

## **Preliminary Estimates of Protected Species Bycatch Rates in the U.S. Atlantic Pelagic Longline Fishery from 1 October – 31 December 2007**

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### **Background**

The U.S. Atlantic Pelagic Longline fleet operates along the U.S. coast from the Gulf of Mexico to New England, the waters of the Caribbean, and in international waters of the Northwestern Atlantic Ocean. The longline fishery has a documented history of incidental takes of non-target species including marine turtles and marine mammals. During recent years there were elevated takes of leatherback turtles in the Gulf of Mexico (Garrison, 2003). As a result, a Biological Opinion on the pelagic longline fishery was developed by NOAA Fisheries under the Endangered Species Act, which required several actions to be taken to improve monitoring and reduce interactions with leatherback and loggerhead turtles. These regulations reopened the Northeast Distant (NED) fishing area, with restrictions, on 30 June 2004, and similar restrictions were imposed on the rest of the fleet effective 5 August 2004. These regulations eliminated J-hooks from the fishery and mandated that all pelagic longline gear use circle hooks of size 16/0 or greater and that only hooks of size 18/0 or greater may be used in the NED area. The regulations further required that hooks less than 18/0 have no offset, while hooks of size 18/0 or greater may have an offset no greater than 10 degrees.

The Biological Opinion also required quarterly reporting of interactions with protected species including marine turtles and marine mammals. The goal of this measure was to more closely monitor any potential short-term increases in interaction rates and thereby allow a more responsive management program. This report meets this requirement and includes the observed fishery effort and incidental takes reported by the Pelagic Observer Program (POP) from 1 October 2007 through 31 December 2007.

While it would be desirable to directly estimate the absolute level of takes (i.e. the total number of turtles or mammals estimated to be taken by the fishery), fishery effort data are reported on logbook forms by fishing captains, and current data are therefore not available until several months after the end of any given quarter. As a result, the bycatch rate (i.e. catch per unit effort) presented here is based solely on observer data as an indicator of the relative level of interactions with protected species. The observed bycatch rate by fishing

area during quarter 4 of 2007 is compared to that observed in quarter 4 of 2006 and to the average of the previous five years (2002-2006) for quarter 4 to assess whether or not the observed rate in 2007 was unusually high or low. Bycatch rates were calculated by applying the delta log-normal method using hooks as the unit of effort. The analytical methods were described in detail in Garrison (2003).

## **Results and Discussion**

A total of 153 longline sets (134,036 hooks) were observed during quarter 4 of 2007 (Table 1), with only circle hooks (sizes 16/0 and 18/0) recorded. The majority of the observed sets occurred in the Gulf of Mexico (GOM) and the Mid-Atlantic Bight (MAB) areas (Figure 1, Table 1).

The locations of observed sets and turtle interactions are shown in Figure 1. There were 24 observed interactions with leatherback turtles and 6 observed interactions with loggerhead turtles (Table 2). All turtles were released alive. Twenty of the leatherbacks were hooked (three of which were also entangled), two were entangled only, and it was unknown whether one leatherback was hooked, but it was entangled upon capture (Appendix A1). All six of the loggerheads were hooked but not entangled upon capture (Appendix A2).

Concerted efforts by fishers to remove hooks and disentangle captured turtles are mandated by the Biological Opinion. Specific information on injuries to sea turtles and gear characteristics of each interaction are shown in Appendix A. Of the 20 leatherback turtles known to be hooked, one was hooked in the mouth, one swallowed the hook, 17 were hooked in the shoulder, armpit or flipper, and one was hooked in an unknown external location (Appendix A1). Hooks were removed from 10 of these leatherbacks. Ten hooked leatherbacks were released with hooks and eight of these were trailing line  $\leq 1.5$  feet, one was trailing 5 feet of line, and one was trailing 12 feet of line upon release. Of the six leatherbacks reported entangled at capture, five were not entangled when released, and it was unknown if the sixth leatherback, which was trailing 5 feet of line, was entangled upon release.

All six of the loggerheads were known to be hooked, with four hooked in the mouth or beak, and two swallowed the hook (Appendix A2). The hook was removed in three of these turtles, and all six were released with no trailing line. No loggerhead was entangled upon release.

Five interactions were observed with marine mammals during this quarter, all in the MAB area (Table 3, Figure 2). These included one interaction with a bottlenose dolphin, one interaction with a Risso's dolphin, and three interactions with pilot whales. The bottlenose dolphin, the Risso's dolphin, and one pilot whale were entangled in gear wrapped around the tail stocks. The gear was cut and removed and the animals released alive with no serious injury, based on observer comments and serious injury criteria (see Garrison, 2003; Angliss and DeMaster, 1998). One pilot whale was hooked in an unknown location, and

the hook fell off the whale during the haul-back, freeing the whale completely of gear when it was released alive with no serious injury. One pilot whale was hooked in the side of the mouth and efforts were unsuccessful to remove all the gear. The whale was released with the hook and 3 feet of trailing gear, and was considered to be alive but seriously injured based on serious injury criteria.

The quarterly and regional bycatch rates are summarized for marine turtles in Table 4 and for marine mammals in Table 5. These rates were compared with those from the same quarter/area for 2006 and the average for the fourth quarter/area from 2002-2006 in Tables 6 and 7 (Fairfield-Walsh and Garrison, 2006 and 2007). Specific information on injuries to sea turtles and gear characteristics of each interaction are shown in Appendix A.

For leatherback turtles, the bycatch rates in the GOM, MAB, and NED fishing areas were significantly higher than the 2006 bycatch rates (Table 6A), as well as the five year average rates. In the Northeast Central (NEC) area, there were no leatherbacks observed taken during the fourth quarter of 2007, which was lower than the observed bycatch for 2006 as well as for the previous five years. No leatherbacks were observed taken in the Florida East coast (FEC) area during 2007, which is consistent with that observed during 2002-2006. There was no observer coverage during this quarter of 2007 in any of the other previously observed fishing areas.

For loggerhead turtles, the bycatch rate observed in the FEC area was significantly higher than the five year average rate, and this area was not observed during the fourth quarter of 2006 (Table 6B). The loggerhead bycatch rate in the MAB was similar to that observed in 2006, and though the rate was lower than the average 2002-2006 bycatch rate, the 95% confidence intervals for 2007 exceeded the five year average 95% confidence intervals. In the GOM, the fourth quarter 2007 zero bycatch rate was the same as 2006, and lower than the five year average rate. In the NED area, the zero bycatch rate for 2007 was lower than both the 2006 and the average five year bycatch rates. In the South Atlantic Bight (SAB) fishing area, the zero bycatch rate for 2007 was lower than the five year average rate, and this area was not observed during 2006. The Caribbean (CAR) and the Sargasso Sea (SAR) areas were not observed during the fourth quarter of 2006 and 2007, though bycatch rates were observed during this quarter in 2005.

In addition to the turtle takes described above, one additional unidentified marine turtle was observed taken during the fourth quarter in the MAB area in 2003, and one in the GOM fishing area in 2002.

Bycatch of bottlenose dolphins, Risso's dolphins and pilot whales were observed during the fourth quarter of 2007 in the MAB fishing area (Table 7). The bycatch rate for bottlenose dolphins was significantly higher relative to the zero bycatch rates reported during 2002-2006 in the MAB. For pilot whales, the bycatch rate in the MAB area during 2007 was lower than 2006 as well as the five year average rate, but was within the bounds of the 95% confidence intervals for the previous five years. The bycatch rate for Risso's

dolphins during this fourth quarter of 2007 was higher in the MAB area than the zero bycatch rate for 2006, and was lower than the 2002-2006 average rate, but was within the 95% confidence intervals for the past five years. The NEC was not observed during this quarter of 2007, though Risso's dolphin takes were observed in this fishing area in 2002, 2003, and 2005. No common dolphins were observed taken in the MAB area during 2007 or 2006, though a take was observed in the fourth quarter of 2003. The SAR was not observed during the fourth quarter of 2007 or 2006, though an Atlantic spotted dolphin and an unidentified dolphin were taken in this area in 2005. In addition to the marine mammals takes described above, an unidentified dolphin and an unidentified marine mammal were observed taken in the MAB area in 2006.

There are a number of caveats and uncertainties associated with the current analysis. First, while these data have undergone an initial audit and review, they are subject to change upon further review after the end of the 2007 calendar year when all logbook data are available. Second, the delta log-normal estimator was applied to calculate bycatch rates consistent with previous estimates (e.g., Garrison 2003). This approach assumed 1) that catch rates (animals per hook) were log-normally distributed, and 2) that the number of hooks was an appropriate unit of effort. The first assumption has been evaluated for turtles; however, violations of this assumption may have resulted in biased (positive or negative) estimates of catch rate and associated variances. The second assumption has not been examined critically in previous analyses. If this assumption was not correct, for example if there were saturation effects resulting in a non-linear relationship between the number of hooks and total catch, then there potentially may have been a bias in the estimate of bycatch rates.

The interaction between longline gear and protected species is a relatively rare event and is therefore inherently variable. Historically, there have been very large inter-annual fluctuations in bycatch rates and estimates of total bycatch. Thus, any differences observed between short term observations of bycatch rates and long term averages may be simply stochastic events and are not necessarily indicative of a significant change in the interactions between the longline fishery and protected species.

### **Literature Cited**

Angliss, R.P. and D.P. DeMaster. 1998. Differentiating Serious and Non-Serious Injury of Marine Mammals Taken Incidental to Commercial Fishing Operations: Report of the Serious Injury Workshop 1-2 April 1997, Silver Spring, Maryland. NOAA Technical Memorandum NMFS-OPR-13: 48 p.

Fairfield-Walsh, C. and L.P. Garrison. 2006. Preliminary Estimates of Protected Species Bycatch Rates in the U.S. Atlantic Pelagic Longline Fishery between 1 October and 31 December 2006; SEFSC Document #PRD-06/07-1; 18 p.

Fairfield-Walsh, C. and L.P. Garrison. 2007. Estimated Bycatch of Marine Mammals and Turtles in the U.S. Atlantic Pelagic Longline Fleet During 2006. NOAA Technical Memorandum NOAA NMFS-SEFSC-560: 53p.

Garrison, L.P. 2003. Estimated Bycatch of Marine Mammals and Turtles in the U.S. Atlantic Pelagic Longline Fleet During 2001-2002. NOAA Technical Memorandum NOAA NMFS-SEFSC-515: 52 p.

**Table 1.** The number of sets and hooks observed in the U.S. Atlantic Pelagic Longline Fishery from 1 October – 31 December 2007 is shown by fishing area. Areas with missing values indicate there was no observer coverage during this time period in this area.

<b>Area</b>	<b># Sets</b>	<b># Hooks</b>
CAR	-	-
FEC	7	3,564
GOM	73	62,770
MAB	52	52,382
NCA	-	-
NEC	-	-
NED	14	11,080
SAB	7	4,240
SAR	-	-
TUN	-	-
TUS	-	-
<b>Total</b>	<b>153</b>	<b>134,036</b>

**Table 2.** Interactions with marine turtles observed during 1 October – 31 December 2007 in the U.S. Atlantic Pelagic Longline Fishery, shown by fishing area. Areas with missing values (dashes) indicate there was no observer coverage during this time period in this area.

<b>Area</b>	<b>Leatherback Takes Observed</b>	<b>Loggerhead Takes Observed</b>
CAR	-	-
FEC	0	2
GOM	11	0
MAB	8	4
NCA	-	-
NEC	-	-
NED	5	0
SAB	0	0
SAR	-	-
TUN	-	-
TUS	-	-
<b>Total</b>	<b>24</b>	<b>6</b>

**Table 3.** Interactions with marine mammals observed during 1 October – 31 December 2007 in the U.S. Atlantic Pelagic Longline Fishery, shown by fishing area. Observer comments and criteria described in Angliss and DeMaster (1998) were used to evaluate serious injury.

<b>Species</b>	<b>Area</b>	<b># Released Uninjured</b>	<b># Serious Injury</b>	<b># Dead</b>
Bottlenose Dolphin	MAB	1	0	0
Pilot Whale	MAB	2	1	0
Risso's Dolphin	MAB	1	0	0

**Table 4.** Estimated bycatch rate (Catch per unit effort (CPUE) = catch per 1000 hooks) for (A) Leatherback, and (B) Loggerhead turtles by area during 1 October – 31 December 2007 in the U.S. Atlantic Pelagic Longline Fishery. Missing values (dashes) indicate areas with no observer coverage. “Var CPUE” indicates the variance of the catch per unit effort, and “CV” indicates the coefficient of variation of the estimated rate.

**A. Leatherback Turtles**

Area	Type of Injury	Number of Turtles	Observed Sets	# Positive Sets	Mean CPUE	Var CPUE	CV
CAR	-	-	-	-	-	-	-
FEC	Alive	0	7	0	-	-	-
GOM	Alive	11	73	9	0.1831	0.0037	0.3333
MAB	Alive	8	52	8	0.1517	0.0025	0.3300
NCA	-	-	-	-	-	-	-
NEC	-	-	-	-	-	-	-
NED	Alive	5	14	5	0.4590	0.0292	0.3722
SAB	Alive	0	7	0	-	-	-
SAR	-	-	-	-	-	-	-
TUN	-	-	-	-	-	-	-
TUS	-	-	-	-	-	-	-

**Table 4 (cont.)**

**B. Loggerhead Turtles**

<b>Area</b>	<b>Type of Injury</b>	<b>Number of Turtles</b>	<b>Observed Sets</b>	<b># Positive Sets</b>	<b>Mean CPUE</b>	<b>Var CPUE</b>	<b>CV</b>
CAR	-	-	-	-	-	-	-
FEC	Alive	2	7	2	0.5692	0.1350	0.6456
GOM	Alive	0	73	0	-	-	-
MAB	Alive	4	52	3	0.0673	0.0016	0.5957
NCA	-	-	-	-	-	-	-
NEC	-	-	-	-	-	-	-
NED	Alive	0	14	0	-	-	-
SAB	Alive	0	7	0	-	-	-
SAR	-	-	-	-	-	-	-
TUN	-	-	-	-	-	-	-
TUS	-	-	-	-	-	-	-

**Table 5.** Estimated bycatch rate (Catch per unit effort (CPUE) = catch per 1000 hooks) for marine mammals by area during 1 October – 31 December 2007 in the U.S. Atlantic Pelagic Longline Fishery. Missing values (dashes) indicate areas with no observer coverage. Under “Type of Injury”, “Alive” indicates the animal was released alive uninjured, and “SI” indicates the animal was released alive with a serious injury, based on observer comments and criteria described in Angliss and DeMaster (1998). “Var CPUE” indicates the variance of the catch per unit effort, and “CV” indicates the coefficient of variation of the estimated rate.

Species	Type of Injury	Number of Animals	Area	# Positive Sets	# Observed Sets	Mean CPUE	Var CPUE	CV
Bottlenose Dolphin	Alive	1	MAB	1	52	0.0204	0.0004	1.0000
Pilot Whale	Alive	2	MAB	2	52	0.0374	0.0007	0.7009
Pilot Whale	SI	1	MAB	1	52	0.0235	0.0006	1.0000
Risso’s Dolphin	Alive	1	MAB	1	52	0.0167	0.0003	1.0000

**Table 6.** The bycatch rates are shown for (A) Leatherback turtles, and (B) Loggerhead turtles in the U.S. Atlantic longline fishery during 1 October - 31 December 2007 in comparison to 2006 and to the average rate from 2002-2006. “95% CI” indicates the estimated 95% confidence interval of the mean bycatch rate (CPUE) in each cell assuming a log-normal distribution of rates. CPUEs reflect total turtles caught including alive and dead turtles.

**A. Leatherback Turtles**

Area	2007 CPUE	2007 95% CI	2006 CPUE	2006 95% CI	2002-2006 CPUE	2002-2006 95% CI
CAR	-	-	-	-	0	-
FEC	0	-	-	-	0	-
GOM	0.1831	0.0986 – 0.3398	0.0628	0.0187 – 0.2114	0.1797	0.1247 – 0.2591
MAB	0.1517	0.0822 – 0.2799	0.0739	0.0223 – 0.2447	0.1005	0.0588 – 0.1717
NCA	-	-	-	-	-	-
NEC	0	-	0.1488	0.0304 – 0.7274	0.2174	0.1159 – 0.4077
NED <sup>1</sup>	0.4590	0.2310 – 0.9118	0.2856	0.1485 – 0.5495	0.2127	0.1178 – 0.3842
SAB	-	-	-	-	0	-
SAR	-	-	-	-	0.2385	0.1136 – 0.5005
TUN	-	-	-	-	-	-
TUS	-	-	-	-	-	-

<sup>1</sup>Fishery effort in the NED region during 2002 and 2003 (included in this table) followed an experimental design distinct from “normal” fishery operations.

**Table 6 (cont.)****B. Loggerhead Turtles**

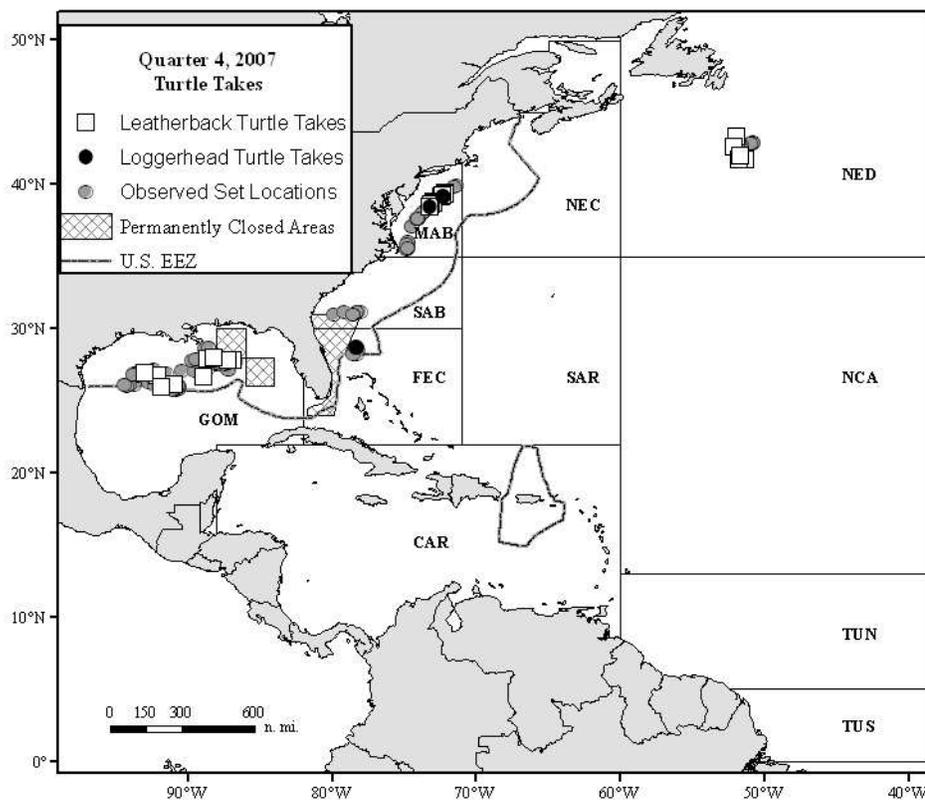
<b>Area</b>	<b>2007 CPUE</b>	<b>2007 95% CI</b>	<b>2006 CPUE</b>	<b>2006 95% CI</b>	<b>2002-2006 CPUE</b>	<b>2002-2006 95% CI</b>
CAR	-	-	-	-	0.2451	0.0501 – 1.1981
FEC	0.5692	0.1848 – 1.7533	-	-	0.4676	0.1448 – 1.5105
GOM	0	-	0	-	0.0214	0.0082 – 0.0555
MAB	0.0673	0.0236 – 0.1924	0.0556	0.0114 – 0.2716	0.1059	0.0619 – 0.1812
NCA	-	-	-	-	-	-
NEC	-	-	0	-	0.0579	0.0175 – 0.1915
NED <sup>1</sup>	0	-	0.3239	0.1767 – 0.5938	0.1944	0.1030 – 0.3668
SAB	0	-	-	-	0.4673	0.1544 – 1.4142
SAR	-	-	-	-	0.1932	0.0701 – 0.5323
TUN	-	-	-	-	-	-
TUS	-	-	-	-	-	-

<sup>1</sup>Fishery effort in the NED region during 2002 and 2003 (included in this table) followed an experimental design distinct from “normal” fishery operations.

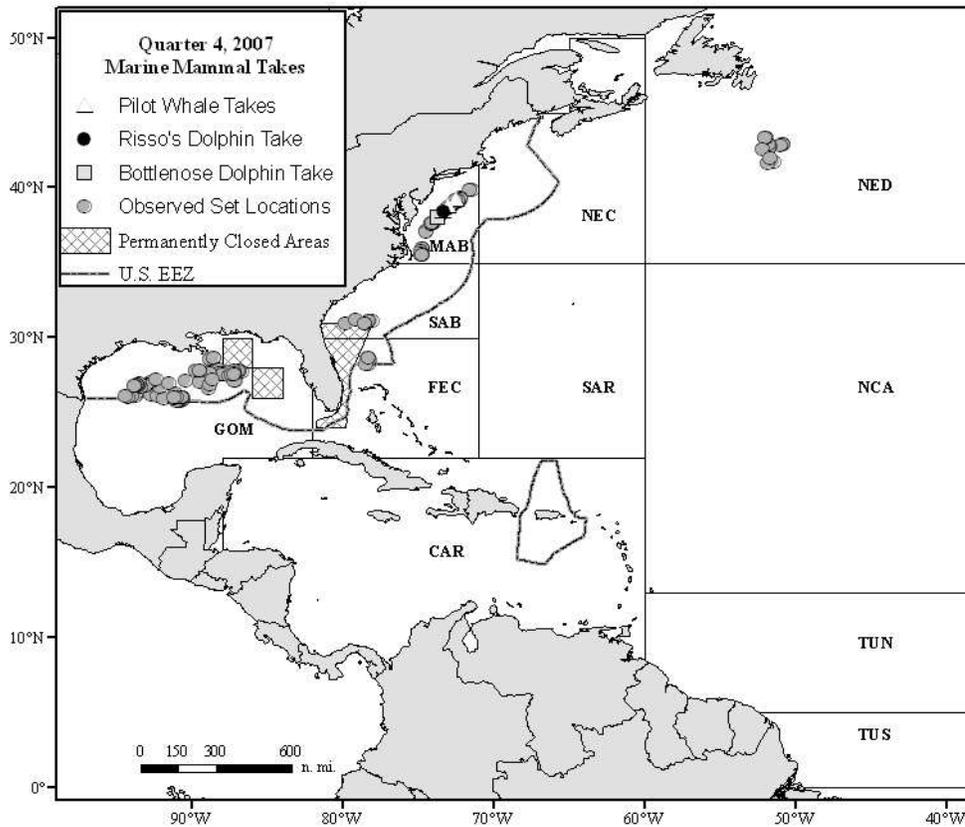
**Table 7.** The summary of bycatch rates for marine mammals in the U.S. Atlantic longline fishery during 1 October – 31 December 2007 in comparison to rates from the previous year (2006) and the average of the previous five years (2002-2006). “95% CI” indicates the estimated 95% confidence interval of the mean bycatch rate (CPUE) in each cell assuming a log-normal distribution of rates. CPUEs reflect total marine mammals caught including alive, dead, and seriously injured animals.

Species	Area	2007 CPUE	2007 95% CI	2006 CPUE	2006 95% CI	2002-2006 CPUE	2002-2006 95% CI
Atlantic Spotted Dolphin	SAR	-	-	-	-	0.0735	0.0150 – 0.3592
Bottlenose Dolphin	MAB	0.0204	0.0042 – 0.0998	0	-	0	-
Common Dolphin	MAB	0	-	0	-	0.0187	0.0038 – 0.0912
Pilot Whale	MAB	0.0608	0.0221 – 0.1670	0.2799	0.0997 – 0.7859	0.1933	0.0981 – 0.3810
Risso’s Dolphin	MAB	0.0167	0.0034 – 0.0816	0	-	0.0759	0.0388 – 0.1484
Risso’s Dolphin	NEC	-	-	0	-	0.1893	0.0952 – 0.3767
Unid. Dolphin	MAB	0	-	0.0650	0.0196 – 0.2150	0.0138	0.0041 – 0.0464
Unid. Dolphin	SAR	-	-	-	-	0.0441	0.0090 – 0.2155
Unid. Marine Mammal	MAB	0	-	0.0309	0.0063 – 0.1509	0.0066	0.0013 – 0.0321

**Figure 1.** The observed U.S. Pelagic Longline Fishery effort and marine turtle interactions during 1 October – 31 December 2007 are shown. The pelagic longline fishing areas in the North Atlantic Ocean are as follows: 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 and TUS = Tuna South. Area closures and the U.S. Exclusive Economic Zone (EEZ) are shown.



**Figure 2.** The observed U.S. Pelagic Longline Fishery effort and marine mammal interactions during 1 October – 31 December 2007 are shown. The pelagic longline fishing areas in the North Atlantic Ocean are as follows: 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 and TUS = Tuna South. Area closures and the U.S. Exclusive Economic Zone (EEZ) are shown.



**Appendix A:** Injury details and hook types for turtles captured in the U.S. Atlantic Pelagic Longline Fishery during 1 October – 31 December 2007. “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.

## 1. Leatherback Turtles

#	Species	Area	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N-N (cm)
1	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	armpit	Yes	No	No	0.0	4.5		
2	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	armpit	Yes	No	No	0.0	5.0		
3	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	armpit	No	Yes	No	0.0	5.5		
4	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	front flipper	Yes	Yes	No	0.0	5.0		
5	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	armpit	No	No	No	0.2	5.0		
6	Leatherback	NED	C-18/0	10	squid	396	Alive, injured	Released alive	armpit	No	No	No	1.5	5.5		
7	Leatherback	NED	C-18/0	10	squid or mackerel	199 or 408	Alive, uninjured	Released alive	not hooked	n/a	Yes	No	0.0	5.5		
8	Leatherback	NED	C-18/0	10	squid or mackerel	213 or 408	Alive, injured	Released alive	shoulder	Yes	No	No	0.0	4.5		
9	Leatherback	NED	C-18/0	10	squid or mackerel	199 or 400	Alive, injured	Released alive	shoulder	No	Yes	No	0.1	4.5		
10	Leatherback	NED	C-18/0	10	squid or mackerel	189 or 406	Alive, injured	Released alive	armpit	No	No	No	0.1	5.0		
11	Leatherback	MAB	C-18/0	10	squid or mackerel	203 or 369	Alive, uninjured	Released alive	not hooked	n/a	No	No	0.0	4.0		
12	Leatherback	MAB	C-18/0	10	mackerel	312.5	Alive, injured	Released alive	shoulder	No	No	No	12.0	5.0		
13	Leatherback	MAB	C-18/0	10	mackerel	298	Alive, injured	Released alive	shoulder	Yes	No	No	0.0	5.0		

**Appendix A (cont.):**

**1. Leatherback Turtles (cont.)**

#	Species	Area	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N_N (cm)
14	Leatherback	MAB	C-18/0	10	mackerel	303	Alive, injured	Released alive	shoulder	No	No	No	0.5	6.0		
15	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	mouth, side, jaw joint	Yes	No	No	0.0	5.0		
16	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	shoulder	Yes	No	No	0.0	4.0		
17	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	swallowed, hook not visible	No	No	No	1.0	4.0		
18	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	shoulder	Yes	No	No	0.0	4.0		
19	Leatherback	GOM	C-16/0	0	squid	300	Alive, injured	Released alive	shoulder	No	No	No	1.0	5.0		
20	Leatherback	GOM	C-16/0	0	squid	350	Alive, injured	Released alive	front flipper	No	No	No	0.5	4.0		
21	Leatherback	MAB	C-18/0	10	squid	225	Alive, injured	Released alive	shoulder	Yes	No	No	0.0	4.0		
22	Leatherback	MAB	C-18/0	10	squid	225	Alive, injured	Released alive	unknown external	Yes	No	No	0.0	6.0		
23	Leatherback	MAB	C-18/0	10	squid	225	Alive, uninjured	Released alive	not hooked	n/a	Yes	No	0.0	5.5		
24	Leatherback	MAB	C-18/0	10	squid	225	Alive, unknown	Released alive	not known if hooked	Yes	Yes	Unknown	5.0	6.0		

**Appendix A (cont.):**

**2. Loggerhead Turtles**

#	Species	Area	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed?	Entangled Capture?	Entangled Release?	Line Left (ft)	CL Est. (ft)	CCL (cm)	Straight N-N (cm)
1	Loggerhead	FEC	C-18/0	10	squid	300	Alive, injured	Released alive	mouth, upper, roof of mouth	Yes	No	No	0.0		63.0	
2	Loggerhead	FEC	C-18/0	10	squid	300	Alive, injured	Released alive	beak (internal)/ mouth, lower jaw	No	No	No	0.0	3.0		
3	Loggerhead	MAB	C-18/0	10	squid	300	Alive, injured	Released alive	beak internal, lower jaw	Yes	No	No	0.0		78.8	71.8
4	Loggerhead	MAB	C-18/0	10	squid or mackerel	238 or 349	Alive, injured	Released alive	swallowed, partial hook visible	No	No	No	0.0		74.0	66.2
5	Loggerhead	MAB	C-18/0	10	squid or mackerel	209.5 or 372	Alive, injured	Released alive	mouth, side, jaw joint	Yes	No	No	0.0		86.1	75.7
6	Loggerhead	MAB	C-18/0	10	squid	225	Alive, injured	Released alive	swallowed, partial hook visible	No	No	No	0.0		76.2	68.0