggerhead	1	NCA	3	34	0.137	0.626	34.3	4.7
Loggerhead	2	CAR	1	19	0.057	1.000	7.6	0.4
Loggerhead	2	NCA	7	57	0.183	0.379	30.2	5.5
Loggerhead	4	CAR	1	10	0.245	1.000	1.6	0.4
Loggerhead	4	FEC	2	14	0.401	0.683	31.1	12.5
Loggerhead	4	SAB	3	17	0.313	0.565	56.1	17.5
Loggerhead	4	SAR	3	21	0.193	0.572	26.2	5.1

B. Marine Mammals

Species	Interaction Type	Quarter	Area	# Positive Sets 2001-2005	# Observed Sets 2001-2005	Mean CPUE 2001-2005	CV CPUE 2001-2005	# Hooks Reported (X1000) - 2006	Estimated Catch – 2006
Pilot Whale	Serious Injury	1	CAR	2	55	0.039	0.701	63.8	2.5
Beaked Whale	Released Alive	1	CAR	1	55	0.035	1.000	63.8	2.2
Atlantic Spotted Dolphin	Released Alive	4	SAR	1	21	0.073	1.000	26.2	1.9
Bottlenose Dolphin	Released Alive	2	NCA	1	57	0.021	1.000	30.2	0.6

Table 11. Total estimated interactions with A) Leatherback, B) Loggerhead, and C) Kemp's Ridley turtles in the pelagic longline fishery during 2006 by fishing area. These estimates include extrapolated values for areas with no observer coverage during 2006 that had observed interactions during the past five years (Table 10).

A. Leatherback Turtles

Area	Dead	Dead CV	Alive	Alive CV	Total	Total CV	Total 95% Confidence Interval
CAR	0	-	4	0.52	4	0.52	2 - 11
FEC	0	-	28	0.78	28	0.78	8 - 106
GOM	17	1	93	0.40	110	0.37	55 - 219
MAB	0	-	30	0.70	30	0.70	9 - 100
NCA	0	-	1	1.00	1	1.00	0 - 3
NEC	0	-	73	0.32	73	0.32	40 - 132
NED	0	-	116	0.49	116	0.49	48 - 282
SAB	0	-	39	0.58	39	0.58	14 – 110
SAR	0	-	14	0.57	14	0.57	5 – 37
TUN	-	-	-	-	-	-	-
Total	**17**	**1**	**398**	**0.21**	**415**	**0.20**	**284 – 607**

Table 11 cont.

B. Loggerhead Turtles

Area	Dead	Dead CV	Alive	Alive CV	Total	Total CV	Total 95% Confidence Interval
CAR	0	-	17	0.26	17	0.26	10 – 27
FEC	0	-	40	0.58	40	0.58	14 - 110
GOM	0	-	17	0.71	17	0.71	5 - 56
MAB	0	-	70	0.50	70	0.50	28 - 172
NCA	0	-	10	0.35	10	0.35	5 - 20
NEC	0	-	135	0.25	135	0.25	84 - 218
NED	0	-	235	0.68	235	0.68	73 - 756
SAB	0	-	18	0.56	18	0.56	6 - 48
SAR	0	-	19	0.52	19	0.52	7 - 48
TUN	-	-	-	-	-	-	-
Total	**0**	**-**	**561**	**0.30**	**561**	**0.30**	**318 – 981**

C. Kemp's Ridley Turtles

Area	Dead	Dead CV	Alive	Alive CV	Total	Total CV	Total 95% Confidence Interval
FEC	0	-	11	1.00	11	1.00	2 – 55
Total	**0**	**-**	**11**	**1.00**	**11**	**1.00**	**2 – 55**

Table 12. Total estimated interactions with marine mammals in the pelagic longline fishery during 2006. These estimates include extrapolated values for areas with no observer coverage during 2006 that had observed interactions during the past five years (Table 10).

Species	Estimated Alive	CV Alive	Estimated Serious Injury	CV Serious Injury	Estimated Dead	CV Dead	Estimated Total	CV Total	95% Confidence Interval
Atlantic Spotted Dolphin	2	1.000	0	-	0	-	2	1.000	0 – 9
Beaked Whale	2	1.000	0	-	0	-	2	1.000	1 – 11
Bottlenose Dolphin	1	1.000	0	-	0	-	1	1.000	0 – 3
Pilot Whale	90	0.389	169	0.502	16	1.000	268	0.306	151 – 474
Unidentified Dolphin	0	-	27	0.695	0	-	27	0.695	8 – 88
Unidentified Marine Mammal	0	-	0	-	13	1.000	13	1.000	3 – 62

Figure 1. Pelagic longline fishing areas in the North Atlantic Ocean: CAR = Caribbean, GOM = Gulf of Mexico, FEC = Florida East Coast, SAB = South Atlantic Bight, SAR = Sargasso Sea, MAB = Mid-Atlantic bight, NEC = Northeast Coastal, NED = Northeast Distant, NCA = North Central Atlantic, TUN = Tuna North, TUS = Tuna South. Pelagic longline closed areas are indicated by shaded polygons and letter labels (A-D).

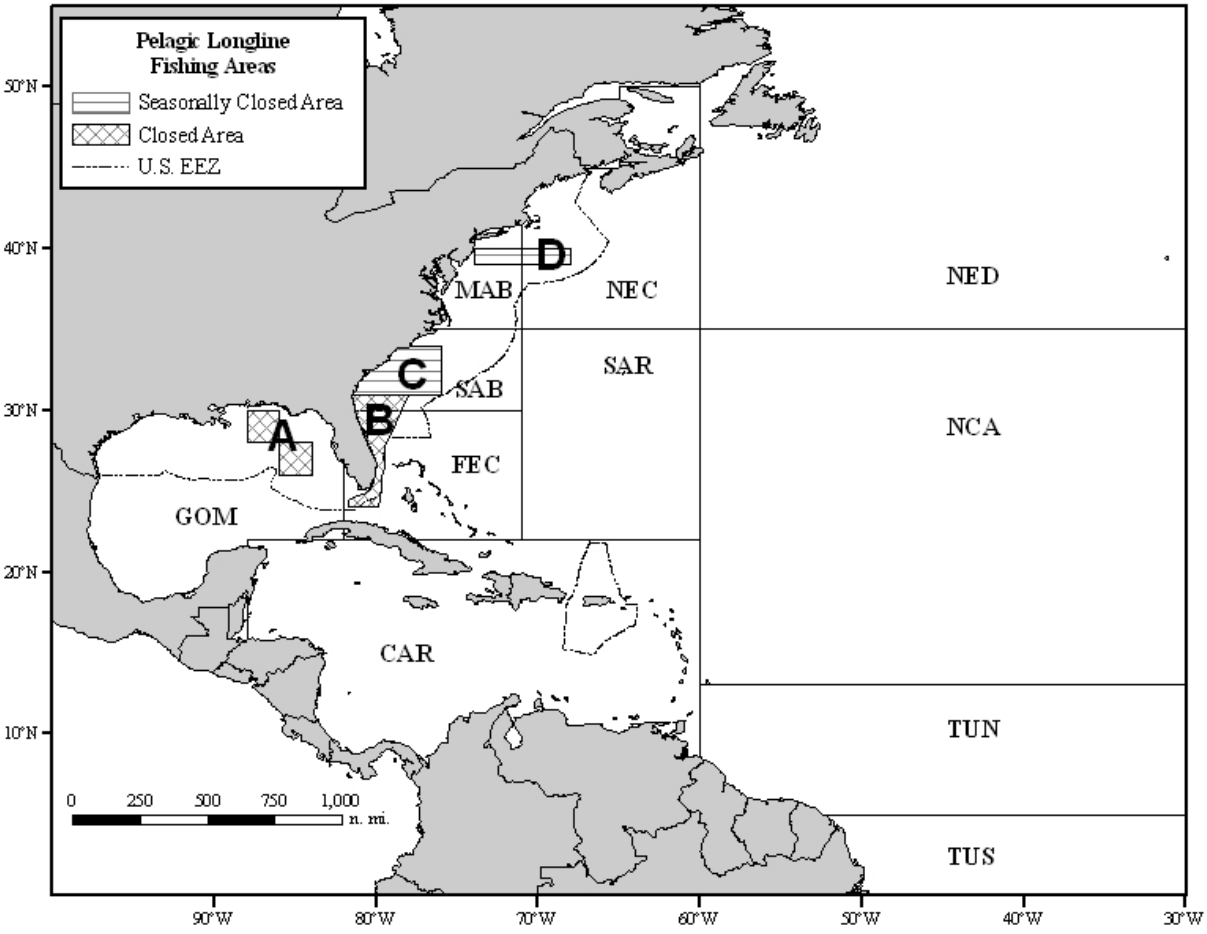


Figure 2. Observed and reported pelagic longline fishing effort during 2006.

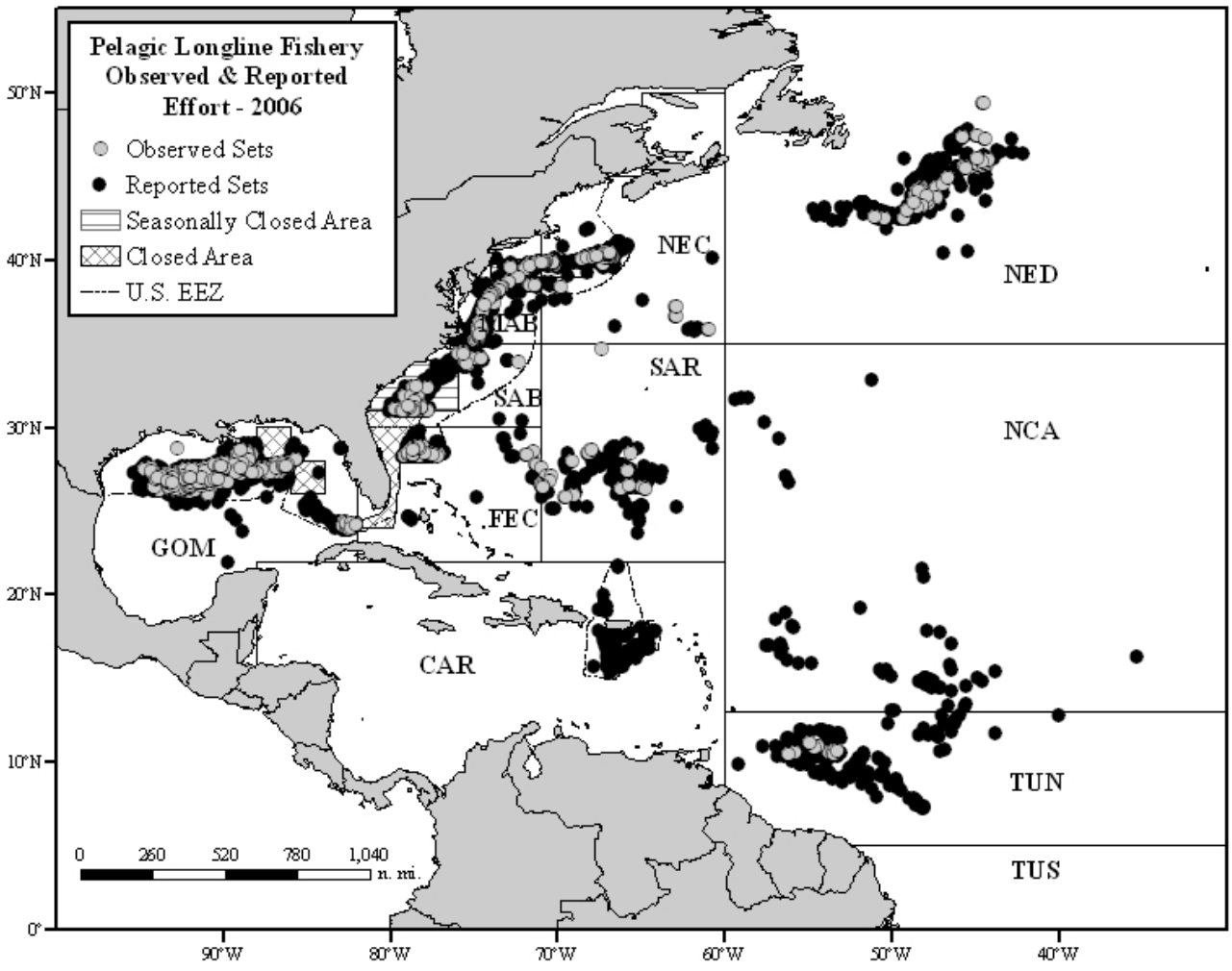


Figure 3. Observed pelagic longline fishing effort and marine turtle takes during 2006.

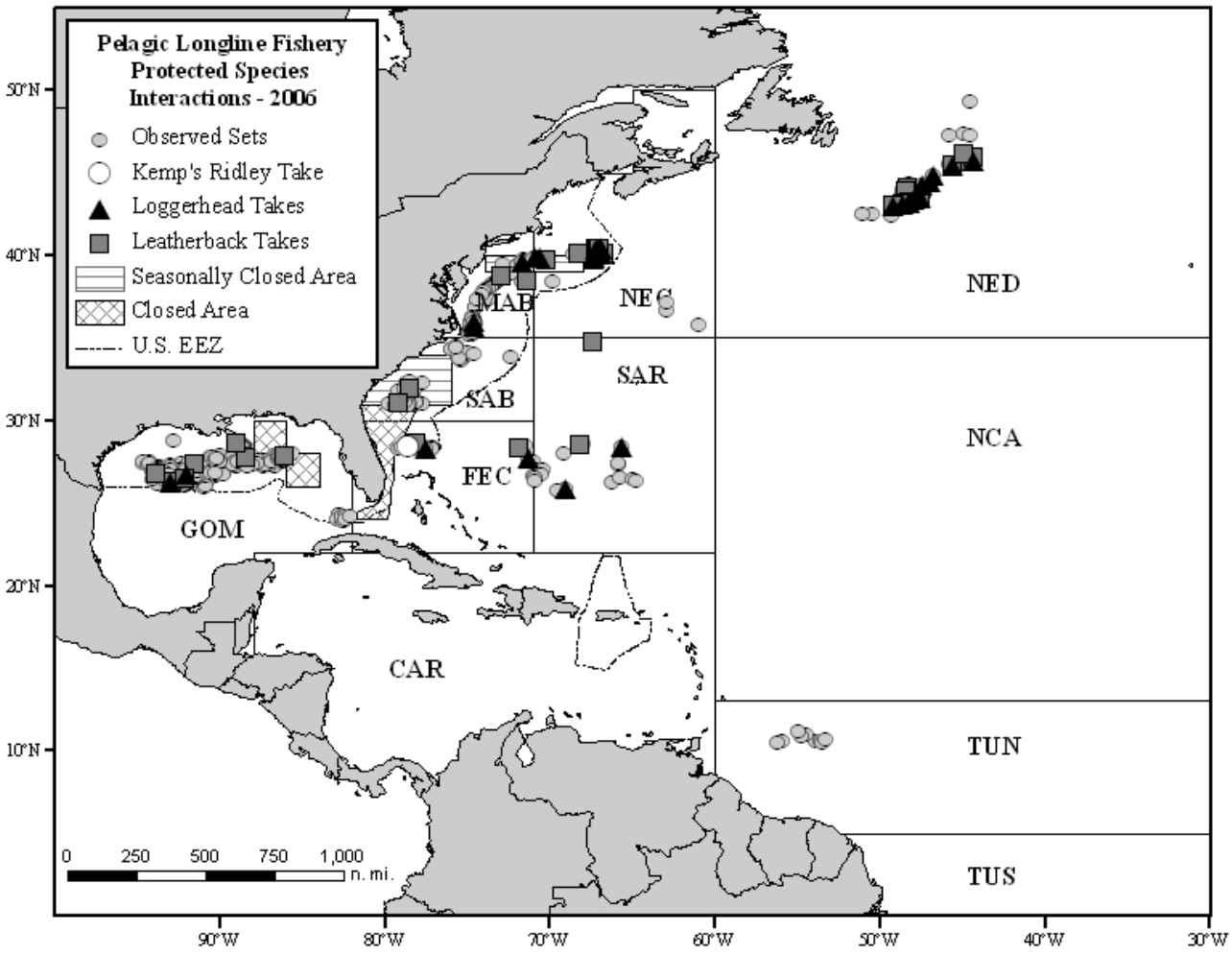


Figure 4. Observed pelagic longline fishing effort and marine mammal takes during 2006.

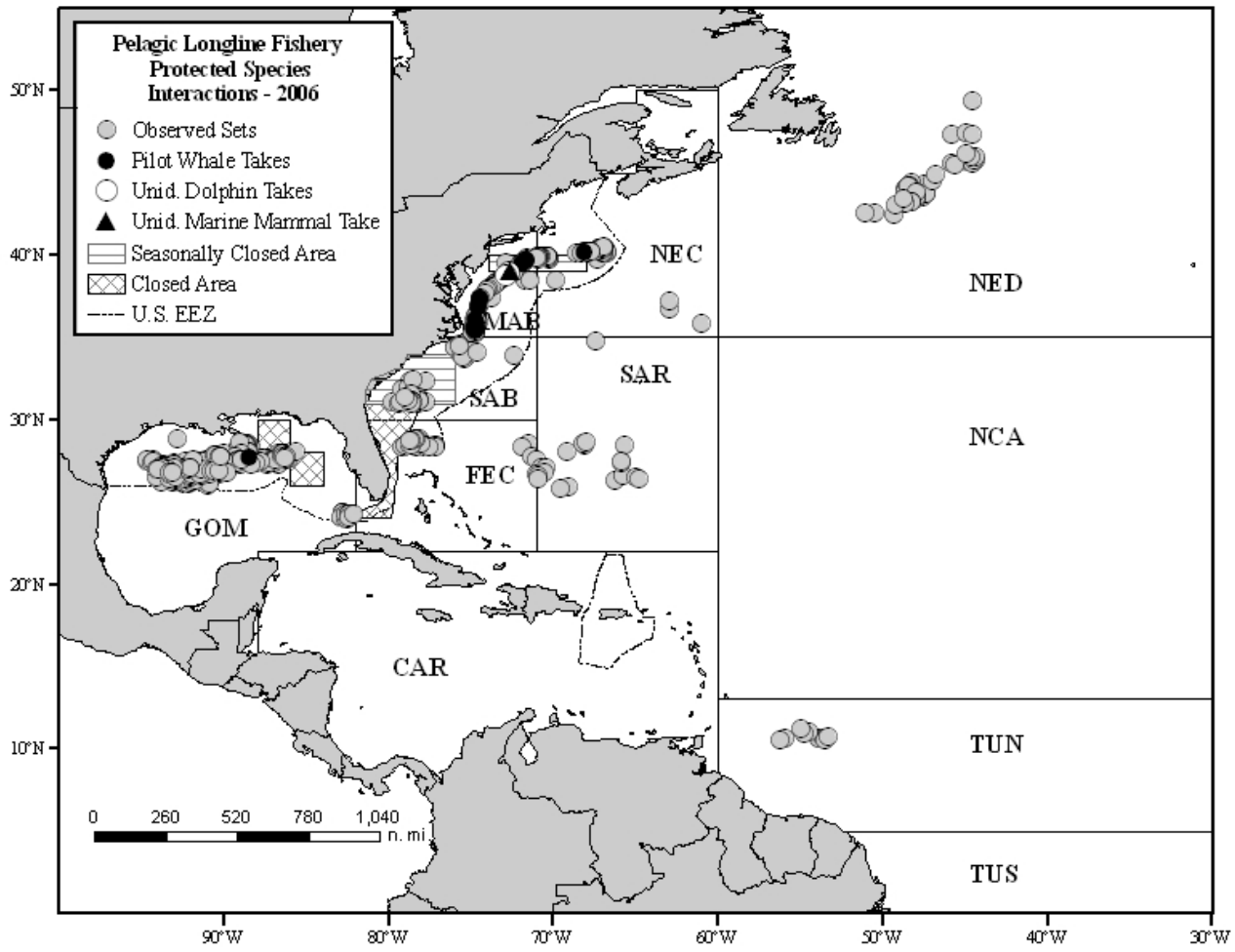
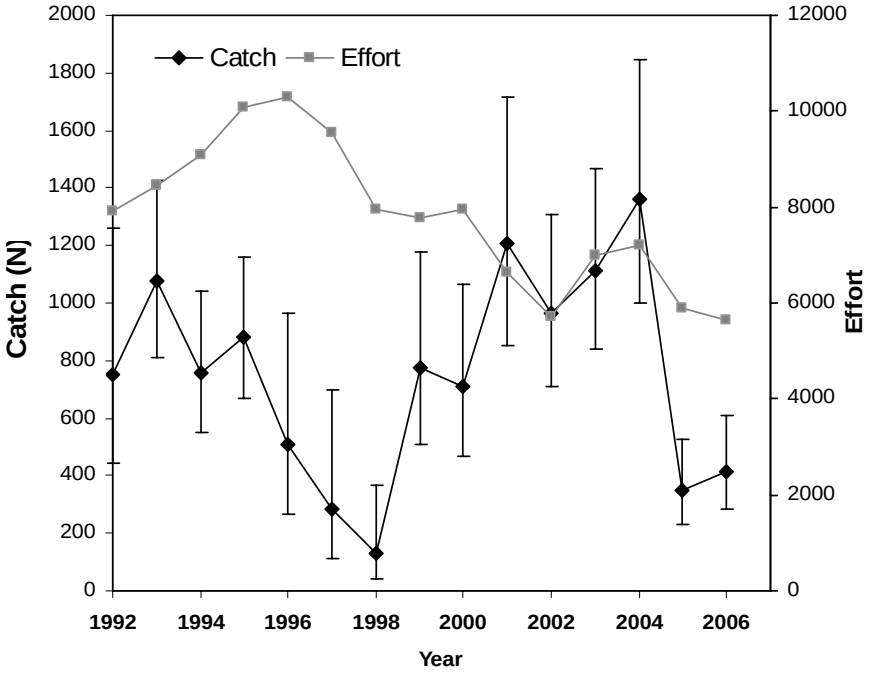


Figure 5. Historical trends in fishery effort and estimated marine turtle takes in the pelagic longline fishery between 1992 and 2006. Errors bars represent 95% confidence intervals.

A. Leatherback Turtles



B. Loggerhead Turtles

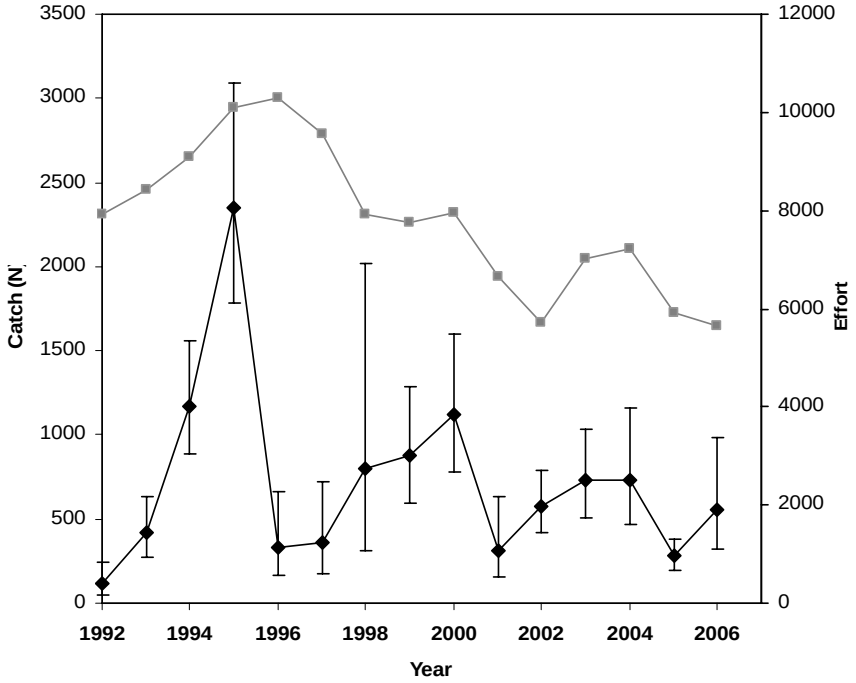
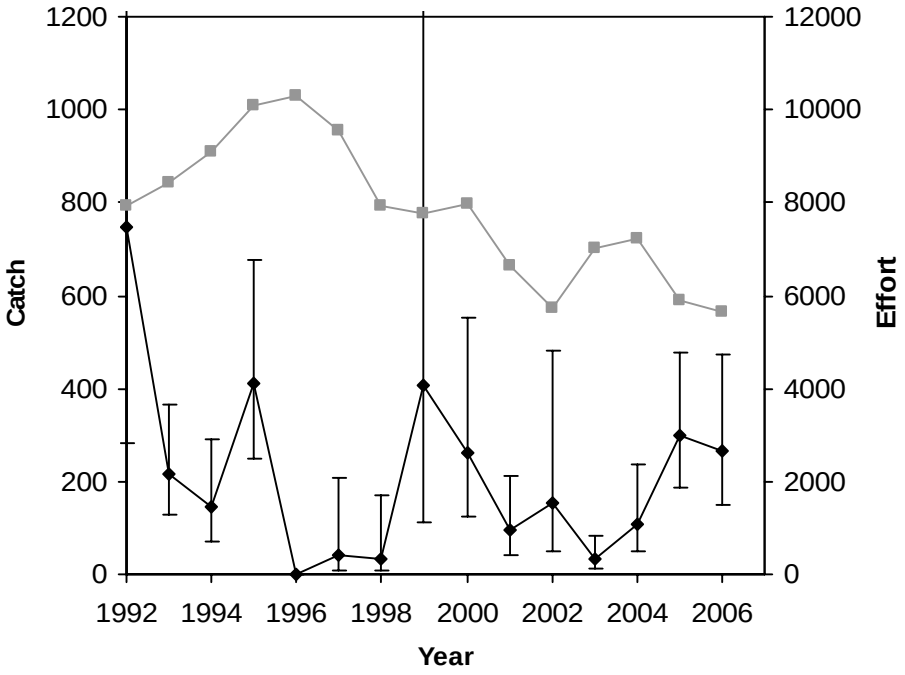
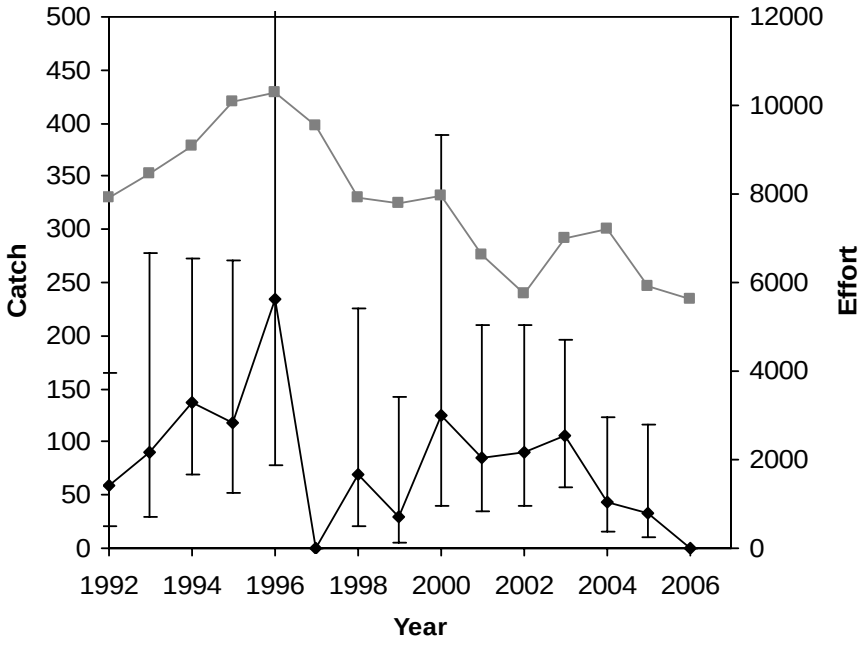


Figure 6. Historic trends in fishery effort and estimated marine mammal takes in the pelagic longline fishery between 1992 and 2006. Errors bars represent 95% confidence intervals.

A. Pilot Whale



B. Risso's Dolphin



Appendix A. Sea Turtle Life History Form

SEA TURTLE LIFE HISTORY FORM

12/04

CAPTURE INFORMATION

TRIP ☐☐☐☐☐☐ YEAR 20☐☐ MONTH☐☐ DAY☐☐

SET/HAUL/TOW ☐☐☐ SPECIMEN NUMBER BY TRIP ☐☐☐

GEAR TYPE: ☐Longline ☐Gill Net ☐Trawl (note trawl time in comments)
GEAR DEPTH: ☐Surface ☐Midwater ☐Bottom ☐Other _____

TIME (24 hr) ☐☐☐☐ WATER TEMP (°F) ☐☐.☐

LATITUDE ☐☐deg☐☐.☐min N / S LONGITUDE ☐☐☐deg☐☐.☐min E / W

Did turtle slide out/escape from gear? Y / N Was turtle brought on board? Y / N

IDENTIFICATION (see back) Number of Photos Taken? ☐☐

SPECIES: ☐Leatherback ☐Loggerhead ☐Kemp's ridley ☐Green ☐Hawksbill ☐Olive ridley
☐Unidentified Hardshell ☐Unknown

CONDITION OF TURTLE

☐Previously dead ☐Fresh dead ☐Comatose (resuscitated**) ☐Other (describe)
☐Alive, injured (describe) ☐Alive, uninjured ☐Alive, injury unknown ☐Unknown (describe)

IF GEAR IS A FORM OF HOOK AND LINE, COMPLETE THIS SECTION, AS APPLICABLE:

HOOK TYPE ☐ "J" ☐ Circle ☐other (describe) _____ SIZE ☐☐/0
MANUFACTURER/STYLE NO. _____ DEGREE OFFSET ☐☐°
BAIT ☐Squid ☐Mackerel ☐Sardine ☐Unknown ☐Other (describe)_____SIZE_____
Caught on hook timer? Y / N If yes, fill in time elapsed ☐☐ ☐☐
Was light stick on hook? Y / N / U If yes (circle) White, Pink, Blue, Green, Black, Red, Yellow, Purple, Other, Unknown
If No, number of gangions to next light stick ☐☐
Light Stick Color (circle)? White, Pink, Blue, Green, Black, Red, Yellow, Purple, Other, Unknown
Number of gangions to next float ☐☐

HOOK LOCATION
(circle specific location; check box if specifics are not known; annotate drawing on reverse to indicate location as needed):

☐ Not Hooked ☐ Not Known if Hooked ☐Hooked, but location totally Unknown

Internal: ☐ Unknown, internal
☐ Swallowed (Esophagus) Hook visible? Visible to insertion point / Partial hook / Not visible
☐ Beak/ Mouth (note location in jaw and circle specific location) ☐upper: soft palate/other ☐lower: tongue/glottis/other ☐side: jaw joint/other ☐other (describe)

External: ☐Unknown, external ☐Beak/Head/Neck ☐Carapace/Plastron
☐Front Flipper/Shoulder/Armpit ☐Rear Flipper/Groin/Tail

Was hook removed from this animal? Y / N / Unknown / Not Applicable

Was animal entangled in gear? At capture? Y / N / Unknown At Release? Y / N / Unknown
How much gear (linear feet) was left on turtle when released? ☐☐☐.☐ ft. (estimated/measured)
Estimated carapace length (notch-to-tip straight line): ☐☐.☐ ft (needed only if turtle is not boated & measured)

Appendix A. Sea Turtle Life History Form (cont.)

BIOLOGICAL INFORMATION

DIMENSIONS (cm)

	Curved (measuring tape) Standard Measurements	Straight Line (calipers) Standard Measurements	Straight Line (calipers)
Carapace Length	☐☐☐.☐ notch-to-tip	☐☐☐.☐ notch-to-tip	☐☐☐.☐ notch-to-notch
Carapace Width	☐☐☐.☐	☐☐☐.☐	

TAGS (identify address on each tag in the comments section)

Flipper Tag Number	Metal (1) or Plastic (2)	Position (Flipper) LF, RF, LR, RR	Already Present (1) or Applied by Observer (2)	Were Tags Removed?
☐☐☐☐☐☐	☐	☐☐	☐	Y / N
☐☐☐☐☐☐	☐	☐☐	☐	Y / N
☐☐☐☐☐☐	☐	☐☐	☐	Y / N
☐☐☐☐☐☐	☐	☐☐	☐	Y / N

PIT Tag ☐☐☐☐☐☐☐☐☐☐ ☐☐ ☐ Scanned? Y / N

Living Tag (describe)_____ Other Tags (describe) _____

(Put PIT tag label here)

BIOPSY SAMPLES TAKEN? Y (itemize below) / N / Unsuccessful

RELEASE INFORMATION

LATITUDE ☐☐deg☐☐.☐min N / S LONGITUDE ☐☐☐deg☐☐.☐min E / W

TIME (24 hr) ☐☐☐☐ WATER TEMP (°F) ☐☐.☐

DATE, if different from capture: YEAR 20☐☐ MONTH☐☐ DAY☐☐

FINAL DISPOSITION

☐ Discarded Marked Carcass ☐ Discarded Unmarked Carcass ☐ Salvaged Carcass

☐ Released Alive ☐ Taken to Holding Facility ☐ Unknown (explain)

ADDITIONAL COMMENTS (list all biological samples collected; describe or sketch any anomalies):

_____

_____

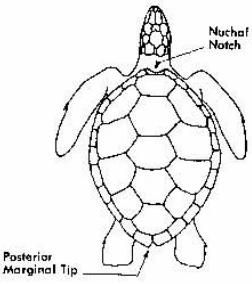
_____

_____

_____

_____

_____



IDENTIFICATION CRITERIA

Number of:

Left Lateral Scutes	☐	Overlapping Scutes?	Y / N / U	Does Nuchal Scute
Right Lateral Scutes	☐	Inframarginal Pores?	Y / N / U	Touch 1st Lateral Scute?
Vertebral Scutes	☐	1 Pair Prefrontal Scales?	Y / N / U	Y / N / U
L. Inframarginal Scutes	☐	Lacks Bony Shell?	Y / N	
R. Inframarginal Scutes	☐			

Dorsal Coloration ☐Black ☐Orange/Red-Brown ☐Brown ☐Gray-Green ☐Other_____

Appendix B. Detail Information on Observed Interactions with Protected Species

Table B1. Observed interactions per longline set with marine turtles during 2006. All turtles were released alive (injured or uninjured). The number of hooks set along with the number of turtles captured in each set is reported.

Species	Quarter	Area	# Hooks	# Turtles Alive	# Turtles Dead
Kemp's Ridley	3	FEC	445	1	0
Leatherback	1	FEC	1032	1	0
Leatherback	1	GOM	840	1	0
Leatherback	1	SAB	810	1	0
Leatherback	1	SAB	810	2	0
Leatherback	1	SAR	932	1	0
Leatherback	2	FEC	390	1	0
Leatherback	2	GOM	764	2	0
Leatherback	2	GOM	968	1	0
Leatherback	2	GOM	824	1	0
Leatherback	2	GOM	684	1	0
Leatherback	2	NEC	896	1	0
Leatherback	2	NEC	560	1	0
Leatherback	2	NEC	896	1	0
Leatherback	2	NEC	872	1	0
Leatherback	3	GOM	864	1	0
Leatherback	3	NEC	984	1	0
Leatherback	3	NEC	1185	1	0
Leatherback	3	NEC	1090	1	0
Leatherback	3	NEC	1120	1	0
Leatherback	3	NED	896	1	0
Leatherback	3	NED	896	3	0
Leatherback	3	NED	868	1	0
Leatherback	4	GOM	576	0	1
Leatherback	4	GOM	900	2	0
Leatherback	4	MAB	930	1	0
Leatherback	4	MAB	875	1	0
Leatherback	4	NEC	840	1	0
Leatherback	4	NED	864	1	0
Leatherback	4	NED	832	1	0
Leatherback	4	NED	836	1	0
Leatherback	4	NED	580	1	0
Leatherback	4	NED	960	1	0
Leatherback	4	NED	960	2	0
Leatherback	4	NED	960	1	0
Loggerhead	1	FEC	1076	1	0
Loggerhead	1	SAR	1076	1	0
Loggerhead	1	SAR	920	1	0
Loggerhead	2	FEC	405	1	0
Loggerhead	2	GOM	732	1	0

Table B1 (Cont.)

Species	Quarter	Area	# Hooks	# Turtles Alive	# Turtles Dead
Loggerhead	2	GOM	960	1	0
Loggerhead	2	NEC	896	1	0
Loggerhead	2	NEC	880	1	0
Loggerhead	3	MAB	812	1	0
Loggerhead	3	MAB	1134	1	0
Loggerhead	3	MAB	690	1	0
Loggerhead	3	NEC	966	1	0
Loggerhead	3	NEC	1128	1	0
Loggerhead	3	NEC	1132	1	0
Loggerhead	3	NEC	1088	1	0
Loggerhead	3	NEC	984	1	0
Loggerhead	3	NEC	1185	2	0
Loggerhead	3	NEC	1120	1	0
Loggerhead	3	NEC	1120	1	0
Loggerhead	3	NEC	1185	2	0
Loggerhead	3	NEC	1145	2	0
Loggerhead	3	NED	896	1	0
Loggerhead	3	NED	896	1	0
Loggerhead	3	NED	868	10	0
Loggerhead	4	MAB	600	1	0
Loggerhead	4	NED	832	1	0
Loggerhead	4	NED	832	1	0
Loggerhead	4	NED	512	1	0
Loggerhead	4	NED	836	1	0
Loggerhead	4	NED	960	1	0
Loggerhead	4	NED	980	2	0
Loggerhead	4	NED	960	1	0
Loggerhead	4	NED	960	1	0

Table B2. Information is presented on gear types and hooking locations based upon observed comments and the sea turtle life history form for each A) Leatherback, B) Loggerhead, and C) Kemp's Ridley sea turtle observed taken during 2006. These data are summarized in Table 6. CL Est. indicates an estimated carapace length in feet, CCL indicates a measured curved carapace length in cm, and Straight N-N indicates a straight line measurement of the turtle carapace from notch to notch (see Appendix A).

A. Leatherback Turtles

#	Area	Quarter	Entangled on Capture?	Entangled on Release?	Hook Type	Hook Offset (degrees)	Bait Type	Release Condition	Hook Location	Jaw Location	Was the Swallowed Hook Visible?	Hook Removed?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N_N (cm)
1	FEC	1	Yes	No	C-18/0	10	mackerel	Alive, uninjured	not hooked	n/a	n/a	n/a	0.00	3.9		
2	GOM	1	No	No	C-16/0	0	squid	Alive, injured	front flipper	n/a	n/a	No	1.00	5.0		
3	SAB	1	No	No	C-18/0	10	squid or mackerel	Alive, injured	shoulder	n/a	n/a	Yes	0.00	4.5		
4	SAB	1	No	No	C-18/0	10	squid or mackerel	Alive, injured	shoulder	n/a	n/a	No	0.00	5.0		
5	SAB	1	No	No	C-18/0	10	squid or mackerel	Alive, injured	armpit	n/a	n/a	Yes	0.00	5.5		
6	SAR	1	Yes	No	C-18/0	10	mackerel	Alive, injured	front flipper	n/a	n/a	Yes	0.00	3.8		
7	FEC	2	No	No	C-18/0	10	squid or mackerel	Alive, injured	unknown location			Yes	0.00	4.00		
8	GOM	2	Unknown	Unknown	C-16/0	0	squid	Alive, injured	unknown location			No	4.00	3.00		
9	GOM	2	Yes	Yes	C-16/0	0	squid	Alive, injured	shoulder	n/a	n/a	No	5.00	3.00		
10	GOM	2	No	No	C-16/0	0	squid	Alive, injured	shoulder	n/a	n/a	Yes	0.00	5.00		
11	GOM	2	No	No	C-16/0	0	squid	Alive, injured	shoulder	n/a	n/a	Yes	0.00	4.50		
12	GOM	2	No	No	C-16/0	0	squid	Alive, injured	shoulder	n/a	n/a	Yes	0.00	5.00		
13	NEC	2	Yes	No	C-18/0	10	squid or mackerel	Alive, uninjured	not hooked	n/a	n/a	n/a	0.00	4.00		

Appendix B, Table B2.B (cont.)

A. Leatherback Turtles (cont.)

#	Area	Quarter	Entangled on Capture?	Entangled on Release?	Hook Type	Hook Offset (degrees)	Bait Type	Release Condition	Hook Location	Jaw Location	Was the Swallowed Hook Visible?	Hook Removed?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N_N (cm)
14	NEC	2	Yes	No	C-18/0	10	squid	Alive, injured	armpit	n/a	n/a	Yes	0.00		150.2	
15	NEC	2	Unknown	No	C-18/0	10	squid or mackerel	Alive, unknown	not known if hooked			Yes	0.00	6.00		
16	NEC	2	Yes	No	C-18/0	10	squid or mackerel	Alive, uninjured	not hooked	n/a	n/a	n/a	0.00		139.5	
17	GOM	3	No	No	C-16/0	0	squid	Alive, injured	armpit	n/a	n/a	No	0.00	3.00		
18	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	carapace	n/a	n/a	No	4.00	4.50		
19	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	armpit	n/a	n/a	No	0.10	4.50		
20	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	armpit	n/a	n/a	Yes	0.00	4.5		
21	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	armpit	n/a	n/a	Yes	0.00	4.50		
22	NED	3	No	No	C-18/0	10	mackerel	Alive, injured	armpit	n/a	n/a	Yes	0.00	6.00		
23	NED	3	No	No	C-18/0	10	mackerel	Alive, injured	armpit	n/a	n/a	No	0.10	6.00		
24	NED	3	No	No	C-18/0	10	mackerel	Alive, injured	armpit	n/a	n/a	Yes	0.00	5.00		
25	NED	3	No	No	C-18/0	10	mackerel	Alive, injured	armpit	n/a	n/a	No	0.10	5.50		
26	NED	3	Unknown	Unknown	C-18/0	10	squid or mackerel	Alive, injury unknown	not known if hooked			No	21.00			
27	GOM	4	No	No	C-16/0	0	squid	Alive, injured	rear flipper	n/a	n/a	No	1.00	7.00		
28	GOM	4	No	No	C-16/0	0	squid	Alive, injured	unknown location			No	8.00			
29	GOM	4	Yes	Yes	C-16/0	0	sardine	Discarded unmarked carcass	not known if hooked			No	100.00	4.50		

Appendix B, Table B2.B (cont.)

A. Leatherback Turtles (cont.)

#	Area	Quarter	Entangled on Capture?	Entangled on Release?	Hook Type	Hook Offset (degrees)	Bait Type	Release Condition	Hook Location	Jaw Location	Was the Swallowed Hook Visible?	Hook Removed?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N_N (cm)
30	MAB	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	armpit	n/a	n/a	Yes	0.00	4.50		
31	MAB	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	shoulder	n/a	n/a	No	3.00	4.50		
32	NEC	4	Yes	No	C-18/0	10	mackerel	Alive, uninjured	not hooked	n/a	n/a	n/a	0.00	5.00		
33	NED	4	Yes	No	C-18/0	10	squid or mackerel	Alive, injured	armpit	n/a	n/a	Yes	0.00	5.50		
34	NED	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	armpit	n/a	n/a	No	0.50	4.50		
35	NED	4	No	No	C-18/0	10	mackerel	Alive, injured	plastron	n/a	n/a	Yes	0.00	5.00		
36	NED	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	shoulder	n/a	n/a	Yes	0.00	4.00		
37	NED	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	shoulder	n/a	n/a	No	1.50	4.50		
38	NED	4	No	No	C-18/0	10	squid	Alive, injured	shoulder	n/a	n/a	Yes	0.00	3.50		
39	NED	4	Yes	No	C-18/0	10	mackerel	Alive, uninjured	not hooked	n/a	n/a	n/a	0.00	5.00		
40	NED	4	Yes	No	C-18/0	10	squid or mackerel	Alive, uninjured	not hooked	n/a	n/a	n/a	0.00	5.00		

Appendix B, Table B2 (cont.)

B. Loggerhead Turtles

#	Area	Quarter	Entangled on Capture?	Entangled on Release?	Hook Type	Hook Offset (degrees)	Bait Type	Release Condition	Hook Location	Jaw Location	Was the Swallowed Hook Visible?	Hook Removed?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N_N (cm)
1	FEC	1	No	No	C-18/0	10	squid	Alive, injured	beak internal	lower other	n/a	Yes	0.00		72.1	66.4
2	SAR	1	No	No	C-18/0	10	squid	Alive, injured	beak internal	lower other	n/a	Yes	0.00		63.2	56.8
3	SAR	1	No	No	C-18/0	10	squid	Alive, injured	beak external	n/a	n/a	Yes	0.00		82.1	75.8
4	FEC	2	No	No	C-18/0	10	squid or mackerel	Alive, injured	tongue	n/a	n/a	No	0.00	2.50		
5	GOM	2	No	No	C-16/0	0	squid	Alive, injured	front flipper	n/a	n/a	Yes	0.00	2.50		
6	NEC	2	No	No	C-18/0	10	squid or mackerel	Alive, injured	front flipper	n/a	n/a	Yes	0.00		76.7	69.5
7	NEC	2	No	No	C-18/0	10	squid or mackerel	Alive, injured	tongue	n/a	n/a	Yes	0.00		70.1	63.6
8	GOM	2	No	No	C-16/0	0	squid	Alive, unknown	not known if hooked			Yes	0.00			
9	MAB	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	swallowed	n/a	not visible	No	0.50		62	55.5
10	MAB	3	No	No	C-16/0	0	squid	Alive, injured	tongue	n/a	n/a	Yes	0.00		72	
11	MAB	3	No	No	C-16/0	0	squid	Alive, injured	swallowed	n/a	partial hook	No	0.10		75	66.4
12	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	beak external	n/a	n/a	Yes	0.00		69	67.8
13	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	tongue	n/a	n/a	Yes	0.00		70.2	64.2
14	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	tongue	n/a	n/a	Yes	0.00		71	63.3
15	NEC	3	No	No	C-18/0	10	squid	Alive, injured	tongue	n/a	n/a	Yes	0.00		76.8	69
16	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	tongue	n/a	n/a	Yes	0.00		72.6	66.7
17	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	swallowed	n/a	not visible	No	0.50		75	68.8

Appendix B, Table B2.B (cont.)

B. Loggerhead Turtles (cont.)

#	Area	Quarter	Entangled on Capture?	Entangled on Release?	Hook Type	Hook Offset (degrees)	Bait Type	Release Condition	Hook Location	Jaw Location	Was the Swallowed Hook Visible?	Hook Removed?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N_N (cm)
18	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	tongue	n/a	n/a	Yes	0.00		62.8	56.2
19	NEC	3	No	No	C-18/0	10	squid	Alive, injured	mouth	side other	n/a	Yes	0.00		73.2	64.3
20	NEC	3	No	No	C-16/0	0	squid	Alive, injured	mouth	lower other	n/a	Yes	0.00			69
21	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	tongue	n/a	n/a	Yes	0.00		78.9	70.9
22	NEC	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	tongue	n/a	n/a	Yes	0.00		64.1	56.9
23	NEC	3	No	No	C-18/0	10	squid	Alive, injured	armpit	n/a	n/a	Yes	0.00		76.5	68.2
24	NEC	3	No	No	C-16/0	0	squid	Alive, injury unknown	not known if hooked			Yes	0.00	2.30		
25	NED	3	No	No	C-18/0	10	mackerel	Alive, injured	mouth	side jaw joint	n/a	Yes	0.00		62.5	55
26	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	swallowed	n/a	not visible	No	0.20		65	58.8
27	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	mouth	lower other	n/a	Yes	0.00		58	51.5
28	NED	3	Unknown	No	C-18/0	10	squid or mackerel	Alive, injury unknown	not known if hooked			Yes	0.00	2.00		
29	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	mouth	lower other	n/a	Yes	0.00		55.4	50.2
30	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	swallowed	n/a	not visible	No	0.20		61.5	55.7
31	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	mouth	lower other	n/a	Yes	0.00		62	55.9
32	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	mouth	lower other	n/a	Yes	0.00		45.8	40.5
33	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	mouth	lower other	n/a	Yes	0.00		65.2	57.2
34	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	mouth	lower other	n/a	Yes	0.00		60.1	54.2

Appendix B, Table B2.B (cont.)

B. Loggerhead Turtles (cont.)

#	Area	Quarter	Entangled on Capture?	Entangled on Release?	Hook Type	Hook Offset (degrees)	Bait Type	Release Condition	Hook Location	Jaw Location	Was the Swallowed Hook Visible?	Hook Removed?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N_N (cm)
35	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	mouth	side jaw joint	n/a	Yes	0.00		45.1	39.2
36	NED	3	No	No	C-18/0	10	squid or mackerel	Alive, injured	mouth	lower other	n/a	Yes	0.00		64.1	57.4
37	MAB	4	No	No	C-18/0	10	squid	Alive, injured	mouth	lower other	n/a	Yes	0.00			
38	NED	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	beak external	lower jaw	n/a	Yes	0.00		65	57.7
39	NED	4	No	No	C-18/0	10	squid	Alive, injured	beak external	upper jaw	n/a	Yes	0.00		70	62
40	NED	4	No	No	C-18/0	10	squid	Alive, injured	mouth	lower jaw other	n/a	Yes	0.00		57.2	53
41	NED	4	No	No	C-18/0	10	mackerel	Alive, injured	mouth	upper jaw other	n/a	Yes	0.00		54	48.3
42	NED	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	swallowed	n/a	not visible	No	0.10		54.4	49.4
43	NED	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	swallowed	n/a	not visible	No	0.10		61.2	55.5
44	NED	4	No	No	C-18/0	10	squid or mackerel	Alive, injured	swallowed	n/a	not visible	No	0.10		65	59.3
45	NED	4	No	No	C-18/0	10	mackerel	Alive, injured	swallowed	n/a	partial hook visible	No	0.00		63	57.1
46	NED	4	No	No	C-18/0	10	squid	Alive, uninjured	not hooked	n/a	n/a	n/a	0.00	2.20		

C. Kemp's Ridley Turtles

#	Area	Quarter	Entangled on Capture?	Entangled on Release?	Hook Type	Hook Offset (degrees)	Bait Type	Release Condition	Hook Location	Jaw Location	Was the Swallowed Hook Visible?	Hook Removed?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N_N (cm)
1	FEC	3	Yes	No	C-16/0	0	squid	Alive, uninjured	not hooked	n/a	n/a	n/a	0.00	1.20		

Table B3. The observed 2006 interactions per longline set with marine mammals are presented. The number of hooks set along with the number of mammals by release status (alive, seriously injured, or dead) in each set is reported.

Species	Quarter	Area	# Hooks	# Alive	# Serious Injury	#Dead
Pilot Whale	2	GOM	968	1	0	0
Pilot Whale	1	MAB	600	1	0	0
Pilot Whale	1	MAB	400	0	2	0
Pilot Whale	1	MAB	580	0	1	0
Pilot Whale	1	MAB	240	1	0	0
Pilot Whale	1	MAB	560	0	1	0
Pilot Whale	1	MAB	712	0	1	0
Pilot Whale	3	MAB	540	0	1	0
Pilot Whale	3	MAB	788	1	0	0
Pilot Whale	3	MAB	1134	1	1	0
Pilot Whale	4	MAB	930	1	0	0
Pilot Whale	4	MAB	920	1	0	0
Pilot Whale	4	MAB	875	0	0	1
Pilot Whale	4	MAB	712	0	4	0
Pilot Whale	3	NEC	952	0	1	0
Unidentified Dolphin	4	MAB	1008	0	1	0
Unidentified Dolphin	4	MAB	1044	0	1	0
Unidentified Marine Mammal	4	MAB	1080	0	0	1

Table B4: 2006 observer comments and serious injury codes for marine mammals are presented. Injury codes are as follows: 5 = inability to swim or dive; 8 = cetacean is hooked internally or in the mouth; and 10 = line entangling the animal is likely to further entangle. Lengths (cm) are estimated visually by the observer.

Animal #	Species	Animal Length (cm)	Release Condition	Injury Code(s)	Observer Comments
1	Pilot Whale	360	Alive, No SI	-	Tail tangled on mainline. Line cut other side of MPW and worked free. No Gear Left on animal
2	Pilot Whale	225	Alive, No SI	-	Snagged tail. Leader cut near boat. 2ft. Leader left. Unknown if entangled.
3	Pilot Whale	120	Alive, No SI	-	MPW not hooked, not snagged, but lassoed. Apparently OK. MPW left unlassoed. [Debrief comments - LB] MPW was lassoed completely around body in front of flippers (not through mouth). Saw blunt head, no beak, sure it was pilot whale. Crew used a long handled ARC dehooker to ease tension and let whale hall out of loop. Swam away quickly. Saw no other marine mammals during the encounter or that day. No signs of depredation to catch or bait this haul.
4	Pilot Whale	240	Alive, No SI	-	Whale was tail wrapped in mainline (Approx 6 wraps [L.B.]), all gear was removed using long handle line cutter. Due to extreme sea conditions, no photo was gotten, positive ID was not possible, I believe it was a longfin but can't swear to it.
5	Pilot Whale	240	Alive, No SI	-	Fluke wrapped in mainline. MPW not hooked. All gear removed. Swam away quickly when released.
6	Pilot Whale	360	Alive, No SI	-	MPW entangled not hooked. Mainline wrapped around pectoral fins and body anterior to dorsal fin. All line removed. [LB} MPW#1 swam away quickly on release.
7	Pilot Whale	300	Alive, No SI	-	MPW entangled not hooked. Mainline and leader wrapped around tail. All line removed. MPW slowly swam away when released.
8	Pilot Whale	270	Dead	10	Animal was entangled, not hooked. It was not on surface when we came upon it. No reaction when released, it just sank. MPW had mainline in its mouth extending back to its tail. This animal could not swim and drowned. [LB] Removed all gear.
9	Pilot Whale	300	SI	8	MPW hooked in mouth. Animal not entangled. Line or crimp gave way with no line left on when released.
10	Pilot Whale	330	SI	10	Un/able to get close to boat. Fin/ally, leader broke ~15 ft of leader missing. Hook pos. unknown. Unknown if entangled
11	Pilot Whale	270	SI	10	Got as close to boat as possible. Leader cut. Est. 12 ft. line left. Hook pos. not seen. Unknown if entangled
12	Pilot Whale	270	SI	10	Leader broke trying to get closer ~15 feet left. Hook location unknown. Unknown if entangled.
13	Pilot Whale	240	SI	10	Not known if hooked. Wrapped in mainline once boat side MPW dove and broke mainline. [LB] At least one wrap around heard. Mainline snapped down by animal. Unknown how much gear was left on animal.
14	Pilot Whale	270	SI	10	MPW entangled with mainline around tail stock. Approx. 4 wraps able to grapple other tag end of mainline and cut both tag ends close to tail. Animal very lively. Released with tail wraps and 2 ft of trailing mainline. Dove immediately upon release.

Table B4 (Cont.)

Animal #	Species	Animal Length (cm)	Release Condition	Injury Code(s)	Observer Comments
15	Pilot Whale	240	SI	10	Tangled around the mainline and some gangion line [LB] Wrapped around body. Couldn't see if hooked, or if any line left attached. Swam away strongly, porpoised once. Picture roll 2#18.
16	Pilot Whale	210	SI	10	Animal was tail wrapped around mainline and some gangion line. 3 wraps and 4 feet of line attached. Dove quickly. Picture roll 2, #19 and #20 (LB actually 3 pics).
17	Pilot Whale	240	SI	10	Animal tail wrapped around mainline. 2 wraps and 2 feet of line left attached. Animal had a small cut and was bleeding from the tangle. Pictures roll 2 #21,22,23. [LB] Swam away strongly.
18	Pilot Whale	240	SI	8, 10	Came out of water once then dove under boat. Apx. 20' line left, hooked in mouth. (LB) Observer did not get a good look at the animal. Thinks hooks was in mouth, but never saw hook. Very lively upon release.
19	Pilot Whale	400	SI	8, 10	Caught on leader. 18' leader & hook went with whale. Could not see where hooked. Leader broke while animal was being brought to boat. (LB) Hook location in forward part of animal, possible mouth but not sure. Animal swam off very strongly.
20	Pilot Whale	240	SI	8, 10	Animal may have been hooked in mouth (the gangion went to its head). No picture taken because animal surfaced once quickly and the line was immediately cut. 12 feet of line left attached. [LB] Swam away strongly.
21	Unidentified Dolphin		SI	10	Dolphin briefly surfaced and dived. (Not close to boat) Only saw dorsal fin and part of dorsal side. [LB] Un/able to see any entanglement or hooking location. Swam away quickly trailing 30-40 feet of mono on release.
22	Unidentified Dolphin	255	SI	5, 10	Dark grey/black. Only saw ventral surface. Blunt/flat head. Flukes wrapped in mono. [LB] Released with about 3-4 wraps around stock (about 4' total). Sank motionless under boat.
23	Unidentified Marine Mammal	240	Dead	10	Mammal wrapped 2-3 times in mono mainline. Also flukes wrapped in mono. I only saw its ventral surface – it was upside down. [L.B] Mammal was not moving and most likely dead. Wraps were around body & stock. Cut off with wraps remaining; no motion of animal evident, sank under boat.