

Dead discards of Atlantic sharpnose sharks in the shark bottom longline fishery

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Dead discards of Atlantic sharpnose sharks in the shark bottom longline fishery

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Introduction

Currently 220 U.S. fishers are permitted to target sharks (excluding dogfish) in the Atlantic Ocean and Gulf of Mexico, and an additional 261 fishers are permitted to land sharks incidentally. Amendments to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan based on stock assessments have eliminated the major directed shark fishery in the U.S. Atlantic (NMFS 2007). These amendments implemented a shark research fishery, which allows NMFS to select a limited number of commercial shark vessels on an annual basis to collect life history data and catch data for future stock assessments. Since 2008, only commercial shark fishers participating in the shark research fishery are allowed to land sandbar sharks, *Carcharhinus plumbeus*, and must carry an observer on 100% of all trips (compared to a coverage level of 4-6% outside the research fishery). Outside the research fishery, fishers are permitted to land 33 non-sandbar large coastal sharks (including Atlantic sharpnose shark, *Carcharhinus limbatus*, bull shark, *Carcharhinus leucas*, lemon shark, *Negaprion brevirostris*, nurse shark, *Ginglymostoma cirratum*, silky shark, *Carcharhinus falciformis*, spinner shark, *Carcharhinus brevipinna*, tiger shark, *Galeocerdo cuvier*, great hammerhead shark, *Sphyrna mokarran*, and scalloped hammerhead shark, *Sphyrna lewini*).

Bottom longline landings and fishing effort of commercial vessels operating in the Gulf of Mexico and south Atlantic Ocean are reported to the National Marine Fisheries Service (NMFS) through the Coastal Fisheries Logbook Program (CFLP, conducted by the NMFS Southeast Fisheries Science Center). The program collects landings and effort data by fishing trip from vessels that are federally permitted to participate in a number of fisheries managed by the National Marine Fisheries Service and Fishery Management Councils. The coastal logbook program began in 1990 with the objective of a complete census of coastal fisheries permitted vessel activity, with the exception of Florida, where a 20% sample of vessels was selected to report. Beginning in 1993, reporting in Florida was increased to include all vessels permitted for Federally managed coastal fisheries.

Commercial shark longline vessels operating in the Gulf of Mexico and south Atlantic Ocean are also required to carry fishery observers to monitor catch and bycatch. Fishery observers are trained in fishery and biological data collection, biological sampling, and teleost and elasmobranch species identification. Observers are required to record and measure all species captured, their disposition (e.g. kept, discarded dead, used for bait, etc.) and effort (e.g. number of hooks, gear characteristics, set and haul times).

Methods

Observer reported Atlantic shark dead discard rates from 2006-2011, along with self reported commercial fishing effort data, were used to calculate Atlantic sharpnose shark discards from the shark bottom longline fishery in the Gulf of Mexico. Fishing effort data were available from the coastal logbook program for the years 1993-2011. Beginning in 1993 all commercial vessels with Federal fishing permits (other than those for swordfish, tunas, and shrimp) were required to report landings and effort to the coastal logbook program.

Available coastal logbook data were filtered to include only bottom longline data and to remove records missing effort information (number of sets, number of hooks per set). Data reported from individual trips with fishing effort in both the South Atlantic and Gulf of Mexico were excluded from the analyses because fishing effort cannot be reliably apportioned within single trips. Coastal logbook data were additionally filtered to remove likely erroneous records; for example, data from trips that reported fishing more than 24 sets per 24 hours. Those data that exceeded the 99.5 percentile of the data for any variable used to calculate effort (number of sets, number of hooks) were also excluded. Such outliers in the data set usually resulted from data entry errors. After data filtering, effort data from only those trips that targeted sharks (defined as trips with reported landings of 2/3 shark by weight) were included in the analysis. Effort was defined as hooks fished because hook hours fished could not be reliably calculated from the coastal logbook data.

Total discards were calculated as the product of observer reported yearly mean dead discard rates, number saved for bait (by hooks fished) and the yearly total fishing effort (bottom longline hooks fished) reported to the coastal logbook program. Discard rate by hook fished was not available prior to 2006. To calculate discards for the years 1993-2005 the mean dead discard rate across the years 2006-2011 was used. Yearly total dead discards prior to 2006 were calculated as the product of the weighted mean dead discard rate and the year-specific shark targeted effort.

Results and Discussion

Calculated Gulf of Mexico Atlantic sharpnose shark discards (in numbers of fish) from the commercial bottom longline fishery are provided in Table 1. Also included are dead discard and sharks saved for bait rates and total effort (hooks fished) by area. GOM=Gulf of Mexico and SA=South Atlantic.

Table 1. Yearly calculated discards of Atlantic sharpnose sharks from shark bottom longline commercial fishing vessels by area. Discards are reported as number of fish.

All areas

Year	Total number of hooks	Per hook discard dead	Total discard dead	Per hook used for bait	Total used for bait	TOTAL MORTALITY (numbers)
1993	868,055	0.004	3,867.3	0.0055	4,776.1	8,643.5
1994	1,520,555	0.004	6,774.4	0.0055	8,366.2	15,140.6
1995	2,892,172	0.004	12,885.2	0.0055	15,913.0	28,798.2
1996	2,875,428	0.004	12,810.6	0.0055	15,820.9	28,631.4
1997	1,931,808	0.004	8,606.6	0.0055	10,629.0	19,235.6
1998	1,513,909	0.004	6,744.7	0.0055	8,329.7	15,074.4
1999	1,567,591	0.004	6,983.9	0.0055	8,625.0	15,608.9
2000	1,409,424	0.004	6,279.2	0.0055	7,754.8	14,034.0
2001	1,324,977	0.004	5,903.0	0.0055	7,290.2	13,193.2
2002	1,508,771	0.004	6,721.9	0.0055	8,301.4	15,023.3
2003	1,651,092	0.004	7,355.9	0.0055	9,084.5	16,440.4

2						
0						
0						
4	1,358,218	0.004	6,051.1	0.0055	7,473.0	13,524.2
2						
0						
0						
5	1,457,755	0.004	6,494.6	0.0055	8,020.7	14,515.3
2						
0						
0						
6	1,579,732	0.001	1,898.1	0.0032	5,107.7	7,005.8
2						
0						
0						
7	495,758	0.003	1,340.8	0.0107	5,323.3	6,664.1
2						
0						
0						
8	281,163	0.002	580.9	0.0129	3,628.6	4,209.5
2						
0						
0						
9	324,696	0.005	1,600.2	0.0004	116.9	1,717.1
2						
0						
1						
0	256,054	0.013	3,273.0	0.0034	879.9	4,152.9
2						
0						
1						
1	232,494	0.003	708.7	0.0023	543.9	1,252.6

Gulf of Mexico

Y e a r	Total number of hooks	Per hook discard dead	Total discard dead	Per hook used for bait	Total used for bait	TOTAL MORTALITY (numbers)
1 9 9	705,715	0.0054	3,809.6	0.0048	3,385.5	7,195.1
1 9 9	1,161,265	0.0054	6,268.8	0.0048	5,570.9	11,839.7
5	2,124,050	0.0054	11,466.1	0.0048	10,189.6	21,655.7
1	2,581,825	0.0054	13,937.2	0.0048	12,385.7	26,323.0

9						
9						
6						
1						
9						
9						
7	1,078,050	0.0054	5,819.5	0.0048	5,171.7	10,991.2
1						
9						
9						
8	1,120,496	0.0054	6,048.7	0.0048	5,375.3	11,424.0
1						
9						
9						
9	1,108,904	0.0054	5,986.1	0.0048	5,319.7	11,305.8
2						
0						
0						
0	989,790	0.0054	5,343.1	0.0048	4,748.3	10,091.4
2						
0						
0						
1	926,817	0.0054	5,003.2	0.0048	4,446.2	9,449.4
2						
0						
0						
2	1,076,109	0.0054	5,809.1	0.0048	5,162.4	10,971.5
2						
0						
0						
3	1,065,727	0.0054	5,753.0	0.0048	5,112.6	10,865.6
2						
0						
0						
4	771,330	0.0054	4,163.8	0.0048	3,700.3	7,864.1
2						
0						
0						
5	1,002,010	0.0054	5,409.1	0.0048	4,806.9	10,216.0
2						
0						
0						
6	1,193,336	0.0016	1,932.4	0.0028	3,400.2	5,332.6
2						
0						
0						
7	288,210	0.0042	1,199.2	0.0071	2,040.2	3,239.4
2						
0						
0						
8	160,520	0.0023	366.9	0.0117	1,879.5	2,246.4
2						
0	64,100	0.0037	235.1	0.0004	27.7	262.8

0						
9						
2						
0						
1						
0	15,380	0.0185	284.4	0.0040	60.9	345.3
2						
0						
1						
1	47,987	0.0022	104.0	0.0028	132.1	236.1

South Atlantic

Year	Total number of hooks	Per hook discard dead	Total discard dead	Per hook used for bait	Total used for bait	TOTAL MORTALITY (numbers)
1993	359,290	0.0041	1,467.6	0.0065	2,327.3	3,794.9
1994	768,122	0.0041	3,137.5	0.0065	4,975.6	8,113.0
1995	293,603	0.0041	1,199.3	0.0065	1,901.8	3,101.1
1996	853,758	0.0041	3,487.3	0.0065	5,530.3	9,017.5
1997	393,413	0.0041	1,606.9	0.0065	2,548.4	4,155.3
1998	458,687	0.0041	1,873.6	0.0065	2,971.2	4,844.7
1999	419,634	0.0041	1,714.0	0.0065	2,718.2	4,432.2
2000						
2000	398,160	0.0041	1,626.3	0.0065	2,579.1	4,205.4
2000						
2000						
1	432,662	0.0041	1,767.3	0.0065	2,802.6	4,569.9

2						
0						
0						
2	585,365	0.0041	2,391.0	0.0065	3,791.7	6,182.7
2						
0						
0						
3	586,888	0.0041	2,397.2	0.0065	3,801.6	6,198.8
2						
0						
0						
4	455,745	0.0041	1,861.5	0.0065	2,952.1	4,813.7
2						
0						
0						
5	386,396	0.0041	1,578.3	0.0065	2,502.9	4,081.2
2						
0						
0						
6	386,212	0.0002	84.8	0.0041	1,597.3	1,682.1
2						
0						
0						
7	207,548	0.0013	264.4	0.0143	2,974.6	3,239.0
2						
0						
0						
8	120,643	0.0016	192.6	0.0155	1,865.9	2,058.5
2						
0						
0						
9	260,596	0.0113	2,939.2	0.0000	0.0	2,939.2
2						
0						
1						
0	240,674	0.0065	1,569.4	0.0029	688.3	2,257.7
2						
0						
1						
1	184,507	0.0036	667.6	0.0021	382.2	1,049.8

Figure 1. Coastal logbook statistical areas.

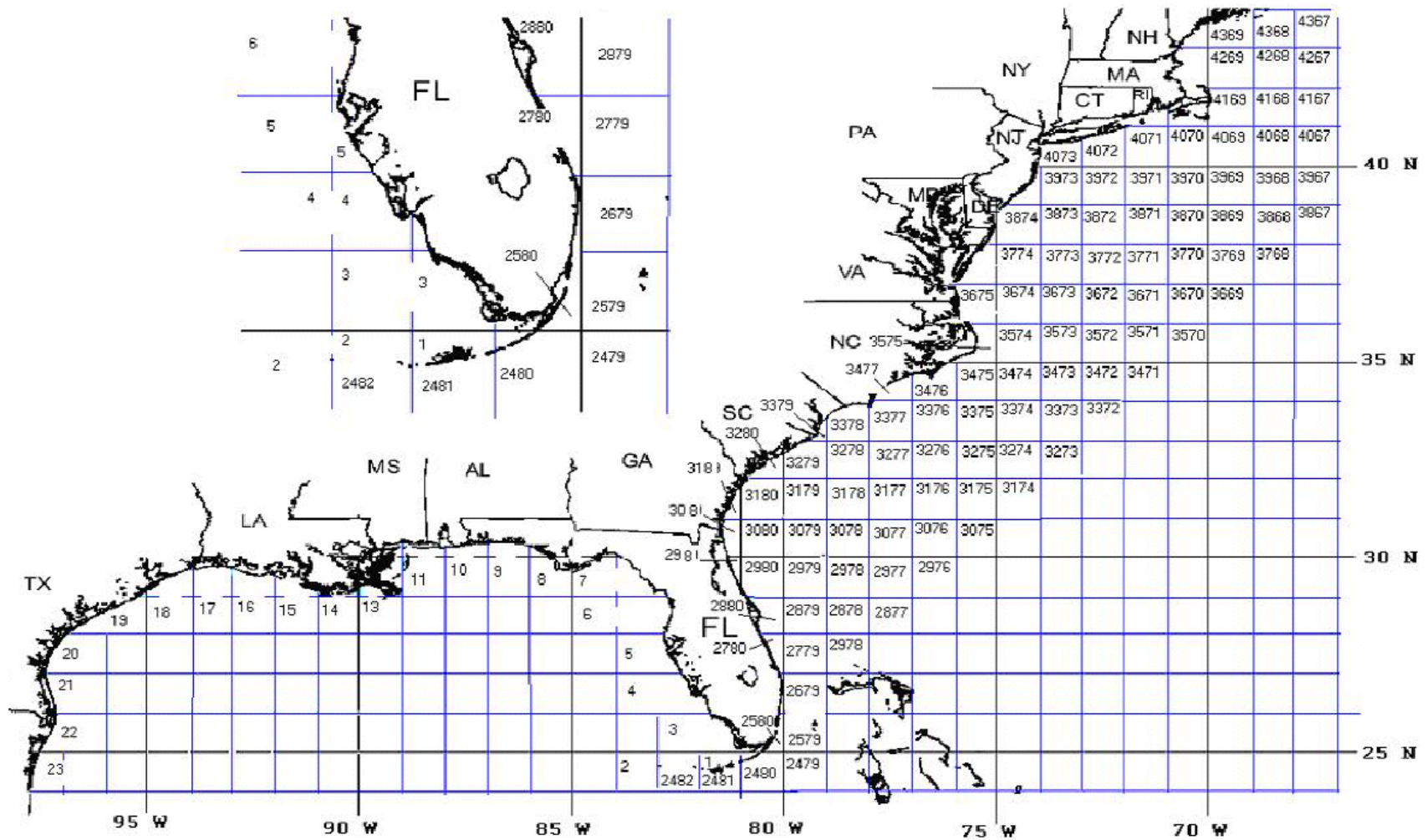


Figure 2. Distribution of observed fishing effort in the directed shark bottom longline fishery 1994-2010.

