

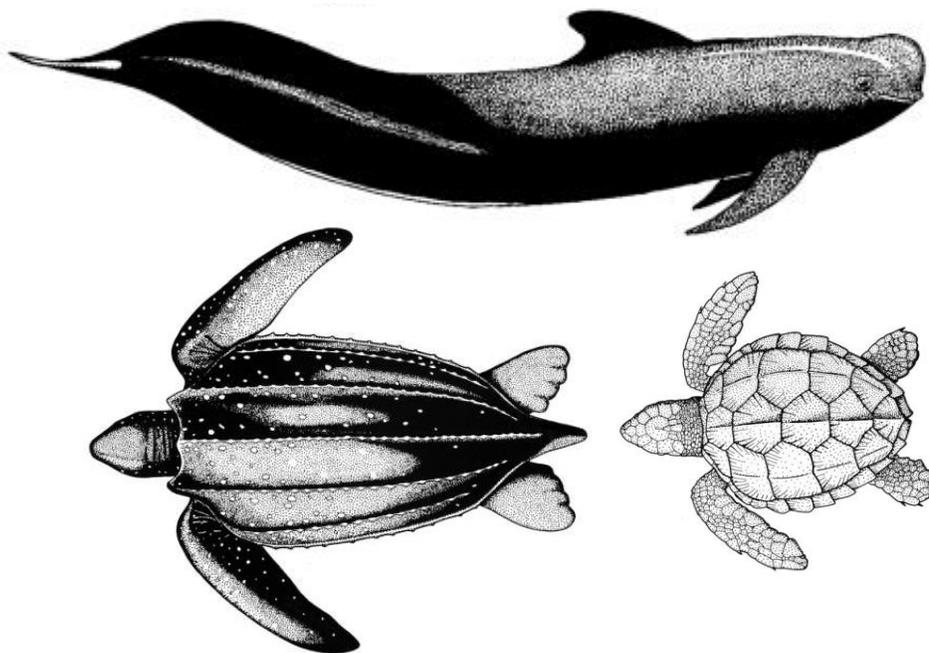


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**Estimated Bycatch of Marine Mammals and Sea Turtles in the U.S. Atlantic Pelagic
Longline Fleet During 2014**

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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 2014 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 in the fishery. During 2014, there were an estimated 281.0 (200.3 – 394.9 [95% CI]) interactions with leatherback turtles and 260.9 (167.3 – 407.6 [95% CI]) interactions with loggerhead turtles. In addition, there were an estimated 6.2 (1.6 – 23.7 [95% CI]) interactions with Olive Ridley turtles. The primary marine mammals interacting with this fishery were pilot whales (*Globicephala* sp.) in Western North Atlantic waters. Interactions were apportioned between short-finned and long-finned pilot whales based upon location and environmental parameters. The majority of interactions were with short-finned pilot whales with an estimated 233.4 (145.9 – 373.2 [95% CI]) interactions resulting in serious injury and an additional 40.4 (15.8 – 103.4 [95% CI]) interactions in which the animal was released alive. 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 western North Atlantic Ocean, 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 sea turtles (*Caretta caretta*). In June 2004, a Biological Opinion was issued by the National Marine 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 increased reporting of bycatch, required education and outreach programs to train fishers in careful handling and release of turtles, and instituted large-scale changes in fishing gear. Most notably, the fishery was required to exclusively use "circle" hooks (size 16/0 or greater) and to adopt safe handling and release practices for sea turtles after August 2004. These mandates were 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 and

an expected reduction in post-release mortality by using the handling and release protocols (Watson *et al.*, 2005).

In addition, 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 De Soto 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 the New Jersey coast between 1 June and 30 June (Figure 1, Label D). The NED area was closed to non-experimental longline fishing from 2001 to 2004 in response to high turtle bycatch. However, with the implementation of gear changes, it was reopened to fishing in June 2004.

In late 2009, regulations were implemented in the fishery to reduce the serious injury and mortality of pilot whales and Risso's dolphins in the Mid-Atlantic Bight region. The Pelagic Longline Take Reduction Plan (PLTRP) was developed based upon consensus recommendations of a team of scientists, managers, and commercial fisheries organizations per the Take Reduction Team process under the MMPA. Regulations were effective on 18 June, 2009 and include restriction of mainline lengths to less than 20 nautical miles in the Mid-Atlantic Bight area and mandatory reporting requirements for fishermen operating in waters offshore of Cape Hatteras, North Carolina (50 CFR Part 229, Federal Register Vol. 74, No. 95, 18 May 2009).

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.*, 2004). In addition, a mandatory fishery logbook system (FLS) has been in place since 1992 requiring vessel 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; Fairfield-Walsh and Garrison, 2006, 2007, 2008; Garrison, Stokes, and Fairfield 2009; Garrison and Stokes, 2010, 2012a, 2012b, 2013, 2014).

In this report, marine mammal and marine turtle bycatch estimates are calculated for pelagic longline fishery effort during 2014. 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 currently allocated among 10 large geographic areas and calendar quarter based upon the historical fishing range of the fleet (Figure 1). The target annual coverage is 8% of the total reported hooks, and observer effort is allocated randomly based upon reported fishing effort during the previous calendar year in each quarter/fishing area stratum (Beerkircher *et al.*, 2004). Between 15 April and 15 June of 2014, observer coverage in the Gulf of Mexico (GOM) fishing area was greatly enhanced to collect more robust information on the interactions between pelagic longline vessels and spawning bluefin tuna. As a result, the observer coverage for this time and area is

dramatically higher than is typical for other strata. The bycatch estimates developed for each species are stratified by fishing area and quarter to reflect the design of the observer program.

In addition to observation of regular fishing, the POP program participated in a cooperative research program that included longline fishing in the Mid-Atlantic Bight and Northeast Coastal areas to test the effectiveness of “weak hooks” on target species catch and bycatch rates. There was 100% observer coverage of all experimental sets, and the experimental fishing is not included in extrapolated bycatch estimates because it is not representative of the normal fishing effort. A total of 17 sets (12,011 hooks) were observed in experimental fishing.

Bycatch rates for quarter-area strata with more than 10 reported longline fishery sets that had no corresponding observer coverage in 2014 were replaced with previously observed mean bycatch rates from 2009-2013.

The Magnuson-Stevens Fishery Conservation and Management Act places restrictions on reporting fishery information including that collected by observers. NMFS rules therefore restrict the reporting of business information within temporal or spatial strata including fewer than 3 vessels. Business information includes information on the fishing gear or level of effort. As such, the number of sets and hooks cannot be reported in some quarter-area strata in reported effort data, observer data, or both. In cases where by simple calculation one could derive the level of effort in such cells, we have not reported sufficient information to make those calculations. Quarter-area strata where the level of reporting is limited by confidentiality concerns are noted in the appropriate tables.

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 prior estimates (Garrison, 2003; Garrison and Richards, 2004; Garrison, 2005; Fairfield-Walsh and Garrison, 2006; Fairfield-Walsh and Garrison, 2007; Fairfield and Garrison, 2008 Garrison, Stokes, and Fairfield 2009; Garrison and Stokes, 2010, 2012a, 2012b, 2013, 2014). The mean and variance of catch rates for marine mammals and turtles observed in longline sets were calculated using a delta lognormal estimator (Pennington, 1983). 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, 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:

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

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,

$s_{L_t}^2$ is the observed sample variance of the log transformed bycatch rate, and G is the cumulative probability function from the Poisson distribution given as:

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

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:

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

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

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

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 (95% CI) were calculated assuming log-normal distribution of total mortality as N/C and $N \cdot C$ for the lower and upper confidence bounds respectively where:

$$(6) \quad C = \exp [z_{\alpha} \sqrt{\text{var}(\ln N)}],$$

and

$$(7) \quad \text{var}(\ln N) = \ln [I + \text{var}(N)/N^2],$$

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 2014. 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). Detailed information on entanglement, hooked animals, and the location of hooks are shown in Appendix B.

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 to a level approaching a zero mortality rate. “Serious injury” has been defined as an injury more likely than not to result in mortality (NOAA Fisheries 50 CFR 229.2, Angliss and DeMaster, 1998). In prior annual reports, serious injury determinations were based upon criteria developed during a workshop of NOAA Fisheries and external experts convened in 1997 (Angliss and DeMaster, 1998). These guidelines were reviewed at a workshop conducted during 2007, and a proposed revision of the criteria for serious injuries in pinnipeds, large whales, and small cetaceans was developed (Andersen et al. 2008). This proposal was reviewed and evaluated by NMFS, and a policy for determining serious vs. non-serious injury in marine mammals with associated criteria was established in 2012

(NMFS 2012a, NMFS 2012b). Observer comments for all takes of marine mammals from 2014 (Appendix B) were reviewed, and serious injury determinations were made on a case by case basis based upon observer comments and photographs (when available) consistent with the 2012 guidelines.

Apportioning Pilot Whale Takes Between Species

Two species of pilot whales, short-finned and long-finned, occur within the MAB and NEC regions and are difficult to reliably identify at sea based upon visual observations. Therefore, nearly all of the observations of pilot whale interactions by observers have been assigned to “Unidentified Pilot Whales” (*Globicephala sp.*). The region of overlap between the two species is thought to occur between 38-40°N latitude along the shelf break during warm months of the year. In the past decade, there have been very few observed interactions observed north of 38.5°N. Available data from studies directed at understanding the relative distribution of the two species based upon genetic and photo-identification data demonstrated that long-finned pilot whales did not occur this far south, and therefore all pilot whale takes were presumed to be from short-finned pilot whales. However, during 2014, there were four interactions with pilot whales in the NEC, and therefore it was unclear whether or not these takes could be reliably assigned to short-finned vs. long-finned pilot whales.

There have been 539 biopsy skin samples collected from pilot whales in the MAB and NEC regions between 1989-2014 from both directed field studies and fisheries bycatch. This included 10 genetic identifications of samples collected from the pelagic longline fishery from 2009-2014. These samples have been analyzed genetically and

identified to species. All of the samples collected from the pelagic longline fishery have to date been identified as short-finned pilot whales. A logistic regression model was used to estimate the probability that an observed pilot whale was a short-finned vs. long-finned pilot whale based upon the location and sea surface temperature at the time of the sample collection. The model used 481 samples that were collected during May-November, as these were most representative of the period when pilot whale bycatch in the pelagic longline fishery is observed. The resulting model indicated that at water temperatures above 22°C and latitudes south of 39°N, the probability of a sample coming from a short-finned pilot whale exceeds 80% (see Garrison and Rosel, 2016 for additional detail).

Of the 21 observed pilot whale interactions during 2014, 18 had a greater than 97% probability of being from short-finned pilot whales. The remaining three included one taken at 39.3°N latitude (MAB, probability short-finned = 81%), one taken at 40.3°N latitude (NEC, probability short-finned = 92%), and one taken at 39.8°N latitude (NEC, probability short-finned = 88%). The remaining two pilot whales observed in the NEC had a greater than 98% probability of being short-finned pilot whales. For all observed unidentified pilot whales, the predicted probability of it being short-finned vs. long-finned was used to apportion the estimated bycatch between the two species. Due to the very low probability of the observed takes being from long-finned pilot whales, the estimated bycatch of this species was very low compared to that for short-finned pilot whales.

Results and Discussion

Reported Fishing Effort and Observer Coverage

The total reported pelagic longline fishing effort included 7.2 million hooks during 2014 (Table 1A, Figure 2). The reported fishery effort included 9,974 sets during 2014, 1,230 of which were observed by the POP program (Tables 1B and 2B, Figure 2). The overall percent coverage during regular fishing was 12.4% expressed as a proportion of reported hooks and 12.3% as a proportion of reported sets (Table 3). The relatively high annual rate reflects the 41.6% coverage of the fishery during the second quarter in the GOM. Observer coverage for other area-quarter strata is shown in Table 3. The location of 17 experimental fishing sets is shown in Figure 3.

Areas with no observer coverage during 2014 with more than 10 sets of reported fishing effort include the Caribbean (CAR) during Quarters 1 and 2, North-Central Atlantic (NCA) during Quarters 1 and 3, Northeast Distant (NED) during Quarters 2 and 4, Sargasso Sea (SAR) during Quarters 1 and 2, Tuna South (TUS) during Quarter 4, and the Tuna North (TUN) during Quarter 1 (Table 3).

Observed Protected Species Interactions

There were 56 observed interactions with leatherback turtles, 25 with loggerhead turtles, and 1 with an olive ridley turtle (Table 4, Figure 4) in 2014 in regular and experimental fishing combined. The greatest number of observed leatherback takes occurred in the GOM during the Quarters 2 and 3 (Table 4A, Figure 4). Loggerhead takes were observed in the greatest numbers in the FEC during Quarters 1 and 2 (Table

4B, Figure 4). These totals include 2 leatherback turtles and 2 loggerhead turtles taken during experimental fishing in the FEC.

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 5). Leatherback turtles were most typically hooked externally, while loggerhead turtles were primarily hooked in the mouth or beak or had swallowed the hook (Table 5). All gear was removed before release from 25 of the 82 turtles captured (Table 6). A total of 21 leatherbacks and 2 loggerheads were released either entangled or with the hook and line remaining that was $> \frac{1}{2}$ the carapace length (Table 6).

There were 31 interactions observed with marine mammals (Table 7, Figure 5). This included 24 interactions with pilot whales in the Atlantic including 21 unspecified pilot whales and 3 that were genetically identified to short-finned pilot whales.

Additional interactions of note included 1 beaked whale, 1 Minke whale, two rough-toothed dolphins (Table 8). Twenty-four of the observed marine mammal interactions were categorized as serious injuries including 20 pilot whales (Table 9). Twenty of the serious injuries were due to animals being hooked in the mouth/head, 4 cases involved being released with gear likely to further entangle the animal (Table 9). Observer comments used in serious injury determinations are summarized in Appendix B.

Stratum estimates of total interactions for sea turtles are shown in Table 10. High numbers of leatherback interactions occurred particularly in the GOM during Quarter 2 (74.6), and Quarter 3 (111.7, Table 10). For loggerhead turtles, the estimated interactions were highest in the FEC, MAB, and NED (Table 10).

The quarter-area strata estimates for observed marine mammal mortality, serious injury, and live releases are presented in Table 11. The highest level of serious injuries occurred for short-finned Pilot whales in the MAB (Quarters 1, 3, and 4) and the NEC (Quarter 3).

Estimated Interactions in Unobserved Areas with Fishing Effort

The average bycatch rates and estimated catches in strata that were not observed during 2014 are summarized in Table 12. There were observed sea turtle takes in prior years in CAR-Quarter 1 and SAR-Quarter 1 for Leatherbacks. Loggerhead interactions occurred in CAR-Quarter 1 and SAR-Quarter 1 in prior years (Table 12). There were no observed interactions with marine mammals in unobserved strata during prior years.

Total Estimated Bycatch

There were an estimated total of 279.0 (198.3 – 392.9 [95% CI]) interactions with leatherback turtles during 2014 in regular fishing and an additional 2 interactions in experimental fishing (Table 13). For loggerhead turtles, the estimated total number of interactions was 258.9 turtles (165.3 – 405.6 [95% CI], Table 13) with two additional take in experimental fishing in the NEC. Olive ridley turtles had an estimated 6.2 (1.6 – 23.7 [95% CI]) interactions in the TUN area.

Annual estimates of marine mammal bycatch are shown in Table 14 with catch estimates separated among three large regions: Atlantic (FEC, SAB, MAB, and NEC), Gulf of Mexico (GOM area), and Offshore (CAR, NED, SAR, and NCA). There were no interactions observed in Offshore strata correspond to regions outside of the U.S. EEZ

while Gulf and Atlantic correspond to boundaries between western North Atlantic and Gulf of Mexico stocks of the affected species. The highest number of interactions and serious injuries were with Atlantic short-finned pilot whales with a total of 40.4 (CV = 0.508) animals released alive and 233.4 (CV = 0.243) animals seriously injured (Table 14a). While three interactions were observed with pilot whales in the NEC where long-finned pilot whales occur, there was a high probability that these animals were short-finned pilot whales based upon environmental conditions and the location of the interactions. The low likelihood that these were long-finned pilot whales is reflected by the small estimate of interactions for this species. Interaction rates in the Gulf of Mexico were relatively low, resulting in a small estimated number of serious injuries of rough-toothed dolphins (4.2 animals, CV = 1.00; Table 14b).

Trends in Bycatch Estimates

The leatherback take estimate reached a historical high in 2004, and prior to that had increased sharply since 1998 (Figure 6). A significant decrease in the leatherback bycatch rate and the annual estimated number of interactions with leatherback turtles occurred beginning in 2005 after the implementation of regulations in August 2004. The estimated take of leatherback turtles remained low and generally trended downward during 2007-2011, and then sharply increased in 2012 associated with an increase in reported fishing effort, but returned to a downward trend in recent years. The estimate for 2014 is lower than that for 2013 and is consistent with estimates during the period from 2004-2011.

Loggerhead turtle interactions since 2000 have been well below the historical highs that occurred in the mid-1990's (Figure 6). Following the implementation of regulations, the bycatch dropped in 2005, but rebounded to be slightly lower than the pre-regulation period. There appears to be a cyclic pattern in loggerhead bycatch rate occurring at 4 year intervals since 1996 with a generally increasing trend over a four year period, followed by a sharp decline. This pattern remains consistent with 2014 being a year with a lower estimate compared to 2013. Generally, the period from 2009-2014 has lower overall estimates of loggerhead takes relative to previous cycles despite a generally increasing trend in fishing effort over time.

For pilot whales (unspecified and short-finned pilot whales combined), the 2014 estimate was higher than that for 2013, and remains at an elevated level relative to the time series since 1995 (Figure 7). The bycatch estimate for Risso's dolphins was very low, consistent with that for 2013 (Figure 7).

Sources of Bias and Uncertainty

The fishery logbook system 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, reporting errors are possible in this fishery that would result in a 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 is sufficient to

provide reasonably precise estimates of interactions with protected species. The observed coefficients of variation for annual estimates of both loggerhead and leatherback turtles are below the 30% benchmark established by guidelines for precision set by NOAA Fisheries.

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; Fairfield-Walsh and Garrison, 2006, 2007, 2008; Garrison, Stokes, and Fairfield 2009; Garrison and Stokes, 2010, 2012a, 2012b, 2013, 2014). This approach assumes that: 1) catch rates (animals per hook) are log-normally distributed, and 2) the number of hooks is an appropriate unit of effort. The first assumption was critically examined for sea turtles in Johnson *et al.* (1999); however, it 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 bias, of unknown direction and magnitude, in the estimate of total bycatch.

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Table 1. Total amount of fishing effort reported to the pelagic longline logbook program during 2014 by quarter and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of sets. NR indicates strata where effort cannot be reported due to confidentiality considerations.

A. Number of Hooks (thousands)

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	NR	417.1	555.4	85.2	NR	0.0	0.0	133.3	162.3	NR	0.0	1391.9
2	NR	259.6	588.1	226.5	0.0	84.0	NR	697.5	9.2	NR	0.0	1904.4
3	0.0	228.8	678.4	573.5	NR	356.6	300.0	104.3	0.0	NR	0.0	2285.9
4	0.0	259.0	434.7	346.7	0.0	69.8	40.7	199.3	195.6	NR	NR	1578.6
Total	24.7	1164.6	2256.6	1231.8	NR	510.4	343.2	1134.4	367.1	116.5	NR	7160.7

B. Number of Sets

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	NR	594	714	165	NR	0	0	182	169	NR	0	1879
2	NR	434	808	377	0.0	89	NR	791	10	NR	0	2569
3	0	382	955	933	NR	405	298	180	0	NR	0	3208
4	0	406	674	560	0.0	79	40	308	202	NR	NR	2318
Total	47	1816	3151	2035	NR	573	341	1461	381	155	NR	9974

Table 2. Total amount of fishing effort observed during 2014 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. NR indicates strata where effort cannot be reported due to confidentiality considerations.

A. Number of Hooks (thousands)

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	0.0	51.0	51.8	5.1	0.0	-	-	28.0	0.0	0.0	-	135.8
2	0.0	22.1	244.9	15.9	-	NR	0.0	66.1	0.0	NR	-	358.9
3	-	20.8	59.6	47.5	0.0	33.6	NR	12.6	-	NR	-	209.0
4	-	14.6	38.8	34.7	-	13.9	0.0	31.3	44.9	NR	0.0	184.8
Total	0.0	108.5	395.0	103.2	0.0	NR	NR	138.0	44.9	NR	0.0	888.5

B. Number of Sets

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	0	62	70	8	0	-	-	36	0	0	-	176
2	0	34	349	27	-	NR	0	88	0	NR	-	508
3	-	34	82	80	0	36	NR	25	-	NR	-	295
4	-	17	56	65	-	17	0	41	44	NR	0	251
Total	0	147	557	180	0	NR	NR	190	44	NR	0	1230

Table 3. Percentage of reported fishing effort observed during 2014 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 and exclude experimental fishing.

A. Number of Hooks

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	0.0	12.2	9.3	5.9	0.0	-	-	21.0	0.0	0.0	-	9.8
2	0.0	8.5	41.6	7.0	-	10.1	0.0	9.5	0.0	5.5	-	18.8
3	-	9.1	8.8	8.3	0.0	9.4	7.2	12.1	-	31.1	-	9.1
4	-	5.6	8.9	10.0	-	19.9	0.0	15.7	23.0	20.8	0.0	11.7
Total	0.0	9.3	17.5	8.4	0.0	11.0	6.3	12.2	12.2	18.3	0.0	12.4

B. Number of Sets

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	0.0	10.4	9.8	4.8	0.0	-	-	19.8	0.0	0.0	-	9.4
2	0.0	7.8	43.2	7.2	-	9.0	0.0	11.1	0.0	5.9	-	19.8
3	-	8.9	8.6	8.6	0.0	8.9	7.4	13.9	-	30.2	-	9.2
4	-	4.2	8.3	11.6	-	21.5	0.0	13.3	21.8	22.9	0.0	10.8
Total	0.0	8.1	17.7	8.8	0.0	10.6	6.5	13.0	11.5	18.7	0.0	12.3

Table 4. Total number of observed interactions with A) Leatherback turtles, B) Loggerhead turtles, and C) All sea turtles in the pelagic longline fishery during 2014 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. Counts include turtles taken during experimental fishing. *One Olive Ridley turtle was captured in the TUN area in Quarter 1.

A. Leatherback Turtles

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	-	4	2	0	-	X	X	1	-	-	X	7
2	-	0	34	0	X	0	-	1	-	0	X	35
3	X	0	11	0	-	1	0	0	X	0	X	12
4	X	0	2	0	X	0	-	0	0	0	-	2
Total	-	4	49	0	-	1	0	2	0	0	-	56

B. Loggerhead Turtles

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	-	7	1	1	-	X	X	1	-	-	X	10
2	-	2	2	1	X	1	-	1	-	0	X	7
3	X	0	0	2	-	0	2	0	X	0	X	4
4	X	1	0	1	X	0	-	1	1	0	-	4
Total	-	10	3	5	-	1	2	3	1	0	-	25

C. All Turtles

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	-	11	3	1	-	X	X	2	-	-	X	17
2	-	2	36	1	X	1	-	2	-	0	X	42
3	X	0	11	2	-	1	2	0	X	0	X	16
4	X	1	2	1	X	0	-	1	1	1*	-	7
Total	-	14	52	5	-	2	2	5	1	1*	-	82

Table 5. Summary of A) Release condition, B) Hook location in hooked animals, and C) Animals with all gear removed, by hook location for sea turtles observed in the pelagic longline fishery during 2014. Hook location information is recorded on the sea turtle life history form (Appendix A) by the observer. Counts include turtles taken during experimental fishing.

A. Capture condition

Species	Alive, Uninjured	Alive, Unknown	Alive, injured	Dead	Total
Leatherback	8	6	41	1	56
Loggerhead	1	0	23	1	25
Olive ridley	0	0	1	0	1
Total	9	6	65	2	82

B. Hook Location in hooked animals

Species	Not Hooked	Unknown if Hooked	Hooked, Location Unknown	Internal			External	Total
				Unknown Internal	Swallowed	Beak or Mouth		
Leatherback	6	6	3	2	0	9	30	56
Loggerhead	2	0	1	0	10	11	1	25
Olive ridley	0	0	0	0	0	0	1	1
Total	8	6	4	2	10	20	32	82

C. Animals with all gear removed, by hook location

Species	Not Hooked	Unknown if Hooked	Hooked, Location Unknown	Internal			External	Total
				Unknown Internal	Swallowed	Beak or Mouth		
Leatherback	5	0	0	0	0	5	5	15
Loggerhead	1	0	0	0	0	7	1	9
Olive ridley	0	0	0	0	0	0	1	1
Total	6	0	0	0	0	12	7	25

Table 6. Release status and gear removal for sea turtles captured and released alive in the U.S. Atlantic Pelagic Longline Fishery during 2014. Counts include turtles captured during experimental fishing. Condition columns refer to post-release mortality categories in Table 1 of SEFSC 2012. Counts do not include one dead leatherback and one dead loggerhead.

Release Status	Leatherback	Loggerheads	Olive Ridley
Released entangled (Condition Column A)	5	0	0
Released with hook and line $\geq \frac{1}{2}$ carapace length (Condition Column B)	16	2	0
Released with hook and line $< \frac{1}{2}$ carapace length (Condition Column C)	19	13	0
Released with all gear removed (Condition Column D)	15	9	1

Table 7. Total number of marine mammals observed in interactions with the pelagic longline fishery during 2014 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. Counts include five interactions observed during experimental fishing.

Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	SAB	SAR	TUN	TUS	Total
1	-	2	0	2	-	X	X	0	-	-	X	4
2	-	0	2	0	X	0	-	0	-	0	X	2
3	X	0	1	10	-	3		0	X	0	X	14
4	X	0	0	19	X	1	-	1	0	0	-	11
Total	-	2	3	21	-	4		1	0	0	-	31

Table 8. Marine mammal interactions with the pelagic longline fishery during 2014 by species, quarter, and fishing area.

Species	Quarter	Fishing Area	Serious Injuries	Released Alive	Total
Unidentified dolphins	4	MAB	1	0	1
Pantropical spotted dolphin	3	GOM	0	1	1
Risso's dolphin	3	MAB	1	0	1
Pilot whale	1	FEC	1	0	1
Pilot whale	1	MAB	1	0	1
Pilot whale	3	MAB	7	2	9
Pilot whale	3	NEC	3	0	3
Pilot whale	4	MAB	5	1	6
Pilot whale	4	NEC	1	0	1
Short-finned Pilot Whale	1	MAB	1	0	1
Short-finned Pilot Whale	4	MAB	1	1	2
Rough-toothed Dolphin	2	GOM	2	0	2
Minke Whale	1	FEC	0	1	1
Beaked Whale	4	SAB	0	1	1
Totals			24	7	31

Table 9. Summary of release condition and serious injury types for marine mammals observed in the pelagic longline fishery during 2014. Serious injury determinations were based upon written observer comments (Appendix B). Codes indicate table injury categories defined in the Small Cetacean Serious Injury Guidelines (NMFS, 2012a,b).

Species	Alive	Dead	Serious Injury Type			Serious Injury Total	Total
			Hooked in Head/Mouth (S5a)	Gear Attached Likely to Entangle (S6)	Freed After Entanglement (S7b)		
Unidentified dolphin	0	0	1	0	0	1	1
Pantropical spotted dolphin	1	0	0	0	0	0	1
Risso's dolphin	0	0	0	1	0	1	1
Rough-toothed dolphin	0	0	2	0	0	2	2
Pilot whale	3	0	15	3	0	18	21
Short-finned Pilot whale	1	0	2	0	0	2	3
Minke whale	1	0	0	0	0	0	1
Beaked whale	1	0	0	0	0	0	1
Total	7	0	20	4	0	24	31

Table 10. Estimated interactions with sea turtles in the pelagic longline fishery during 2014 by fishing area and quarter. NR indicates strata where effort cannot be reported due to confidentiality considerations.

A. Leatherback

Species	Area	Quarter	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
Leatherback	FEC	1	2	62	0.048	0.760	417.1	19.9
Leatherback	GOM	1	2	70	0.053	0.738	555.4	29.2
Leatherback	SAB	1	1	36	0.028	1.000	133.3	3.7
Leatherback	GOM	2	29	349	0.127	0.188	588.1	74.6
Leatherback	SAB	2	1	88	0.010	1.000	697.5	7.2
Leatherback	GOM	3	10	82	0.165	0.307	678.4	111.7
Leatherback	NEC	3	1	36	0.025	1.000	356.6	8.8
Leatherback	GOM	4	2	56	0.045	0.701	434.7	19.6

Table 10 – Continued
 B. Loggerheads

Species	Area	Quarter	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
Loggerhead	FEC	1	5	62	0.080	0.442	417.1	33.5
Loggerhead	GOM	1	1	70	0.032	1.000	555.4	17.9
Loggerhead	MAB	1	1	8	0.174	1.000	85.2	14.8
Loggerhead	SAB	1	1	36	0.028	1.000	133.3	3.7
Loggerhead	FEC	2	2	34	0.082	0.753	259.6	21.2
Loggerhead	GOM	2	2	349	0.008	0.708	588.1	4.7
Loggerhead	MAB	2	1	27	0.051	1.000	226.5	11.6
Loggerhead	NEC	2	1	8	0.116	1.000	84.0	9.7
Loggerhead	SAB	2	1	88	0.012	1.000	697.5	8.3
Loggerhead	MAB	3	2	80	0.050	0.754	573.5	28.8
Loggerhead	NED	3	1	22	0.090	1.000	300.0	27.1
Loggerhead	FEC	4	1	17	0.109	1.000	259.0	28.2
Loggerhead	MAB	4	1	65	0.034	1.000	346.7	11.9
Loggerhead	SAB	4	1	41	0.038	1.000	199.3	7.5
Loggerhead	SAR	4	1	44	0.019	1.000	195.6	3.7

C. Olive ridley

Species	Area	Quarter	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
Olive ridley	TUN	4	1	NR	0.141	1.000	31.8	4.5

Table 11. Estimated A) Serious Injury and B) Released Alive marine mammals in the pelagic longline fishery during 2014 by fishing area and quarter. NR indicates strata where effort cannot be reported due to confidentiality considerations. Totals exclude experimental sets. Long-finned and short-finned pilot whale estimates reflect the apportioning of observed unidentified pilot whale takes by species based upon location and environmental conditions.

A. Serious Injury

Species	Area	Quarter	# Positive Sets	# Observed Sets	Mean CPUE	CV CPUE	# Hooks Reported (x1000)	Estimated Catch
Unidentified Dolphin	MAB	4	1	65	0.041	1.000	346.7	14.1
Risso's Dolphin	MAB	3	1	80	0.013	1.000	573.5	7.7
Long-finned Pilot Whale	MAB	1	1	8	0.005	1.000	85.2	0.4
Long-finned Pilot Whale	MAB	3	7	80	0.012	0.818	573.5	7.0
Long-finned Pilot Whale	MAB	4	4	65	0.005	0.808	346.7	1.7
Long-finned Pilot Whale	NEC	3	3	36	0.002	0.590	356.6	0.6
Long-finned Pilot Whale	NEC	4	1	17	0.002	1.000	69.8	0.1
Short-finned Pilot Whale	FEC	1	1	62	0.014	1.000	417.1	5.8
Short-finned Pilot Whale	MAB	1	2	8	0.402	0.656	85.2	34.3
Short-finned Pilot Whale	MAB	3	7	80	0.181	0.386	573.5	103.8
Short-finned Pilot Whale	MAB	4	6	65	0.149	0.402	346.7	51.8
Short-finned Pilot Whale	NEC	3	3	36	0.096	0.565	356.6	34.3
Short-finned Pilot Whale	NEC	4	1	17	0.056	1.000	69.8	3.9
Rough-toothed Dolphin	GOM	2	1	349	0.007	1.000	588.1	4.2

Table 11 cont.

B. Released Alive

Species	Area	Quarter	# Positive Sets	# Observed Sets	Mean CPUE	CV CPUE	# Hooks Reported (x1000)	Estimated Catch
Pantropical Spotted Dolphin	GOM	3	1	82	0.014	1.000	678.4	9.6
Long-finned Pilot Whale	MAB	3	2	80	0.001	0.728	573.5	0.5
Long-finned Pilot Whale	MAB	4	1	65	0.001	1.000	346.7	0.2
Short-finned Pilot Whale	MAB	3	2	80	0.044	0.708	573.5	25.1
Short-finned Pilot Whale	MAB	4	2	65	0.046	0.702	346.7	16.1
Minke Whale	FEC	1	1	62	0.013	1.000	417.1	5.6
Beaked Whale	SAB	4	1	41	0.051	1.000	199.3	10.1

Table 12. Bycatch rates for sea turtles in area-quarter strata that were not observed in 2014. NR indicates strata where effort cannot be reported for 2014 due to confidentiality restrictions. There were no marine mammals observed taken during 2009-2013 for these area-quarter strata.

Bycatch Rate Source	Species	Area	Quarter	# Positive Sets	#Observed Sets	Mean CPUE	CV CPUE	# Hooks Reported (X1000) 2013	Estimated Catch 2013
Quarterly 09-13	Leatherback	CAR	1	1	14	0.148	1.000	14.3	2.1
Quarterly 09-13	Leatherback	SAR	1	1	78	0.014	1.000	162.3	2.3
Quarterly 09-13	Olive ridley	TUN	1	1	11	0.108	1.000	15.4	1.7
Quarterly 09-13	Loggerhead	CAR	1	1	14	0.184	1.000	14.3	2.6
Quarterly 09-13	Loggerhead	SAR	1	9	78	0.147	0.325	162.3	23.8

Table 13. Total estimated interactions and experimental takes for A) Leatherback and B) Loggerhead turtles in the pelagic longline fishery during 2014 by fishing area. This includes estimates for strata that were not observed during 2014.

A. Leatherbacks

Area	Alive	Alive CV	Dead	Dead CV	Total	Total CV	Total 95% Confidence Interval	Experimental Takes
CAR	2.1	1.000	0	-	2.1	1.000	0.4-10.8	-
FEC	19.9	0.760	0	-	19.9	0.760	5.3-74.6	2
GOM	232.6	0.193	2.5	1.000	235.1	0.191	162.1-341	-
MAB	0	-	0	-	0	-	-	-
NCA	0	-	0	-	0	-	-	-
NEC	8.8	1.000	0	-	8.8	1.000	1.7-45.1	-
NED	0	-	0	-	0	0	-	-
SAB	10.8	0.743	0	-	10.8	0.743	3-39.8	-
SAR	2.3	1.000	0	-	2.3	1.000	0.5-11.9	-
TUN	0	-	0	-	0	0	-	-
TUS	-	-	-	-	-	-	-	-
Total	276.6	0.177	2.5	1.000	279.0	0.176	198.3 – 392.9	2

B. Loggerheads

Area	Alive	Alive CV	Dead	Dead CV	Total	Total CV	Total 95% Confidence Interval	Experimental Takes
CAR	2.6	1.000	0	-	2.6	1.000	0.5-13.5	-
FEC	82.9	0.430	0	-	82.9	0.430	37-185.8	2
GOM	22.6	0.805	0	-	22.6	0.805	5.7-90.2	-
MAB	55.5	0.520	11.6	1.000	67.1	0.463	28.3-159.3	-
NCA	0	-	0	-	0	-	-	-
NEC	9.7	1.000	0	-	9.7	1.000	1.9-49.7	-
NED	27.1	1.000	0	-	27.1	1.000	5.3-138.4	-
SAB	19.4	0.604	0	-	19.4	0.604	6.5-57.9	-
SAR	27.5	0.312	0	-	27.5	0.312	15.1-50	-
TUN	0	-	0	-	0	-	-	-
TUS	-	-	-	-	-	-	-	-
Total	247.3	0.238	11.6	1.000	258.9	0.232	165.3 – 405.6	2

C. Olive ridley

Area	Alive	Alive CV	Dead	Dead CV	Total	Total CV	Total 95% Confidence Interval	Experimental Takes
CAR	0	-	0	-	0	-	-	0
FEC	0	-	0	-	0	-	-	0
GOM	0	-	0	-	0	-	-	0
MAB	0	-	0	-	0	-	-	0
NCA	0	-	0	-	0	-	-	0
NEC	0	-	0	-	0	-	-	0
NED	0	-	0	-	0	-	-	0
SAB	0	-	0	-	0	-	-	0
SAR	0	-	0	-	0	-	-	0
TUN	6.2	0.778	0	-	6.2	-	-	0
TUS	-	-	-	-	-	-	-	0
Total	6.2	0.778	0	-	6.2	0.778	1.6 – 23.7	0

Table 14. Total estimated interactions with marine mammals in the pelagic longline fishery during 2014.

A. Atlantic

Species	Estimated Alive	CV Alive	95% CI Alive	Estimated Serious Injury	CV Serious Injury	95% CI Serious Injury
Unidentified dolphin	0	-	-	14.1	1.000	2.8 - 72.1
Risso's dolphin	0	-	-	7.7	1.000	1.5 - 39.4
Long-finned pilot whale	1.4	0.765	0.4 – 5.4	9.6	0.430	4.3 – 21.6
Short-finned pilot whale	40.4	0.508	15.8 – 103.4	233.4	0.243	145.9 – 373.2
Minke whale	5.6	1.000	1.1 - 28.7	0	-	-
Beaked whale	10.1	1.000	2.0 - 51.8	0	-	-

B. Gulf of Mexico

Species	Estimated Alive	CV Alive	95% CI Alive	Estimated Serious Injury	CV Serious Injury	95% CI Serious Injury
Pantropical spotted dolphin	9.6	1.000	1.9 – 49.0	0	-	-
Rough-toothed dolphin	0	-	-	4.2	1.000	0.8 - 21.5

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. Year-round closed areas in the De Soto Canyon (A) and the Florida East Coast (B) are indicated along with seasonal closures in the Charleston Bump (C) and in the Mid-Atlantic (D).

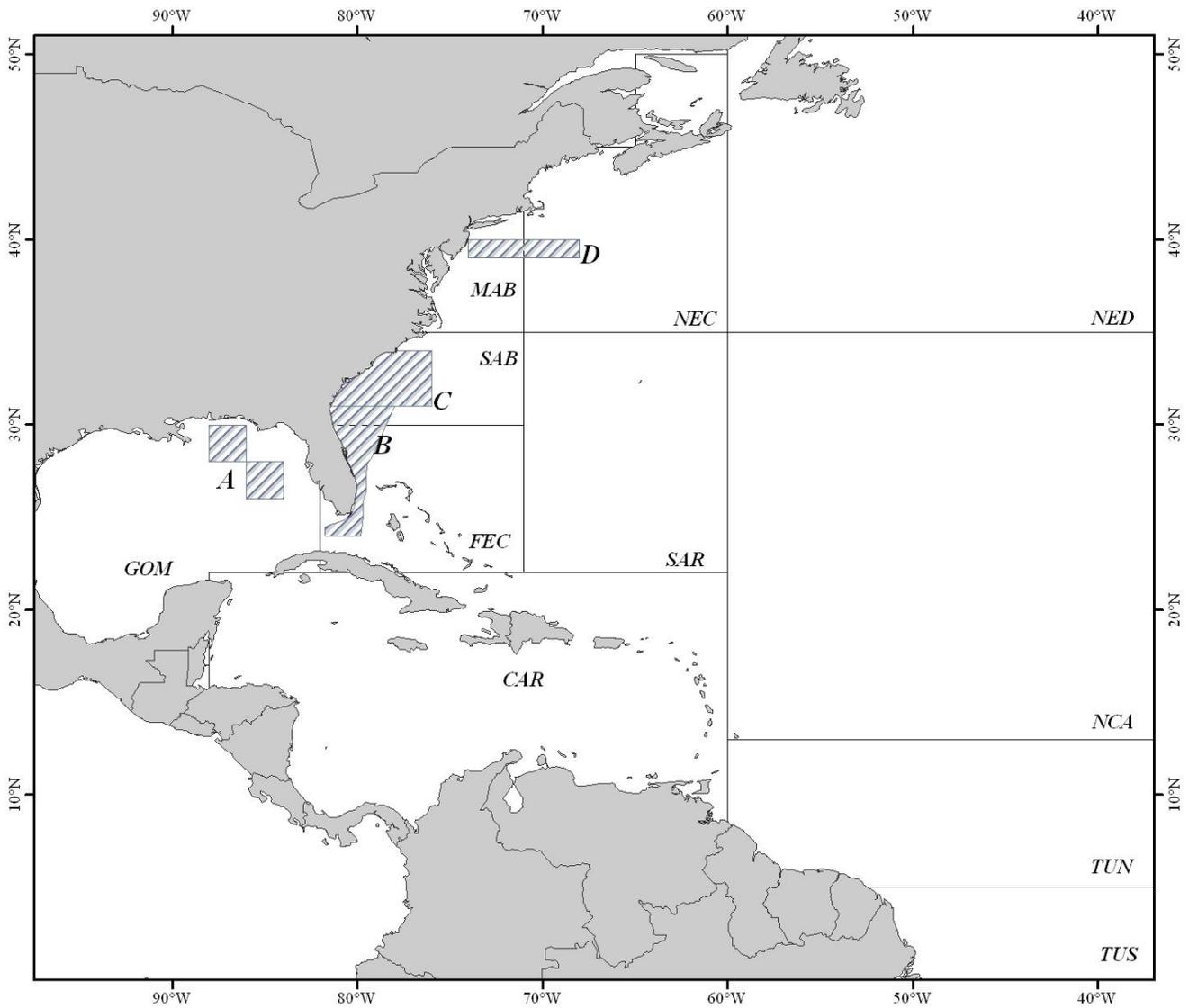


Figure 2. Observed (gray circles) and reported (black circles) pelagic longline fishing effort during 2014

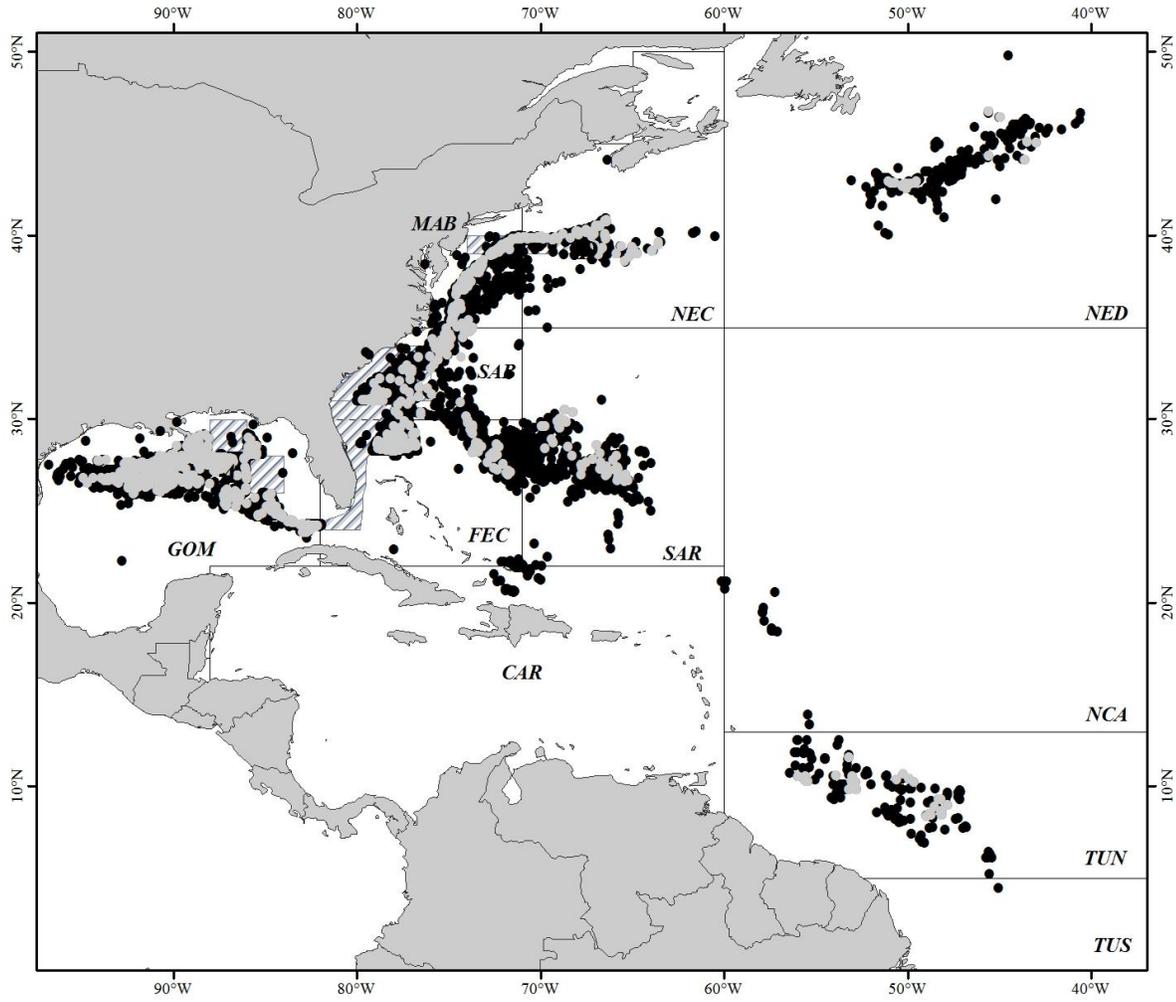


Figure 3. Locations of experimental sets during 2014.

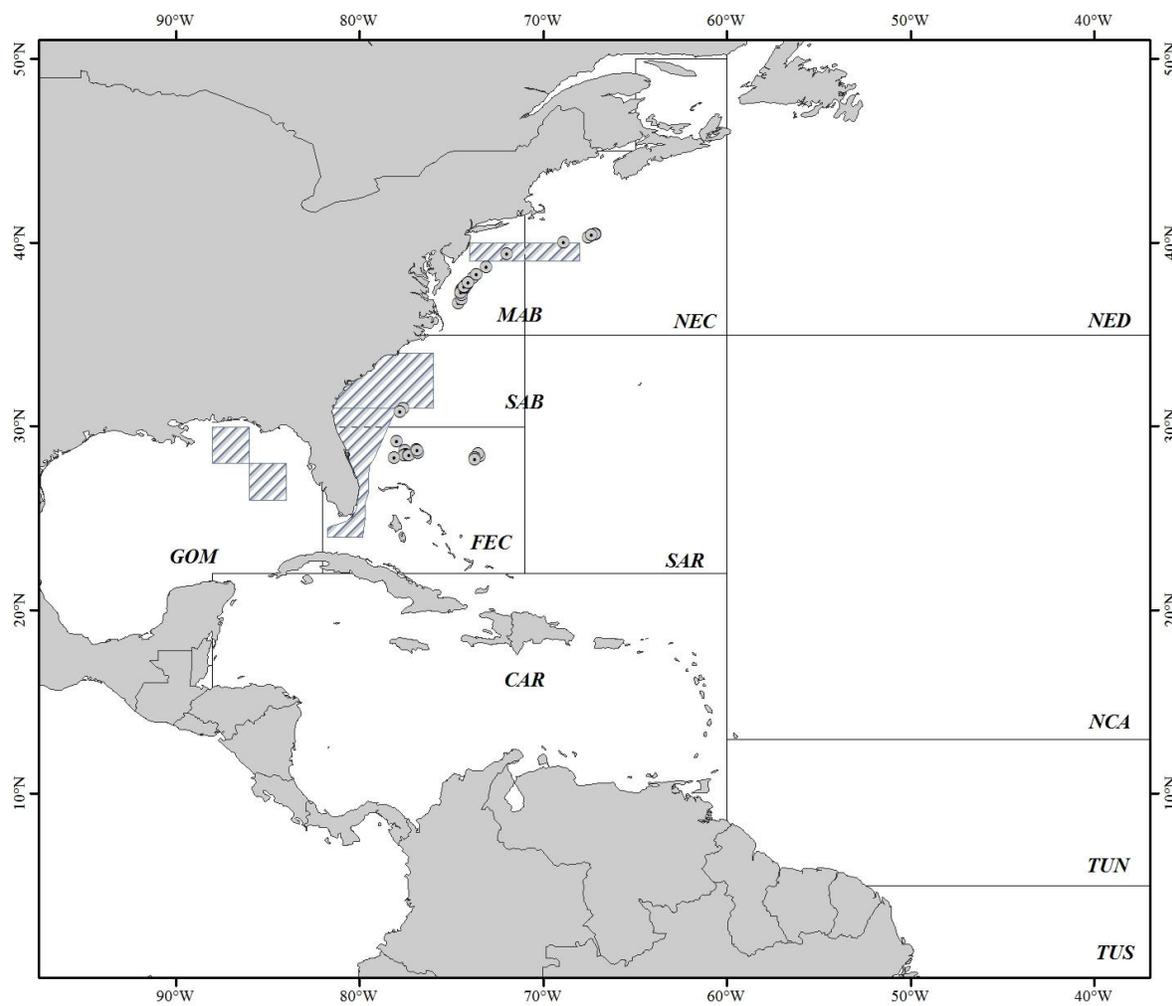


Figure 4. Observed pelagic longline fishing effort and sea turtle interactions during 2014

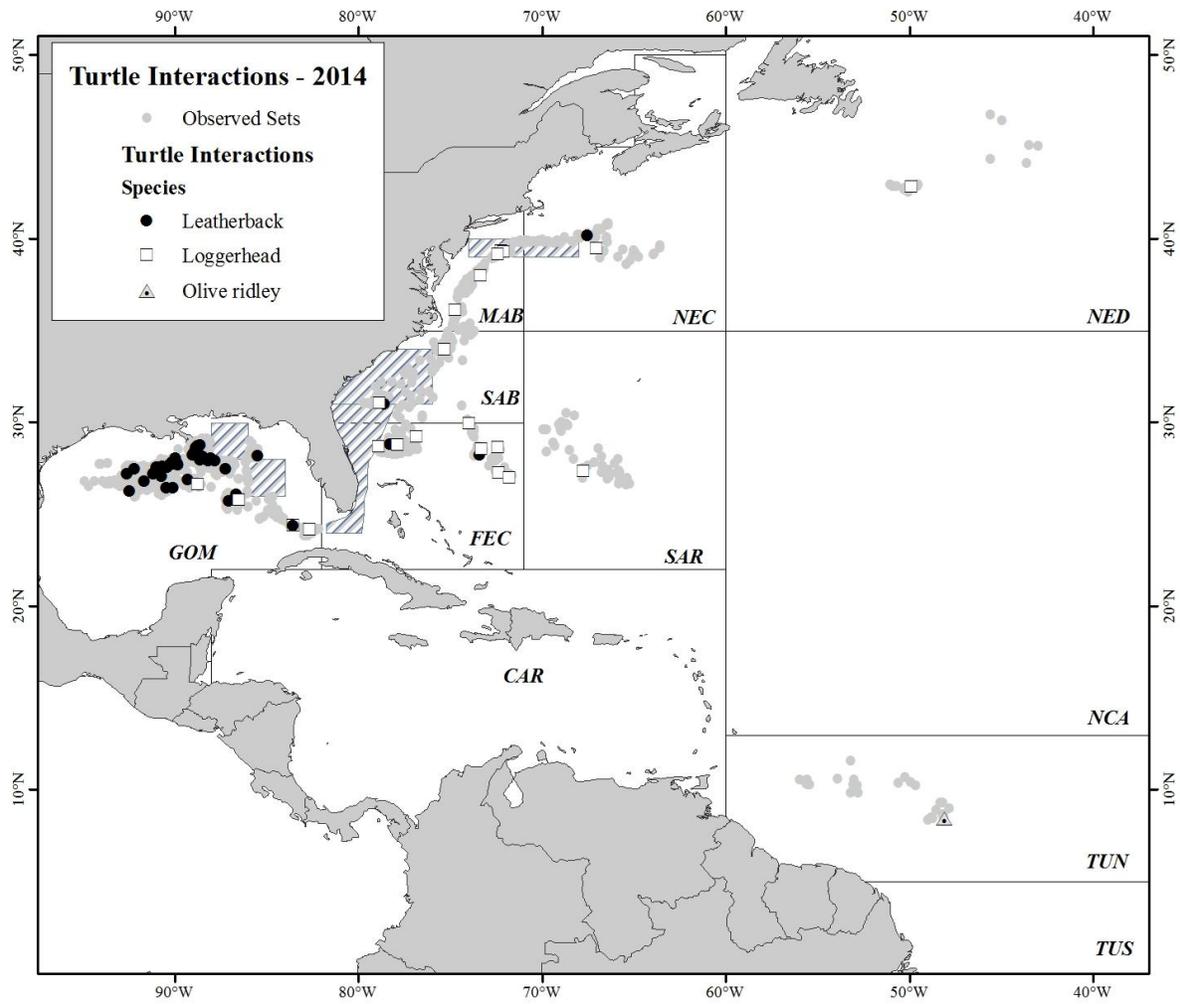


Figure 5. Observed pelagic longline fishing effort and marine mammal takes during 2014.

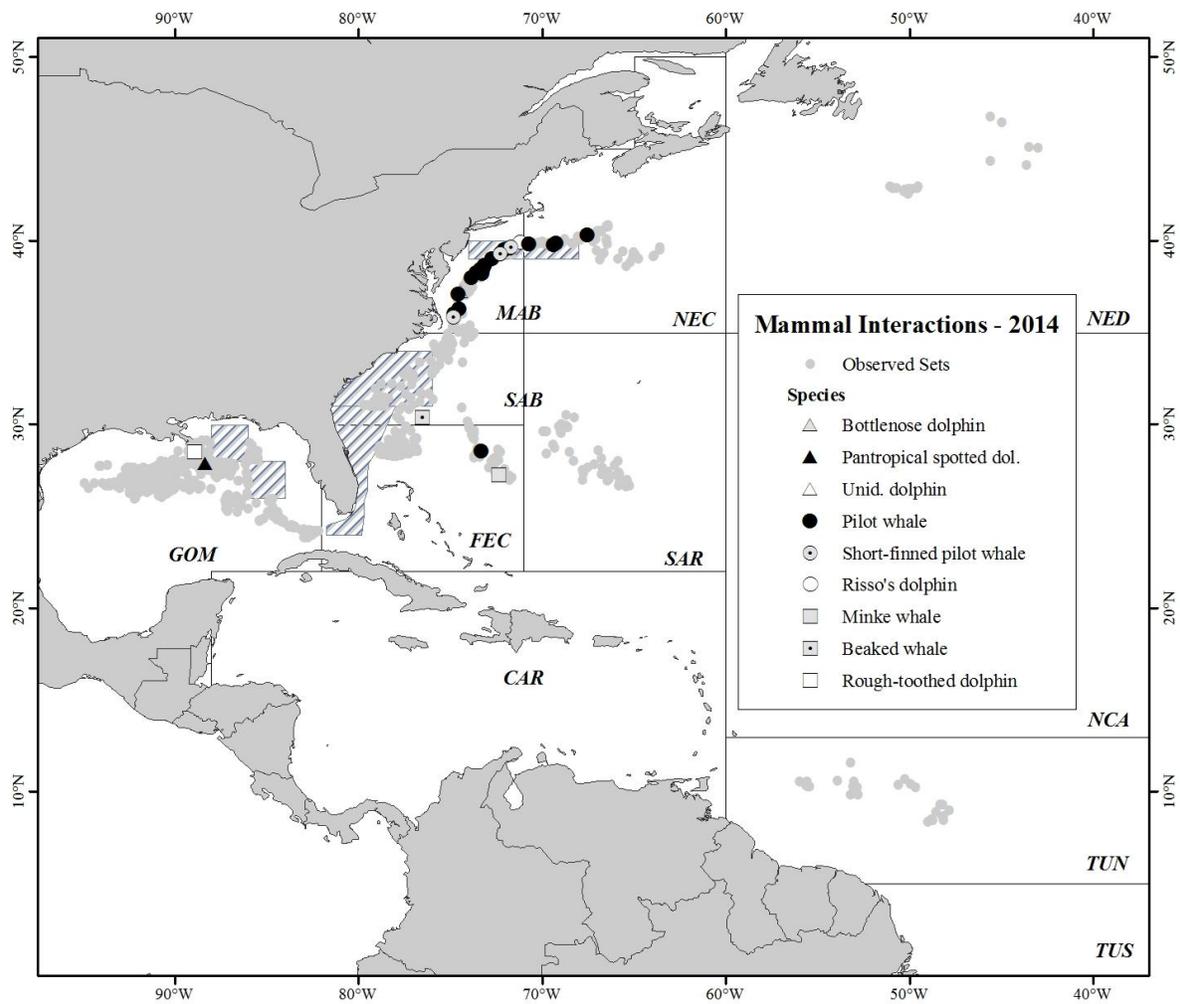
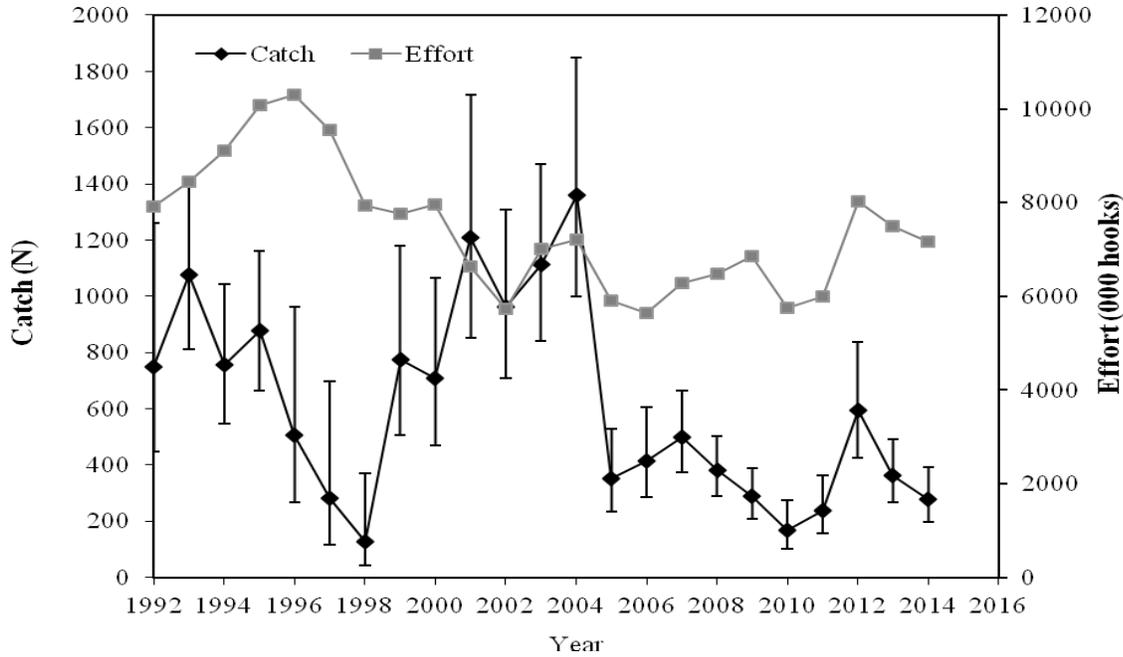


Figure 6. Historical trends in fishery effort and estimated marine turtle takes in the pelagic longline fishery from 1992 to 2014 for A) Leatherback Turtles, and B) Loggerhead Turtles. Errors bars represent 95% confidence intervals.

A. Leatherback Turtles



B. Loggerhead Turtles

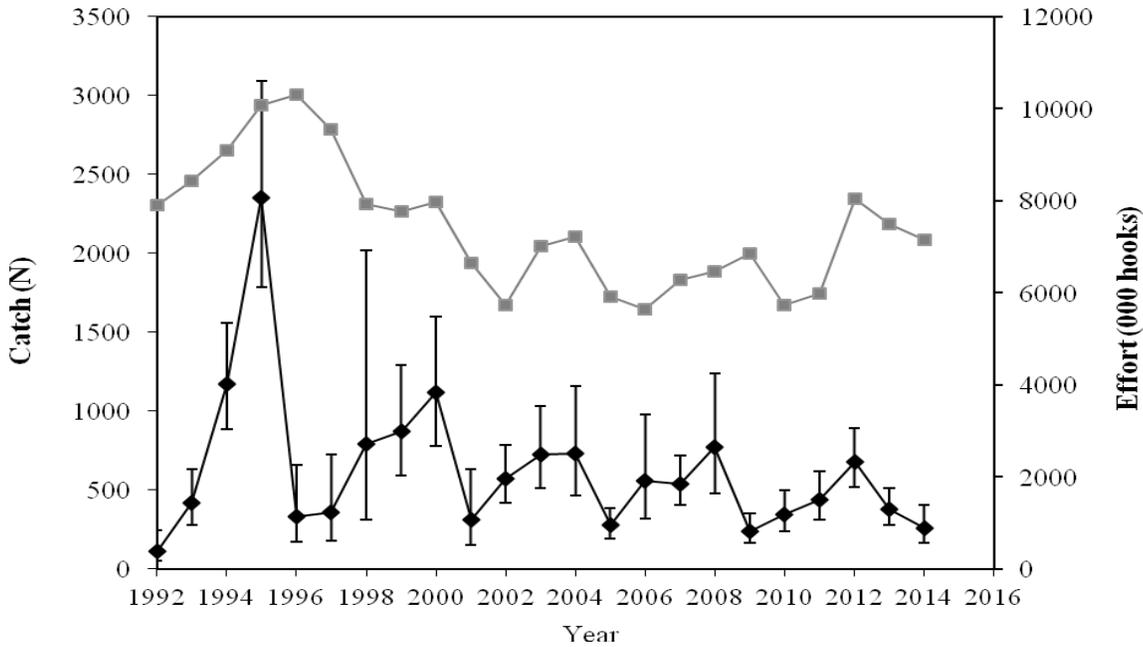
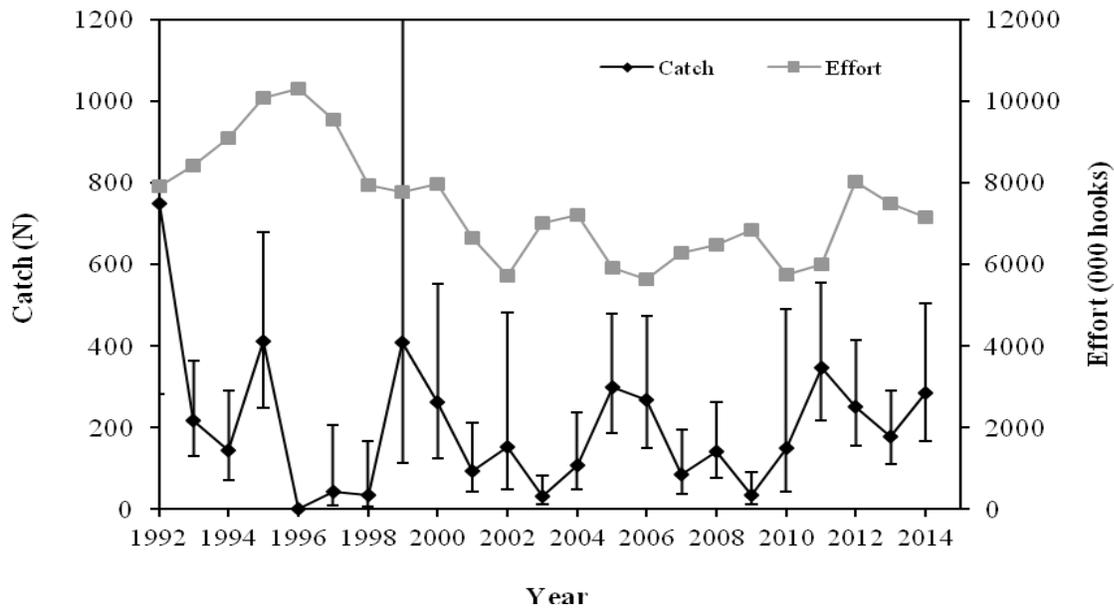
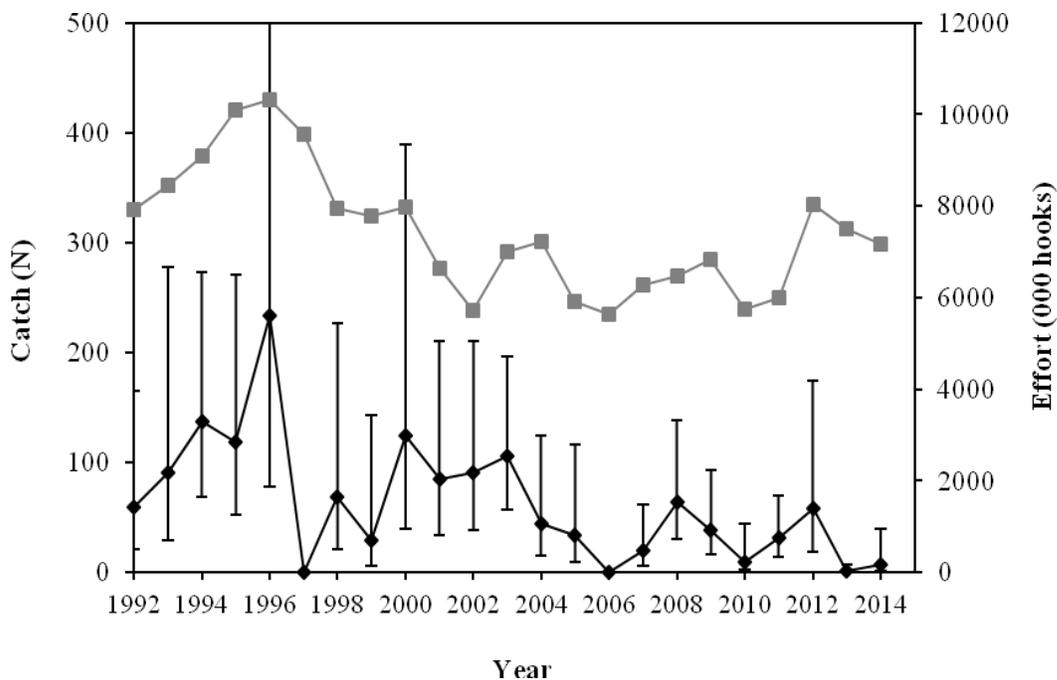


Figure 7. Historic trends in fishery effort and estimated marine mammal takes in the pelagic longline fishery from 1992 to 2014 for A) Pilot Whales and B) Risso’s Dolphins in Western North Atlantic waters. Errors bars represent 95% confidence intervals. For pilot whales, all takes are most likely of short-finned pilot whales.

A. Pilot Whales



B. Risso’s Dolphins



Appendix A. Sea Turtle Life History Form

SEA TURTLE LIFE HISTORY FORM

02/2012

CAPTURE INFORMATION

TRIP YEAR 20 MONTH DAY

SET/HAUL/TOW SPECIMEN NUMBER BY TRIP EXPERIMENTAL Y / N?
(if Y, note project name in comments)

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

TARGET CATCH: _____ 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 AT CAPTURE Injured Uninjured Unknown
(Please check injury status above as well as condition below; complete condition evaluation on p. 2 for any not coded "alive")
 Previously dead Fresh dead/comatose/unresponsive Attempted resuscitation? Y / N
 Alive Unknown (describe) Other (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 / Not Applicable If No, number of gangions to next light stick
 Light stick type (circle): Chemical / LED
 Light stick color (circle)? White, Pink, Blue, Green, Black, Red, Yellow, Purple, Other, Unknown
 Number of gangions to next float

HOOK LOCATION (See Appendix in manual for descriptive figures)
(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 Holding bait/hook

Internal: Unknown, internal
 Swallowed (Esophagus) Hook visible? Visible to insertion point / Partial hook / Not visible
 Beak/ Mouth (Circle one) Jaw Location (Check one) upper lower side (mouth only)
 Check one for mouth: tongue glottis roof of mouth jaw joint other (describe)

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

Was hook recovered 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)

Appendix B. Details of Sea Turtle and Marine Mammal Interactions

Table B1. Gear types and hooking locations based upon observed comments and the sea turtle life history form for each A) Leatherback, and B) Loggerhead turtles observed during 2014. These data are summarized in Tables 5 and 6. Q indicates calendar quarter, “CL Est.” indicates an estimated carapace length in feet, “CCL” indicates a measured curved carapace length in cm, and “N-N” indicates a straight line measurement of the turtle carapace from notch to notch (see Appendix A). Areas denoted with “Exp” indicate takes in experimental fishing. “Injury Cat. Row” and “Release Cond. Col.” refer to rows and columns, respectively, for post-release mortality assignments in SEFSC 2013.

A. Leatherback Turtles

#	Area	Q	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	N-N (cm)
1	FEC	1	C-18/0	0	Squid	270	Alive, injured	Released alive	Shoulder	No	No	No	15.0	I	B	7.0		
2	FEC-Exp.	1	C-18/0 weak hook	0	Squid	203	Alive, injured	Released alive	Armpit	Yes	Yes	No	0.0	I	D	4.0		
3	FEC	1	C-18/0	10	Squid	207	Alive, uninjured	Released alive	Not hooked	N/A	Yes	No	0.0	V	D	5.0		
4	FEC-Exp.	1	C-18/0 weak hook	0	Squid	221	Alive, unknown	Released alive	Not known if hooked	No	Yes	No	2.0	IV	C	6.0		
5	GOM	1	C-16/0	0	Squid	113	Alive, injured	Released alive	Shoulder	Yes	No	No	0.0	I	D	5.0		
6	GOM	1	C-16/0	0	Squid or mackerel	270 or 225	Alive, injured	Released alive	Shoulder	No	No	No	0.0	I	C	3.5		
7	SAB	1	C-18/0	10	Squid	180	Alive, injured	Released alive	Shoulder	No	No	No	6.0	I	B	7.0		
8	GOM	2	C-16/0	0	Mackerel	122	Fresh dead	Discarded unmarked carcass	Front flipper	No	Yes	Yes	2.0	I	Dead	3.5		
9	GOM	2	C-16/0	0	Squid	171	Alive, injured	Released alive	Shoulder	No	No	No	0.5	I	C	6.0		
10	GOM	2	C-16/0	0	Squid	117	Alive, injured	Released alive	Shoulder	No	No	No	8.0	I	B	4.8		
11	GOM	2	C-16/0	0	Squid	225	Alive, injured	Released alive	Shoulder	Yes	No	No	0.0	I	D	5.0		

Appendix B, Table B1, A. Leatherback Turtles cont.

#	Area	Q	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	N-N (cm)
12	GOM	2	C-16/0	0	Squid	113	Alive, injured	Released alive	Roof of mouth	Yes	No	No	0.0	III	D	3.5		
13	GOM	2	C-16/0	0	Squid	113	Alive, injured	Released alive	Carapace	Yes	No	No	0.0	I	D	4.0		
14	GOM	2	C-16/0	0	Squid	261	Alive, uninjured	Released alive	Not known if hooked	No	Yes	Yes	3.0	IV	A	5.0		
15	GOM	2	C-16/0	0	Squid	99	Alive, injured	Released alive	Unknown, internal	No	No	No	6.0	IV	B	4.0		
16	GOM	2	C-16/0	0	sardine	68	Alive, uninjured	Released alive	Not hooked	N/A	Yes	No	0.0	V	D	5.0		
17	GOM	2	C-16/0	0	Squid	176	Alive, injured	Released alive	Shoulder	No	Unknown	No	1.5	I	C	5.0		
18	GOM	2	C-16/0	0	Squid	176	Alive, unknown	Released alive	Not known if hooked	No	Yes	Yes	6.0	IV	A	7.0		
19	GOM	2	C-16/0	0	Squid	113	Alive, injured	Released alive	Shoulder	No	No	No	1.0	I	C	4.5		
20	GOM	2	C-16/0	0	Squid	113	Alive, injured	Released alive	Shoulder	No	No	No	1.0	I	C	5.0		
21	GOM	2	C-16/0	0	Squid	113	Alive, injured	Released alive	Armpit	No	No	No	1.0	I	C	4.0		
22	GOM	2	C-16/0	0	Squid or sardine	113 or 72	Alive, injured	Released alive	Front flipper	No	No	No	1.0	I	C	5.0		
23	GOM	2	C-16/0	0	Squid or sardine	113 or 68	Alive, unknown	Released alive	Unknown location	No	No	No	45.0	IV	B	4.0		
24	GOM	2	C-16/0	0	sardine	68	Alive, uninjured	Released alive	beak (external)/ head/neck	Yes	No	No	0.0	I	D	5.0		

Appendix B, Table B1, A. Leatherback Turtles cont.

#	Area	Q	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	N-N (cm)
25	GOM	2	C-16/0	0	Squid	108	Alive, injured	Released alive	Shoulder	No	No	No	1.0	I	C	6.0		
26	GOM	2	C-16/0	0	Squid or herring	131 or 63	Alive, injured	Released alive	Shoulder	No	No	No	1.0	I	C	3.5		
27	GOM	2	C-16/0	0	Squid or herring	131 or 63	Alive, injured	Released alive	Plastron	No	Yes	No	2.0	I	B	4.0		
28	GOM	2	C-16/0	0	Squid or herring	131 or 63	Alive, uninjured	Released alive	Not hooked	N/A	Yes	No	0.0	V	D	3.5		
29	GOM	2	C-16/0	0	Squid or sardine	126 or 59	Alive, uninjured	Released alive	Not hooked	N/A	Yes	No	0.0	V	D	4.5		
30	GOM	2	C-16/0	0	Squid or sardine	180 or 68	Alive, injured	Released alive	Shoulder	Yes	No	No	0.0	I	D	4.5		
31	GOM	2	C-16/0	0	Squid or sardine	180 or 68	Alive, injured	Released alive	Armpit	No	Yes	No	2.0	I	C	4.5		
32	GOM	2	C-16/0	0	Squid	126	Alive, injured	Released alive	Shoulder	No	No	No	8.0	I	B	5.0		
33	GOM	2	C-16/0	0	Squid	108	Alive, injured	Released alive	Mouth, side, other	No	No	No	2.0	II	C	7.0		
34	GOM	2	C-16/0	0	Squid	108	Alive, injured	Released alive	Armpit	No	Yes	Yes	4.0	I	A	7.0		
35	GOM	2	C-16/0	0	Squid	126	Alive, injured	Released alive	Mouth, side, other	Yes	No	No	0.0	II	D	4.0		
36	GOM	2	C-16/0	0	Squid	126	Alive, injured	Released alive	Unknown, internal	No	No	No	6.5	IV	B	4.5		
37	GOM	2	C-16/0	0	Squid or sardine	180 or 68	Alive, injured	Released alive	Armpit	No	No	No	2.0	I	C	4.5		

Appendix B, Table B1, A. Leatherback Turtles cont.

#	Area	Q	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	N-N (cm)
38	GOM	2	C-16/0	0	Squid	108	Alive, unknown	Released alive	Not known if hooked	No	Yes	No	1.0	IV	C	5.0		
39	GOM	2	C-16/0	0	Squid	108	Alive, unknown	Released alive	Not known if hooked	No	Yes	Yes	5.0	IV	A	6.0		
40	GOM	2	C-16/0	0	Squid	162	Alive, injured	Released alive	Armpit	No	No	No	1.5	I	C	3.5		
41	GOM	2	C-16/0	0	Mackerel	108	Alive, injured	Released alive	Armpit	No	Yes	No	0.5	I	C	6.5		
42	SAB	2	C-16/0	0	Squid	59	Alive, injured	Released alive	Shoulder	No	No	No	0.5	I	C	5.0		
43	GOM	3	C-16/0	0	Squid	90	Alive, injured	Released alive	Unknown location	No	No	No	3.0	IV	B	5.0		
44	GOM	3	C-16/0	0	Squid	90	Alive, injured	Released alive	Unknown location	No	Unknown	No	3.0	IV	B	4.0		
45	GOM	3	C-16/0	0	Squid	90	Alive, injured	Released alive	Armpit	No	No	No	3.0	I	B	5.0		
46	GOM	3	C-16/0	0	Squid	95	Alive, injured	Released alive	Front flipper/shoulder/armpit	No	No	No	unk	I	B	5.0		
47	GOM	3	C-16/0	0	Squid	90	Alive, unknown	Released alive	Not known if hooked	No	Yes	Yes	15.0	IV	A	5.0		
48	GOM	3	C-16/0	0	Squid or mackerel	135	Alive, injured	Released alive	Side jaw joint	No	No	No	3.0	III	B	4.0		
49	GOM	3	C-16/0	0	Squid or mackerel	90 or 135	Alive, injured	Released alive	Mouth upper jaw unknown	No	No	No	5.0	III	B	5.0		
50	GOM	3	C-16/0	0	Squid	90	Alive, injured	Released alive	Armpit	No	No	No	2.0	1	B	4.0		

Appendix B, Table B1, A. Leatherback Turtles cont.

#	Area	Q	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	N-N (cm)
51	GOM	3	C-16/0	0	Squid or mackerel	90 or 135	Alive, uninjured	Released alive	Not hooked	N/A	Yes	No	0.0	V	C	4.0		
52	GOM	3	C-16/0	0	Squid or herring	90 or 45	Alive, injured	Released alive	Tongue	Yes	No	No	0.0	III	D	4.0		
53	GOM	3	C-16/0	0	Mackerel	162	Alive, uninjured	Released alive	Not hooked	N/A	Yes	No	0.0	V	D	8.0		
54	NEC	3	C-16/0	0	Squid	225	Alive, injured	Released alive	Mouth upper jaw unknown	Yes	No	No	0.0	III	D	5.0		
55	GOM	4	C-16/0	0	Squid	225	Alive, injured	Released alive	Plastron	No	No	No	0.1	I	C	5.0		
56	GOM	4	C-16/0	0	Squid	162	Alive, injured	Released alive	Side jaw joint	No	No	No	5.0	III	B	4.0		

Appendix B, Table B1, B. Loggerhead Turtles

#	Area	Q	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	N-N (cm)
1	FEC	1	C-16/0	0	Squid	248	Alive, injured	Released alive	Beak (internal), upper jaw	Yes	No	No	0.0	I	D		80.0	not avail.
2	FEC-Exp.	1	C-18/0 weak hook	0	Squid	185	Alive, injured	Released alive	Swallowed, hook partially visible	No	No	No	0.0	III	C	3.0		
3	FEC-Exp.	1	C-18/0 weak hook	0	Squid	180	Alive, injured	Released alive	Mouth, side, other	Yes	No	No	0.0	II	D		62.0	not avail.
4	FEC	1	C-18/0	10	Squid	194	Alive, injured	Released alive	Tongue	Yes	No	No	0.0	III	D		65.2	59.0
5	FEC	1	C-18/0	10	Squid	207	Alive, injured	Released alive	Swallowed, hook not visible	No	No	No	0.5	IV	C		62.0	not avail.
6	FEC	1	C-18/0	10	Squid	207	Alive, injured	Released alive	Swallowed, hook not visible	No	No	No	0.5	IV	C		79.1	not avail.
7	FEC	1	C-18/0	10	Squid	207	Alive, injured	Released alive	Tongue	Yes	No	No	0.0	III	D		69.0	not avail.
8	GOM	1	C-16/0	0	Squid or mackerel	270 or 225	Alive, injured	Released alive	Swallowed, hook not visible	No	No	No	0.3	IV	C	2.5		
9	MAB	1	C-18/0	0	mackerel or menhaden	216 or 320	Alive, injured	Released alive	Unknown location	No	No	No	0.5	IV	C	2.0		
10	SAB	1	C-18/0	10	Squid	180	Alive, injured	Released alive	Front flipper	Yes	Yes	No	0.0	I	D		72.0	67.2
11	FEC	2	C-16/0	0	Squid or mackerel	518 or 617	Alive, injured	Released alive	Swallowed, not visible	No	No	No	0.2	IV	C		74.9	not avail.
12	FEC	2	C-16/0	0	Squid	216	Alive, injured	Released alive	Swallowed, not visible	No	No	No	0.2	IV	C		63.0	61.0
13	GOM	2	C-16/0	0	Mackerel	122	Alive, injured	Released alive	Beak (internal), lower jaw	No	No	No	0.0	I	C	3.0		
14	GOM	2	C-16/0	0	Squid or herring	181 or 68	Alive, injured	Released alive	Mouth, side, other	No	No	No	2.0	II	B	3.0		

Appendix B, Table B1, B. Loggerhead Turtles cont.

#	Area	Q	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	N-N (cm)
15	MAB	2	C-18/0	0	Squid	176	Fresh dead	Discarded unmarked carcass	Not hooked, holding bait	Yes	No	No	0.0	V	Dead		69.5	not avail.
16	NEC	2	C-16/0	0	Squid	90	Alive, injured	Released alive	Mouth, side, other	No	No	No	0.1	II	C	2.0		
17	SAB	2	C-16/0	0	Squid	203	Alive, injured	Released alive	Tongue	Yes	No	No	0.0	III	D		69.8	65.0
18	MAB	3	C-16/0 or C-18/0	0 or 10	Squid	185	Alive, injured	Released alive	Mouth lower jaw other	No	No	No	1.5	II	B	2.0		
19	MAB	3	C-16/0	0	Squid	203	Alive, injured	Released alive	Beak (internal) lower jaw	Yes	No	No	0.0	I	D		68.0	not avail.
20	NED	3	C-18/0	10	Mackerel	396	Alive, injured	Released alive	Swallowed hook not visible	Attempted, Unsuccessful	No	No	0.2	IV	C		60.2	59.4
21	NED	3	C-18/0	10	Mackerel	396	Alive, injured	Released alive	Roof of mouth	Yes	No	No	0.0	III	D		73.0	67.6
22	FEC	4	C-16/0	0	Squid	203	Alive, injured	Released alive	Swallowed hook not visible	No	No	No	0.1	IV	C	2.0		
23	MAB	4	C-16/0	0	Squid	302	Alive, injured	Released alive	Swallowed hook not visible	No	No	No	0.2	IV	C	4.0		
24	SAB	4	C-16/0	0	Squid	180	Alive, injured	Released alive	Swallowed hook not visible	No	No	No	0.2	IV	C		72.0	73.0
25	SAR	4	C-18/0	10	Squid	225	Alive, uninjured	Released alive	Not hooked	N/A	Yes	No	0.0	V	D	4.0		

Appendix B, Table B1, C. Olive Ridley Turtles cont.

#	Area	Q	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	N-N (cm)
1	TUN	4	C-16/0	0	Other	149	Alive, injured	Released alive	Front flipper	Yes	No	No	0.0	I	D		63.0	57.0

Appendix B cont.

Table B2: 2014 observer comments and serious injury codes for marine mammals are presented. Lengths (cm) are estimated visually by the observer. Interaction type categories are based on NMFS Serious Injury determination policy.

Animal #	Species	Length (cm)	Release Condition	Interaction Type	Observer Comments
1	Short-finned pilot whale (genetic id)	300	Serious Injury	S5a - Hook in head	[Check boxes indicate animal hooked in mouth, lower jaw. Line cut but hook not removed. 2 ft gangion remaining. Entangled in mainline around body, wraps cut and mainline removed.] Capt. and crew were able to get MPW to side of boat because mainline was around its body. Then gangion was cut w/line cutter. The aminline was cut w/mono cutter releasing it. There was about 2 ft of gangion left and no mainline. When released MPW swam away slowly]
2	Pilot Whale	210	Serious Injury	S5a - Hook in head, S6- Gear attached to free-swimming animal	[Check boxes indicate animal was hooked in the mouth, location unknown and not visible. Hook was not removed and released with 18ft of trailing line. Not entangled.] Captain "hand-lined" the MPW as close to the boat as he saw fit and then had a crew member cut the line with a knife. Once the line was cut, the MPW quickly swam away.
3	Pilot Whale	270	Serious Injury	S6 - Gear attached to free-swimming animal with potential to be ingested or entangle	[Check boxes indicate unknown if hooked, released with 72 ft of trailing line. Unknown if entangled.] One bundle of gangions/leaders were caught on the mainline prior to whale being spotted. Whale had pulled bundle transecting the mainline. Fisherman spotted whale at surface ~100 yds. from boat then began to haul gear toward whale and it dove. I saw dorsal fin before it dove but level of species id was poor. Animal pulled against line. It is unclear if animal was hooked or entangled or both. Animal broke line and fisherman continued fishing]
4	Minke Whale	270	Released Alive	L3 – Loose wrap, bridled or draped gear, L4- External hook	[Check boxes indicate animal was hooked in the side of the mouth. Hook was not removed, released with 8 ft. trailing gear. Entangled in gear around front flipper including mainline, gangion, and droplines. Wraps cut before release.] Attempted to use long-handled hook cutters instead pulled line as whale thrashed then two ends of line came undone from wrap and whale was free. The whale was still hooked in the upper jaw but able to swim away b/c tangle was freed from flipper. Whale swam away immediately after it was released from gear.
5	Rough-toothed dolphin	180	Serious Injury	S5a - Hook in head, S6- Gear attached to free-swimming animal	[Check boxes indicate animal was hooked, location unknown. Released with 20 feet of trailing gear, unknown if entangled] Dolphin pulled to within 20 ft. of vessel, then crew cut gangion, leaving hook and approximately 20 ft. of gangion attached to the dolphin. Dolphin did not appear to be entangled in line, but could not be sure. Unable to see exact location of hook, but based upon tension, direction of gangion, appeared to be hooked in the rostrum. Dolphin swam away normally and likely stayed with the vessel for the remainder of the haul.
6	Rough-toothed dolphin	165	Serious Injury	S5a - Hook in head, S6- Gear attached to free-swimming animal	[Check boxes indicate animal was hooked, location unknown. Released with 25 feet of trailing gear, unknown if entangled.] Dolphin pulled within 25 ft of boat, then line cut by crew, approximately 25 feet of gangion remaining.

Appendix B, Table B2 (cont.)

Animal #	Species	Length (cm)	Release Condition	Interaction Type	Observer Comments
7	Pantropical spotted dolphin	150	Released Alive	S7b - Entangled before being freed without gear attached	[Check boxes indicate animal not hooked. Entangled around tail/flukes in dropline/floatline. Gear removed from animal] Captain brought the marine mammal near the boat slowly. Grabbed the dropline and slowly began unraveling it from the dolphin's fluke. Freed it from all line and dolphin swam away. Animal swam slowly but alert. Took a breath right after release then about 10-15 seconds later. Small cut into the fork of the fluke, no cuts noticed on the base of the tail.
8	Risso's dolphin	300	Serious Injury	S6 - Gear attached to free-swimming animal with potential to be ingested or entangle	[Check boxes indicate unknown if hooked or entangled. Released with ~30 free of trailing gear, no wraps seen] Gear a mess, something powerful on line just under surface, expecting to see tiger shark, came up to gangion not tangled with other gear. Rissos dolphin came out of water for 1 second pulling very hard. Capt. concered for crews safety, crew cut line with line cutter. Very powerful, came out of water for 1 second, mostly white, saw back above dorsal to head, disappeared when line cut.
9	Pilot Whale	120	Serious Injury	S5a - Hook in head, S6- Gear attached to free-swimming animal	[Check boxes indicate animal was hooked, location unknown. Line cut and released with 28 ft. of trailig gear. Not entangled.] Once gangion was within arms reach, Captain instructed crew member to cut the line leaving ~28ft remaining. Once gangion was cut, animal quickly swam away normally. [Drawing indicates gangion connected to head/mouth]
10	Pilot Whale	450	Serious Injury	S5a - Hook in head, S6- Gear attached to free-swimming animal	[Check boxes indicate animal was hooked, noted line looked to go toward head. Never got close enough to get a good look. Line cut and animal released with 20ft of trailing gear. Not entangled] Whale was very strong and active, crew tried to bring whale closer, but whale was resisting. After several minutes of struggling with whale they cut the line. Animal very active and strong, jumping partially out the of the water. Would not allow crerw to bring it closer. After line was cut the whale dove and was not seen again.
11	Pilot Whale	300	Serious Injury	S5a - Hook in head, S6- Gear attached to free-swimming animal	[Check boxes indicate animal was hooked, location unknown. Line cut leaving 30 feet of trailing line. Not entangled.] Cut line (not much effort involved) Captain was inside ship, crew cut line without his supervision. As we pulled up, animal was dormant, resting at surface. No motion other than breathing. After line was cut, animal remained at surface for another 30 seconds before diving normally.
12	Pilot Whale	180	Serious Injury	S5c – Hook in any body part but removed, S5a – Hook in head	[Check boxes indicate animal was hooked in the mouth, partial hook observable, unknown exactly what part of the mouth was hooked. Hook and line removed before release. Not entangled.] Crew was handlining MPW boatside when hook "popped" loose; no gear remaining. Once hook "popped" loose, MPW swam away quickly
13	Pilot Whale	150	Serious Injury	S5a - Hook in head, S6- Gear attached to free-swimming animal	[Check boxes indicate animal was hooked in mouth, location unknown. Line cut leaving 15 ft of trailing line and hook in mouth. Not entangled.] Crew pulled MPW as close to boat as they could and cut the line. ~15' of line and hook remains attached to MPW. MPW quickly swam away once line was cut.

Appendix B, Table B2 (cont.)

Animal #	Species	Length (cm)	Release Condition	Interaction Type	Observer Comments
14	Pilot whale	270	Serious injury	S6 - Gear attached to free-swimming animal with potential to be ingested or entangle	[Check boxes indicate unknown if hooked. Entangled around head/neck in mainline and gangions. Wraps not cut, released with 48 feet of remaining line.] Whale was maneuvered alongside at which time the long handle line cutter was used to remove as much line as possible. Whale made a run, breaking the line. It still had two wraps on head and pectoral and trailong about 8 fm of line as it swam off. It appeared that the wraps could work themselves free eventually. Made a run as line was being cut off. Broke mainline and swam away quickly.
15	Pilot whale	270	Serious injury	S5a - Hook in head	[Check boxes indicate animal was hooked in mouth, swallowed. Line cut leaving 3 feet trailing. Not Entangled] Crew handlined MPW close to the vessel and used long-handled line cutter to cut line ~3' from MPW's mouth. Once line was cut, MPW quickly swam away.
16	Pilot whale	210	Serious injury	S5a - Hook in head	[Check boxes indicate animal was hooked in mouth, unknown location, just saw line going in mouth. Line cut and released with 4.5 ft of gear remaining. Not entangled] Pulled whale in as far as possible and used long handled line cutter to cut line as close to whale as possible. Approx. 4.5 feet of line left trailing from mouth. Dove and swam away quickly. Could not get a picture of interaction as there was not much room on stern of vessel and it happened very quickly.
17	Pilot whale	240	Released Alive	S7b - Entangled before being freed without gear attached	[Check boxes indicate unknown if hooked. Entangled in mainline, gangion/leader around head/neck and tail/flukes. Wraps partially cut with 5 ft of line remaining on release.] Maniline and gangion/leader wrapped around tail was cut and mostly removed with 2 loops (~5ft) of line remaining. When released. I am unsure if there was line attached to the head. Swam down, kicking with its tail, and I did not see it again.
18	Pilot whale	360	Serious injury	S5a - Hook in head	[Check boxes indicate hooked in side of mouth. Line cut leaving 3 feet of line remaining. Not Entangled.] Crew pulled in animal within 10 feet of boat so that I could attempt to take a biopsy. I scrapped the animal's dorsal side with the biopsy tip attached to the extended pole, then a crewman cut the line as close as he could reach. It swam away vigorously, then rested at the surface, occasionally submerging, some distance from the boat.
19	Pilot whale	360	Released Alive	S7b - Entangled before being freed without gear attached	[Check boxes indicate not hooked, entangled in mainline around body and tail/flukes. Gear removed before release] Mainline that was wrapped around the body and tail came free after crew cut the line. No remaining gear visible on the animal. After release this (mother?) pilot whale swam 10-20m away, but remained nearby until the other pilot whale (her calf) was disentangled.
20	Pilot whale	120	Serious injury	S5a - Hook in head, S6- Gear attached to free-swimming animal	[Check boxes indicate animal was hooked in side of mouth. Line cut leaving 5 feet and hook. Entangled in mainline and gangion/leader. Partial gear removed and partial cut of wraps] Animal was pulled close to boat by reeling in line with hydraulics until tail was pulled out of water. Line wraps and gangion were cut close to body, but a couple of wraps remained around tail at base of flukes. Swam away, joining up with its mother.

Appendix B, Table B2 (cont.)

Animal #	Species	Length (cm)	Release Condition	Interaction Type	Observer Comments
21	Pilot Whale	195	Serious injury	S5a - Hook in head	[Check boxes indicate animal was hooked inside mouth, not visible. Hook not removed, but line snapped at crimp with no trailing line. Not entangled] The line snapped while the captain was trying to pull MPW boatside. The line broke where it was crimped to the hook. Only hook remains inside MPW's mouth. Once the line snapped, the MPW swam away quickly.
22	Short-finned pilot whale (genetic id)	240	Serious injury	S5a - Hook in head	[Check boxes indicate animal was hooked in the side of the mouth. Line cut with 4 feet of trailing line remaining. Not Entangled.] Whale was brought in close and held for observer biopsy. Whale was active did not want to surface. Brought in closer and line was cut by crewman hanging over side. Whale was active, did not want to surface. Line handler had trouble bringing it in close. When line was cut, immediately dove.
23	Pilot Whale	300	Released alive	S7b - Entangled before being freed without gear attached	[Check boxes indicate animal was not hooked. Entangled in mainline and gangion/leader around flukes. Gear removed.] Gear was removed using a long turtle line cutter after first few wraps of mainline were cut the rest untangled. Animal was active and aggressive during untangling procedure. After wraps were untangled it dove. Left with some redness around tail but nothing that looked serious.
24	Pilot Whale	210	Serious injury	S5a - Hook in head	[Check boxes indicate animal was hooked in side of mouth. Line cut leaving 1 foot of trailing line. Not entangled] Whale was brought in close to boat then line was cut close to mouth using turtle line cutter. Whale was calm, swimming normally. Brought closer to boat with relative ease. After line was cut, whale swam away.
25	Short-finned pilot whale (genetic id)	240	Released alive	S7b - Entangled before being freed without gear attached	[Check boxes indicate animal was hooked in tail. Line cut and released with 4 feet of trailing line. Not entangled.] Whale brought in closer to boat. Crewman leaned over side cut line with line cutters. Left 4 feet of mono and hook. Active, put up a fight, hard to biopsy. After line was cut, swam away.
26	Beaked whale	450	Released alive	S7b - Entangled before being freed without gear attached	[Check boxes indicate not hooked. Entangled around tail/flukes in gangion/leader. Line partially removed, 10 feet remaining with wraps not cut.] Pulled the whale in as close as possible but it was fighting the crew so they cut it as close to the fluke as safely as possible. Only 1 wrap and the hook did not seem embedded at all. Swam away vigorously did not seem to be in distress as it was fighting hard to get away and swam off quickly upon being cut free.
27	Pilot Whale	450	Serious injury	S5a - Hook in head	[Check boxes indicate animal was hooked in side of mouth. Line cut leaving 1 foot of trailing line. Not entangled] Crew used long handled line cutter to cut line as close as possible. The animal did not seem to be negatively affected physically by the gear. The animal swam away without being restrained by the gear.
28	Pilot Whale	270	Serious injury	S5a - Hook in head	[Check boxes indicate animal was hooked in mouth, location unknown. Line cut leaving 2 feet of trailing line. Not entangled.] MPW not tangled, gangion disappeared into mouth, exact location unknown. Line cut, slightly less than 2 ft outside. Coming out of water, head and dorsal and flukes seen approximately every 10 seconds, appeared 4 or 5 times before line was cut.

Appendix B, Table B2 (cont.)

Animal #	Species	Length (cm)	Release Condition	Interaction Type	Observer Comments
29	Pilot Whale	450	Serious Injury	S5a - Hook in head	[Check boxes indicate animal was hooked in side of mouth. Line cut leaving 2 feet trailing. Not entangled.] Mammal was brought near to the boat and cut lose using long handled line cutters as close to the hook as possible (less than 2 feet) Swam away with group healthy and aggressively. Animal was actively swimming making circles around the mainline. Others were in the area awaiting him. He was cut loose with long handled line cutters and swam away healthy.
30	Pilot Whale	600	Serious Injury	S6 - Gear attached to free-swimming animal with potential to be ingested or entangle	[Check boxes indicate unknown if hooked. Entangled with daub/gangion around front flippers. Gear not removed, released with 20 feet remaining wrapped.] Mammal was entangled/hooked in hear brought near to boat, dove causing part off. Gear recovered, hauled to animal to attempt to remove gear, Dove, causing another part off. Animal was alive, healthy and active when spotted interacting with gear. Dove causing part off, gear collected to animal to unentangle/cut loose, dove aggressively again causing another part off, was not seen afterward.
31	Unid. Dolphin	165	Serious Injury	S5a - Hook in head	[Check boxes indicate animal was hooked in side of mouth. Line cut leaving 2 feet trailing. Not entangled.] Crew got dolphin to side of boat and cut leader with a knife as close as they could reach. When released, dolphin quickly swam away. Animal swam away normally when released, very active jumping out of water.

