

# **Preliminary Estimates of Protected Species Bycatch Rates in the U.S. Atlantic Pelagic Longline Fishery From 1 April to 30 June, 2009**

Lance P. Garrison  
Lesley Stokes

Southeast Fisheries Science Center  
75 Virginia Beach Dr.  
Miami, FL 33149  
E-mail: [Lance.Garrison@noaa.gov](mailto:Lance.Garrison@noaa.gov)

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## **Background**

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 longline fishery has a documented history of incidental takes of non-target species including sea turtles and marine mammals. In June 2004, regulations were implemented to reduce interactions with sea turtles by requiring the use of “circle” hooks. The Biological Opinion also required quarterly reporting of interactions with protected species including sea turtles and marine mammals. The goal of this measure is to more closely monitor any short-term changes in interaction rates to allow more responsive management. This report meets this requirement and includes the observed fishery effort and incidental takes reported by the Pelagic Observer Program (POP) from 1 April to 30 June, 2009.

While it is desirable to 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. Therefore, the bycatch rate (i.e. catch per unit effort) is presented in this report 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 2 of 2009 is compared to that observed in quarter 1 during the three year period prior to (2002-2004) and the period after (2005-2008) implementation of regulations to determine if the current rates are unusually high or low. Bycatch rates were calculated by fishing area (Figure 1) using the delta log-normal method using hooks as the unit of effort. The analytical methods are described in detail in Garrison (2003).

## **Results and Discussion**

A total of 700 longline sets (544,518 hooks) were observed during the second quarter of 2009 (Table 1) during normal fishing effort with only circle hooks (16/0 and 18/0) recorded. The effort level in the MAB, SAR, and TUN fishing areas cannot be reported due to confidentiality

restrictions. The majority of the observed sets occurred in the GOM fishing area during enhanced coverage of the fishery with the intent to document catch of bluefin tuna (Figure 1).

In addition, a cooperative research program with NOVA Southeastern University was conducted that included longline fishing inside and outside of areas normally closed to fishing in the SAB and FEC areas. Effort levels cannot be reported since fewer than 3 vessels were observed (Table 1). Additional experimental fishing to examine the effectiveness of “weak hooks” was conducted in the GOM. The experimental fishing, and associated bycatch, is not included in estimates of bycatch rates because they are not representative of the normal fishing effort.

The locations of observed sets and turtle interactions are shown in Figure 1. During normal fishing, there were 39 observed interactions with leatherback turtles and 7 observed interactions with loggerhead turtles (Table 2). There were an additional 4 interactions with leatherback turtles in experimental fishing. One leatherback and one loggerhead were dead upon capture. All other turtles were released alive (Appendix A).

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. The release status for all turtles is summarized in Table 3. Of the 43 leatherback turtles observed captured, 33 were released with either all gear removed or with the hook and trailing line less than one-half of the carapace length. Of the captured loggerhead turtles, 6 out of 7 were released alive with all gear removed or with the hook and trailing line less than one-half the carapace length (Table 3).

The quarterly and regional bycatch rates are summarized for sea turtles in Table 4. These rates were compared with those from the same quarter/area for 2002-2004 before the implementation of the circle hook regulations and the average for same quarter/area for 2005-2008 after implementation (Table 5).

For leatherback turtles, the observed bycatch rate in during the second quarter of 2009 was lower than that observed in 2002-2004 for all strata where bycatch was observed. The bycatch rate in the MAB, GOM, and SAB areas were higher in 2009 compared to 2005-2008; however, these differences were not statistically significant. There was no observer coverage in the CAR, NCA, or NEC areas during 2009 where bycatch had been observed in prior years (Table 6a).

For loggerhead turtles, the bycatch rate during the second quarter of 2009 was generally lower than that for the 2002-2004 period for all areas except the MAB. The bycatch rate for 2009 was consistent with that for 2005-2008 in the GOM area, and higher than the 2005-2008 period for both the MAB and SAB areas. Again, these differences are not statistically significant due to high uncertainty and wide confidence limits for these estimates. The CAR, NCA, NEC areas were not observed in 2009 but did have bycatch of loggerheads in prior years (Table 6b).

The observed interactions with marine mammals in the GOM continue the pattern of recent years where occasional interactions are observed with a diverse group of species associated with the very large numbers of sets observed during the enhanced coverage for bluefin tuna research. Pantropical spotted dolphins had not previously been observed interacting with longline gear

since 2002. There were no observations of bycatch of pilot whales in the MAB, though this had been observed during the second quarter in both the 2002-2004 and 2005-2008 periods. However, a very small number of sets (<20) were observed during the second quarter of 2009, making it unlikely to observe this bycatch if it did occur. The bycatch of a bottlenose dolphin in the SAB area had also not been observed in prior years. There was no observer coverage in the NEC or NCA areas where marine mammal bycatch had been observed in previous years (Table 7, Table 8).

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 2009 calendar year. 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.

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.** Number of sets and hooks observed in the U.S. Atlantic Pelagic Longline Fishery between 1 April and 30 June, 2009 by fishing area during (A) normal and (B) experimental fishery operations. NR indicates areas where effort cannot be reported due to confidentiality considerations.

**A. Normal Fishing**

<b>Area</b>	<b>Sets</b>	<b>Hooks</b>
CAR	0	0
FEC	16	9,896
GOM	608	470,975
MAB	NR	NR
NCA	0	0
NEC	0	0
NED	0	0
SAB	45	39,596
SAR	NR	NR
TUN	NR	NR
<b>Total</b>	<b>700</b>	<b>544,518</b>

**B. Experimental Fishing**

<b>Area</b>	<b>Sets</b>	<b>Hooks</b>
CAR	0	0
FEC	NR	NR
GOM	150	96,700
MAB	0	0
NCA	0	0
NEC	0	0
NED	0	0
SAB	NR	NR
SAR	0	0
TUN	0	0
TUS	0	0
<b>Total</b>	<b>181</b>	<b>111,798</b>

**Table 2.** Total observed interactions with marine turtles in the U.S. Atlantic Pelagic Longline Fishery for sets beginning between 1 April and 30 June, 2009 by fishing area during (A) normal and (B) experimental fishing operations. Areas with missing values indicate no observer coverage during this time period.

**A. Normal Fishing**

<b>Area</b>	<b>Leatherback</b>	<b>Loggerhead</b>
CAR	-	-
FEC	1	0
GOM	36	4
MAB	1	1
NCA	-	-
NEC	-	-
NED	-	-
SAB	1	2
SAR	0	0
TUN	0	0
<b>Total</b>	<b>39</b>	<b>7</b>

**B. Experimental Fishing**

<b>Area</b>	<b>Leatherback</b>	<b>Loggerhead</b>
CAR	-	-
FEC	0	0
GOM	3	0
MAB	-	-
NCA	-	-
NEC	-	-
NED	-	-
SAB	1	0
SAR	-	-
TUN	-	-
<b>Total</b>	<b>4</b>	<b>0</b>

**Table 3.** Release status and gear removal for sea turtles captured in the U.S. Atlantic Pelagic Longline Fishery between 1 April and 30 June, 2009, including in experimental sets. Totals do not include 1 dead and 1 alive, unknown status leatherback.

<b>Release Status</b>	<b>Leatherback</b>	<b>Loggerheads</b>
Released entangled	2	0
Released with hook and line $\geq$ $\frac{1}{2}$ carapace length	7	1
Released with hook and line $<$ $\frac{1}{2}$ carapace length	21	1
Released with all gear removed	11	5

**Table 4.** Estimated bycatch rate (Catch per 1,000 hooks) for (A) Leatherback and (B) Loggerhead turtles by geographic area and between 1 April and 30 June, 2009 in the U.S. Atlantic Pelagic Longline Fishery during normal fishing operations. Missing values indicate areas with no observer coverage. CV indicates the coefficient of variation of the estimated rate. NR indicates areas where effort cannot be reported due to confidentiality considerations.

**A. Leatherback Turtles**

Area	Interaction Type	# Observed Sets	# Positive Sets	Mean CPUE	CV CPUE	95% Confidence Interval
CAR	Alive	0	-	-	-	-
FEC	Alive	16	1	0.0730	1.0000	0.0143 – 0.3733
GOM	Alive	608	33	0.0775	0.1804	0.0545 – 0.1100
GOM	Dead	608	1	0.0071	1.0000	0.0014 – 0.0361
MAB	Alive	NR	1	0.0880	1.0000	0.0172 – 0.4501
NCA	Alive	0	-	-	-	-
NEC	Alive	0	-	-	-	-
NED	Alive	0	-	-	-	-
SAB	Alive	45	1	0.0181	1.000	0.0035 – 0.0924
SAR	Alive	NR	0	0	-	-
TUN	Alive	NR	0	0	-	-

**B. Loggerhead Turtles**

Area	Interaction Type	# Observed Sets	# Positive Sets	Mean CPUE	CV CPUE	95% Confidence Interval
CAR	Alive	0	-	-	-	-
FEC	Alive	16	0	-	-	-
GOM	Alive	608	4	0.0109	0.5131	0.0043 – 0.0283
MAB	Alive	NR	1	0.0880	1.0000	0.0172 – 0.4501
NCA	Alive	0	-	-	-	-
NEC	Alive	0	-	-	-	-
NED	Alive	0	-	-	-	-
SAB	Alive	45	1	0.0193	1.000	0.0038 – 0.0988
SAB	Dead	45	1	0.0233	1.000	0.0046 – 0.1191
SAR	Alive	NR	0	-	-	-
TUN	Alive	NR	0	-	-	-

**Table 5.** Bycatch rates for (A) Leatherback turtles and (B) Loggerhead turtles in the U.S. Atlantic Pelagic Longline fishery between 1 April and 30 June, 2009 compared to the first quarter average rate from 2002-2004 and from 2005-2008. 95% CI indicates the estimated 95% confidence interval of the mean bycatch rate (CPUE) in each cell assuming a lognormal distribution of rates. These rates reflect combined alive, dead and unknown turtles.

**A. Leatherback turtles**

Area	2002-2004 CPUE	2002-2004 95% CI	2005-2008 CPUE	2005-2008 95% CI	2009 CPUE	2009 95% CI
CAR	0.0598	0.0122 – 0.2923	0.0789	0.0161 – 0.3857	-	-
FEC	0.1847	0.0517 – 0.6602	0.0382	0.0078 – 0.1871	0.0731	0.0143 – 0.3733
GOM	0.2920	0.2123 – 0.4017	0.1092	0.0873 – 0.1366	0.0816	0.0568 – 0.1172
MAB	0.3561	0.1745 – 0.7264	0.0496	0.0101 – 0.2425	0.0880	0.0172 – 0.4501
NCA	0.0384	0.0079 – 0.1877	0	-	-	-
NEC	0.0814	0.0166 – 0.3979	0	-	-	-
NED	-	-	-	-	-	-
SAB	0.0434	0.0157 – 0.1215	0	-	0.0181	0.0035 – 0.0924
SAR	0	-	-	-	0	-
TUN	-	-	-	-	0	-

**B. Loggerhead Turtles**

Area	2002-2004 CPUE	2002-2004 95% CI	2005-2008 CPUE	2005-2008 95% CI	2009 CPUE	2009 95% CI
CAR	0.0575	0.0118 – 0.2809	0	-	-	-
FEC	0.2195	0.0571 – 0.8446	0.1233	0.0506 – 0.3010	0	-
GOM	0.0582	0.0304 – 0.1111	0.0119	0.0065 – 0.0217	0.0110	0.0043 – 0.0283
MAB	0	-	0.0479	0.0098 – 0.2341	0.0880	0.0172 – 0.4501
NCA	0.2324	0.0945 – 0.5719	0.0842	0.0172 – 0.4115	-	-
NEC	1.3817	0.7107 – 2.6863	0.1408	0.0433 – 0.4579	-	-
NED	-	-	-	-	-	-
SAB	0.0714	0.0294 – 0.1735	0.0232	0.0069 – 0.0783	0.0426	0.0123 – 0.1475
SAR	0	-	-	-	0	-
TUN	-	-	-	-	0	-

**Table 6.** Interactions with marine mammals observed during 1 April – 30 June, 2009 in the U.S. Atlantic Pelagic Longline Fishery by fishing area. “Exp” indicates an experimental set. Observer comments and criteria described in Angliss and DeMaster (1998) were used to evaluate serious injury.

<b>Species</b>	<b>Region</b>	<b># Released Un-injured</b>	<b># Dead</b>	<b># Serious Injury</b>
Pantropical Spotted Dolphin	GOM	0	0	3
Bottlenose Dolphin	GOM	0	0	1
Un-identified Dolphin	GOM	1	0	0
Bottlenose Dolphin	SAB	1	0	0
Pantropical Spotted Dolphin	GOM (Exp)	1	0	0

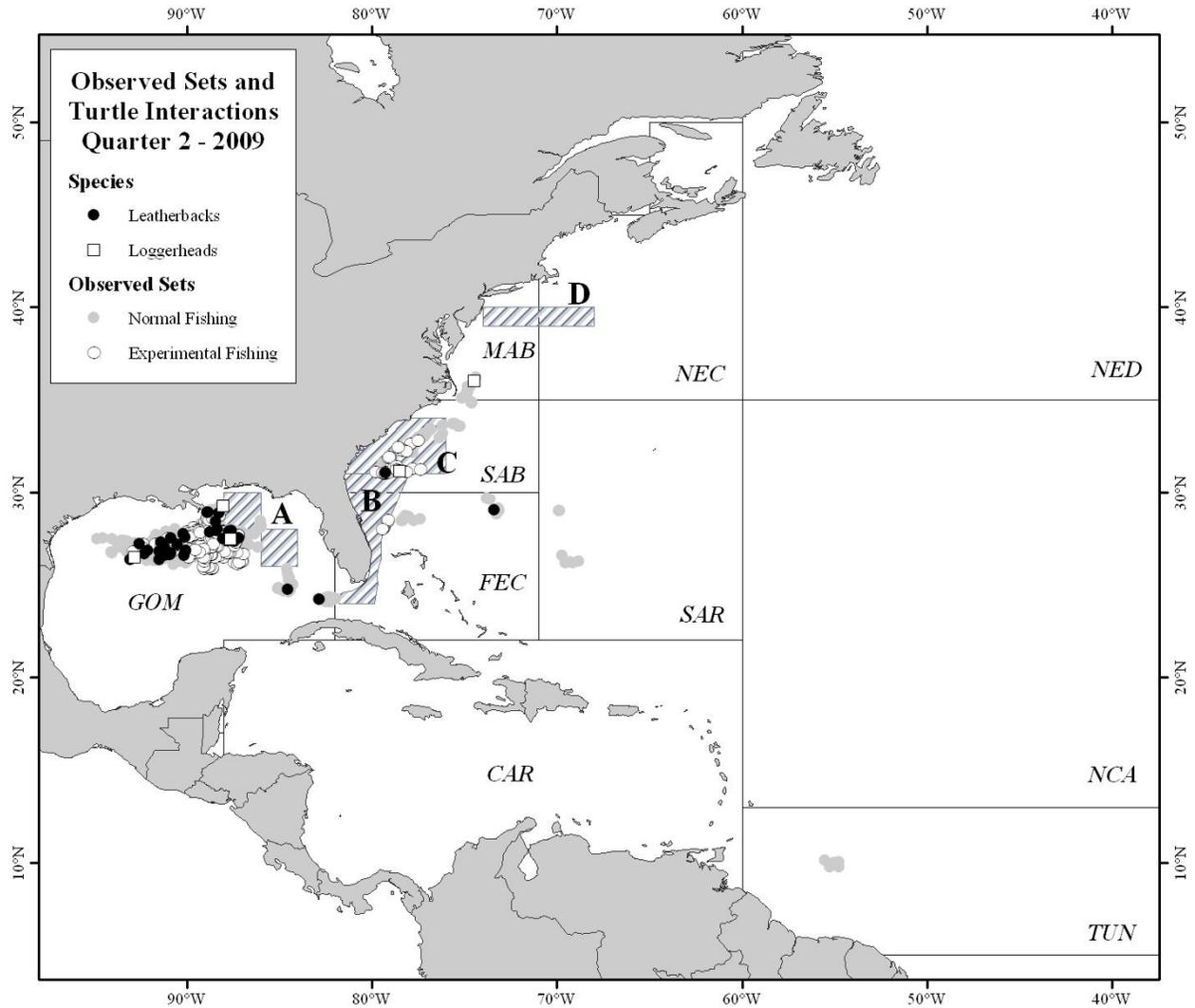
**Table 7.** Estimated bycatch rate (Catch per 1000 hooks) for marine mammals by geographic area and quarter during 1 April – 30 June, 2009 in the U.S. Atlantic Pelagic Longline Fishery during normal fishing operations. CV indicates the coefficient of variation of the estimated rate.

Species	Serious Injury?	Area	# Observed Sets	# Positive Sets	Mean CPUE	CV CPUE	95% Confidence Interval
Bottlenose Dolphin	Y	GOM	608	1	0.0039	1.000	0.0007 – 0.0198
Pantropical Spotted Dolphin	Y	GOM	608	3	0.0066	0.5808	0.0023 – 0.0191
Unidentified Dolphin	N	GOM	608	1	0.0020	1.000	0.0004 – 0.0102
Bottlenose Dolphin	N	SAB	45	1	0.0232	1.000	0.0046 – 0.1190

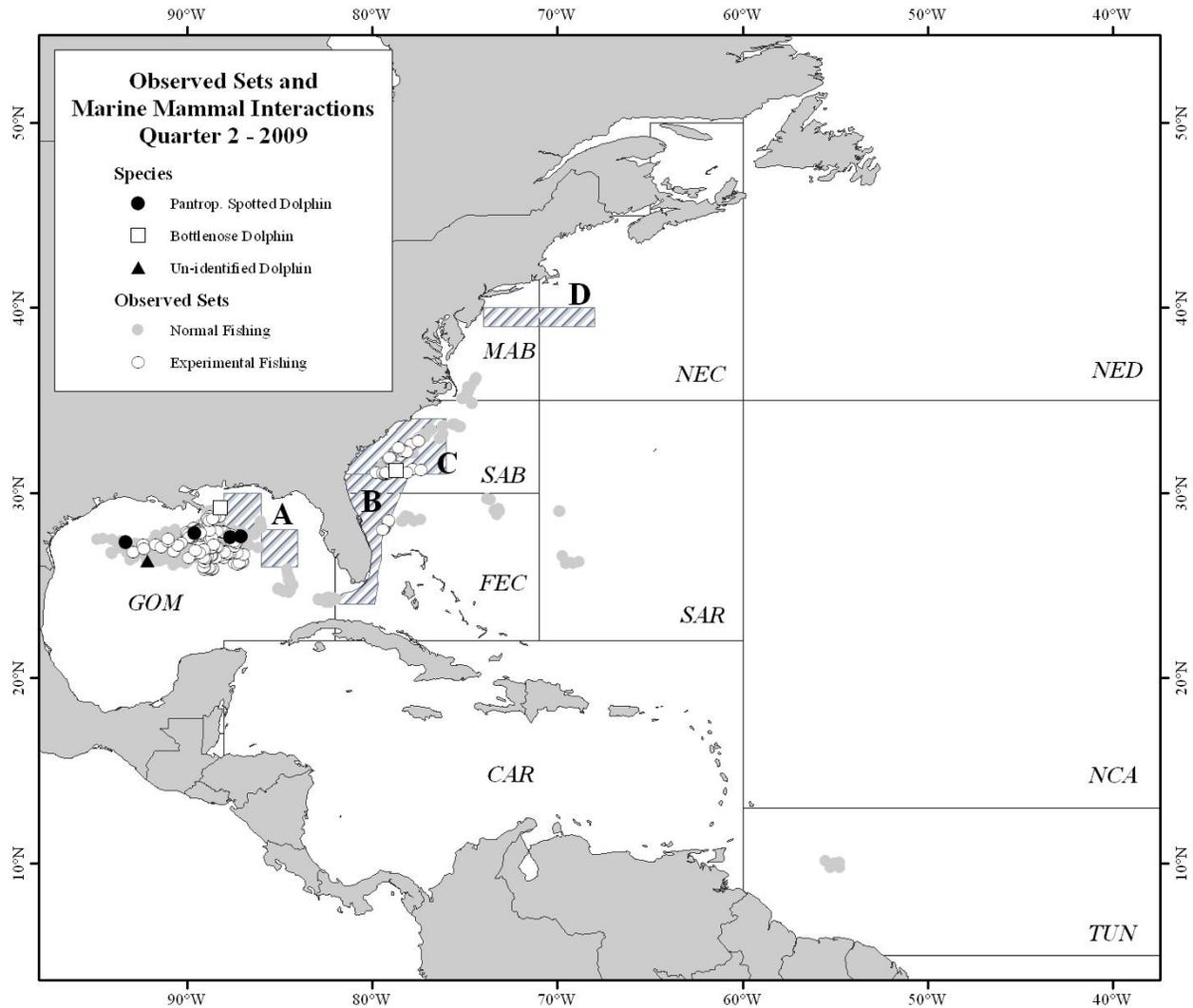
**Table 8.** Bycatch rates for marine mammals in the U.S. Atlantic Pelagic Longline Fishery between 1 April and 30 Jun, 2009 compared to the first quarter average rate from 2002-2004 and the average rate from 2005-2008. 95% CI indicates the estimated 95% confidence interval of the mean bycatch rate (CPUE) in each cell assuming a lognormal distribution of rates. CPUEs reflect total marine mammals caught including alive, dead, and seriously injured animals.

Species	Area	2002-2004 CPUE	2002-2004 95% CI	2005-2008 CPUE	2005-2008 95% CI	2009 CPUE	2009 95% CI
Risso's Dolphin	GOM	0	-	0.0026	0.0008 – 0.0090	0	-
Killer Whale	GOM	0	-	0.0022	0.0005 – 0.0110	0	-
Sperm Whale	GOM	0	-	0.0010	0.0002 – 0.0051	0	-
Cuvier's Beaked Whale	GOM	0	-	0.0010	0.0002 – 0.0048	0	-
Unidentified Dolphin	GOM	0	-	0.0019	0.0006 – 0.0064	0.0020	0.0004 – 0.0102
Bottlenose Dolphin	GOM	0	-	0.0012	0.0002 – 0.0059	0.0039	0.0007 – 0.0198
Pilot Whale	GOM	0	-	0.0009	0.0002 – 0.0044	0	-
Pantropical Spotted Dolphin	GOM	0	-	0	-	0.0066	0.0023 – 0.0191
Risso's Dolphin	NEC	0.1389	0.0284 – 0.6789	0	-	-	-
Minke Whale	NEC	0.0882	0.0180 – 0.4311	0	-	-	-
Bottlenose Dolphin	NCA	0.0384	0.0079 – 0.1877	0	-	-	-
Atlantic Spotted Dolphin	MAB	0.0417	0.0085 – 0.2037	0	-	0	-
Pilot Whale	MAB	0.0338	0.0069 – 0.1652	0.1114	0.0339 – 0.3669	0	-
Bottlenose Dolphin	SAB	0	-	0	-	0.0232	0.0046 – 0.1190

**Figure 1.** Observed Pelagic Longline effort and turtle interactions between 1 April and 30 June, 2009. Pelagic longline fishing areas include: 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. Year-round closed areas in the DeSoto Canyon (A) and the Florida East Coast (B) are indicated as are seasonal closed areas in the SAB (C) and the mid-Atlantic (D).



**Figure 2.** Observed Pelagic Longline effort and marine mammal interactions between 1 April and 30 June, 2009. Pelagic longline fishing areas include: 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. Year-round closed areas in the DeSoto Canyon (A) and the Florida East Coast (B) are indicated as are seasonal closed areas in the SAB (C) and the mid-Atlantic (D).



**Appendix A:** Injury details and hook type for turtles captured in the U.S. Atlantic Pelagic Longline Fishery for sets between 1 April and 30 June 2009. GOM-Exp and SAB-Exp indicate turtles taken in experimental sets in the GOM and SAB areas.

**A1. Leatherback Turtles**

#	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	GOM	C-16/0	0	squid	117	Alive, injured	Released alive	mouth, side, other	No	No	No	2.00	4.0		
2	GOM	C-16/0	0	squid	225	Alive, injured	Released alive	front flipper	Yes	Yes	No	0.00	4.5		
3	GOM	C-16/0	0	squid	225	Alive, injured	Released alive	armpit	No	No	No	20.00	5.0		
4	GOM	C-16/0	0	squid	225	Alive, injured	Released alive	front flipper	No	No	No	6.00	5.0		
5	GOM	C-16/0	0	squid	225	Alive, injured	Released alive	front flipper	Yes	No	No	0.00	5.0		
6	GOM	C-16/0	0	squid	Unknown	Alive, uninjured	Released alive	not hooked	N/a	Yes	No	0.00	5.0		
7	GOM	C-16/0	0	squid	119	Alive, injured	Released alive	mouth, side	No	No	No	0.50	4.0		
8	GOM	C-16/0	0	squid	119	Alive, injured	Released alive	mouth, side	No	No	No	2.00	5.0		
9	GOM	C-16/0	0	squid	114	Alive, injured	Released alive	armpit	No	No	No	4.00	4.0		
10	GOM	C-16/0	0	squid	117	Alive, unknown	Released alive	not known if hooked	Unknown	Unknown	Unknown	4.00	Unknown		
11	GOM	C-18/0	10	mackerel	194	Alive, injured	Released alive	not hooked	N/a	Yes	No	0.00	5.0		

**Table A1 cont.**

#	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)
12	GOM	C-18/0	10	mackerel	194	Fresh dead	Discarded unmarked dead/unresponsive carcass	not hooked	N/a	Yes	No	0.00	5.0		
13	GOM	C-18/0	10	mackerel	194	Alive, injured	Released alive	shoulder	No	No	No	0.00	5.0		
14	GOM	C-16/0	0	squid	113	Alive, uninjured	Released alive	mouth, side, other	Yes	No	No	0.00	5.0		
15	GOM	C-16/0	0	squid	113	Alive, injured	Released alive	not hooked	N/a	Yes	Yes	3.00	5.0		
16	SAB	C-18/0	10	mackerel	249	Alive, injured	Released alive	unknown, external	No	No	No	10.00	5.0		
17	MAB	C-16/0	0	squid	185	Alive, injured	Released alive	shoulder	No	No	No	6.00	4.0		
18	FEC	C-18/0	10	squid	212	Alive, injured	Released alive	armpit	No	No	No	1.00	4.0		
19	GOM	C-16/0	0	squid	202	Alive, injured	Released alive	shoulder	No	No	No	1.00	4.5		
20	GOM	C-16/0	0	squid	140	Alive, injured	Released alive	shoulder	No	No	No	0.00	4.0		
21	GOM	C-16/0	0	squid	140	Alive, injured	Released alive	shoulder	No	No	No	0.10	4.0		
22	GOM	C-16/0	0	squid	135	Alive, injured	Released alive	shoulder	No	No	No	4.00	4.0		
23	GOM	C-16/0	0	squid	225	Alive, injured	Released alive	front flipper	Yes	No	No	0.00	4.5		
24	GOM	C-16/0	0	squid	180	Alive, injured	Released alive	carapace	No	No	No	0.10	4.5		

**Table A1 cont.**

#	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)
25	GOM	C-16/0	0	squid	153	Alive, injured	Released alive	armpit	No	No	No	0.50	4.0		
26	GOM	C-16/0	0	squid	149	Alive, injured	Released alive	shoulder	No	No	No	1.50	4.0		
27	GOM	C-16/0	0	squid	144	Alive, injured	Released alive	front flipper	No	No	No	2.00	5.0		
28	GOM	C-16/0	0	squid	149	Alive, injured	Released alive	mouth, side	No	No	No	0.00	4.0		
29	GOM	C-16/0	0	squid	140	Alive, injured	Released alive	mouth, side	No	No	No	0.30	6.0		
30	GOM	C-16/0	0	squid	135	Alive, injured	Released alive	shoulder	No	No	No	0.50	5.0		
31	GOM	C-16/0	0	mackerel	360	Alive, unknown	Released alive	not known if hooked	Yes	Yes	No	0.00	3.0		
32	GOM	C-16/0	0	mackerel	320	Alive, injured	Released alive	front flipper	Yes	Yes	No	0.00	5.0		
33	GOM	C-16/0	0	squid	225	Alive, injured	Released alive	armpit	No	No	No	0.00	5.0		
34	GOM	C-16/0	0	squid	225	Alive, injured	Released alive	armpit	Yes	No	No	0.00	4.5		
35	GOM	C-16/0	0	squid	140	Alive, injured	Released alive	shoulder	No	No	No	0.50	5.0		
36	GOM	C-16/0	0	squid	140	Alive, injured	Released alive	flipper/shoulder/armpit	Yes	No	No	0.00	4.0		

**Table A1 cont.**

#	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)
37	GOM	C-16/0	0	squid	113	Alive, injured	Released alive	armpit	No	No	No	0.00	3.0		
38	GOM	C-16/0	0	squid	135	Alive, injured	Released alive	neck	No	No	No	0.10	4.0		
39	GOM	C-16/0	0	squid	203	Alive, injured	Released alive	shoulder	No	No	No	0.30	4.5		
40	SAB-Exp	C-18/0	0	mackerel	225	Alive, injured	Released alive	shoulder	Yes	No	No	0.00	4.0		
41	GOM-Exp	C-16/0	0	squid	158	Alive, injured	Released alive	shoulder	No	No	No	0.20	5.0		
42	GOM-Exp	C-16/0	0	squid	167	Alive, injured	Released alive	armpit	No	No	No	0.00	5.0		
43	GOM-Exp	C-16/0	0	sardine	63	Alive, injured	Released alive	shoulder	No	Yes	Yes	7.00	5.0		

## A2. Loggerhead Turtles

#	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	GOM	C-18/0	10	mackerel	150	Alive, injured	Released alive	mouth, lower jaw, other	Yes	No	No	0.00			66.5
2	GOM	C-16/0	0	squid	119	Alive, injured	Released alive	mouth, side	No	No	No	1.00	2.0		
3	GOM	C-16/0	0	squid	189	Alive, injured	Released alive	mouth, lower jaw, other	No	No	No	0.30	3.0		
4	SAB	C-16/0	0	squid	146	Alive, injured	Released alive	mouth, lower jaw, other	Yes	No	No	0.00		66	62.5
5	SAB	C-16/0	0	squid	176	Fresh dead	Discarded marked dead/unresponsive carcass	tongue	Yes	No	No	0.00		74.3	67.8
6	MAB	C-16/0	0	squid	185	Alive, injured	Released alive	mouth, side, other	Yes	No	No	0.00		72.5	67.4
7	GOM	C-16/0	0	sardine	68	Alive, uninjured	Released alive	not hooked	N/a	Yes	No	0.00	2.0		