The Directed Shark Gillnet Fishery: Catch and Bycatch, 2003

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Introduction

Observations of the east Florida-Georgia shark drift gillnet fishery have been previously conducted and reports of the catch and bycatch from these observations were developed (Carlson and Baremore, 2002a, b and references therein). The Atlantic Large Whale Take Reduction Plan and The Biological Opinion issued under Section 7 of the Endangered Species Act mandate that, with respect to the southeast shark gillnet fishery, 100% observer coverage is required during the Right Whale Calving Season (15 Nov-1 Apr) for vessels operating from West Palm Beach, FL to Sebastian Inlet, FL. Outside the right whale calving season (1 Apr-14 Nov), an interim final rule published in March 2001 (March 30, 2001; 66 FR 17370) to the Fishery Management Plan for Highly Migratory Species (NMFS, 1999) established a level of observer coverage equal to that which would attain a sample size needed to provide estimates of sea turtle or marine mammal interactions with an expected coefficient of variation of 0.3. The objectives of this report are to document protected species bycatch and catch and bycatch in the southeast US coastal directed shark gillnet fishery for the calendar year, 2003.

Methods

Observer protocol

During the 100% observer requirement period, observers were deployed in ports where the vessels are currently active. Observers board all vessels for all trips during this time period. Outside the 100% requirement, vessels were randomly selected from a universe of 5 vessels for a series of 2-week coverage periods. Selection letters requiring observer coverage were issued by the SEFSC observer coordinator beginning on 1 April 2003. After the fisher made initial contact with the observer coordinator, an observer was deployed to the port where the vessel was currently active. The last assessment of sample size found that a 33.8% level of coverage is required to attain a sample size needed to provide estimates of a sea turtle or marine mammal interaction with an expected coefficient of variation of 0.3 (Carlson and Baremore, 2002b).

Methods as described by Carlson and Lee (1999) were employed. Observations were made as the net was hauled aboard. The observer remained about 3-8 m forward of the net reel in a position with an unobstructed view and recorded species, numbers and lengths (±30 cm) of sharks and other species caught as they were suspended in the net just after passing over the power roller. Weights (in kg) were estimated from these estimated lengths using length-weight relationships provided Kohler et al. (1998) and Carlson (unpublished data). When species identification was questionable, the crew stopped the reel so that the observer could examine the animal(s) for positive identification. Disposition of each species brought onboard was recorded as kept, discarded alive, or discarded dead. When time permitted after the haulback was complete, observers randomly measured sharks when the vessel was returning to port. Fork length (FL, measured on a straight line), and sex, were determined for each shark. Biological samples (e.g. vertebrae, reproductive organs, stomach) were removed and placed on ice after collection. Data were submitted to the NMFS/SEFSC Sustainable Fisheries Division on a weekly basis. The data were entered by SEFSC staff, examined by NMFS/SEFSC Sustainable Fisheries Division staff, and reviewed with Johnson Controls observer contract staff to resolve any questions.

Results and Discussion

Strikenet Fishery

During the 2003 period of observer coverage, strikenet vessels carried nets ranging from 182.4-1368.0 m long and 21.3-30.4 m deep. Stretched mesh sizes ranged from 22.8-25.4 cm. The most frequently used mesh size was 23.5 cm. Setting of the gear averaged 0.1 hrs (±0.01 S.D.) and was made in sea water depths averaging 16.6 m (±5.6 S.D). Haulback averaged 1.2 hrs (±1.2 S.D.). The entire strikenetting process (time net was first set minus time haulback was completed) averaged 1.9 hrs (±1.5 S.D.).

A total of 41 strikenet sets were observed on 3 vessels from 1/13/03-9/27/03. However, 51 additional trips were made when the observer departed with the vessel but no strike was made. Reasons for not striking for sharks included the inability to locate the school, sharks located in state waters, and poor weather conditions. The distribution of observed strikenet fishing effort is illustrated in Figure 1.

Observed strikenet catches

Observed catch in the strikenet fishery consisted of 6 species of sharks (96.7% of total number caught) and 7 species of teleosts and rays (3.3% of total number caught) (Table 1). No marine mammals or sea turtles were observed caught. The blacktip shark, *Carcharhinus limbatus*, made up 94.7% of the number of sharks caught. Bycatch included crevalle jack, *Caranx hippos*, red drum, *Sciaenops ocellatus*, and great barracuda, *Sphyraena barracuda*.

Driftnet fishery

A total of 24 driftnet sets were observed on 5 vessels from 2/27/03-9/27/03. Driftnet vessels carried nets ranging in length from 547.2-2736 m; depths from 7.6-13.7 m and stretched mesh sizes from 12.7-22.9 cm. The most frequently used mesh size was 12.7 cm. For all observed driftnet sets, set duration averaged 0.4 hrs (±0.2 S.D.). Sets were made in sea water averaging 15.4 m (±7.7 S.D.) deep. Haulback and processing of the catch averaged 3.4 hrs (±1.6 S.D.). Average soak time for the driftnet (time net was first set minus time haulback began) was 10.8 hrs (±6.8 S.D.).

Observed driftnet catches

The observed driftnet catch consisted of 9 species of sharks, 23 species of teleosts, 2 species of rays, and 1 species of marine mammal. Total observed catch composition (percent of numbers caught) were 79.0% sharks, 20.7% teleosts, 0.3% rays, and 0.03% protected species (i.e marine mammals, sea turtles, sawfish). Three species of sharks made up 92.9% (by number) of the observed shark catch (Table 2). These species were the Atlantic sharpnose shark, *Rhizoprionodon terraenovae,* blacknose shark, *Carcharhinus acronotus*, and finetooth shark, *Carcharhinus isodon*. By weight, the shark catch was made up of Atlantic sharpnose shark, (55.3%), blacknose shark (17.1%), blacktip shark (10.7%), and finetooth shark (10.3%).

Four species of teleosts and rays made up 90.8% by number of the overall non-shark species. These species were little tunny, *Euthynnus alletteratus*, (45.6%); king mackerel, *Scomberomorus cavalla* (23.3%); great barracuda (11.8%); and red drum (10.2%) (Table 3).

For incidental driftnet catch species, the highest proportion discarded dead (with observed catch greater than 10 specimens) was Atlantic sailfish, *Istiophorus platypterus*

(100.0%), king mackerel (78.3%), and cobia, *Rachycentron canadum* (28.7%) (Table 3). Red drum had the highest discard proportion alive (98.1%).

Av*erage size*

When time permitted after the haulback was complete, observers randomly measured sharks (cm fork length) when the vessel was returning to port. Observers measured 4.0% of the total catch of sharks. By species, 95.2% of spinner shark, 50.0% of great hammerhead shark, 12.9% of scalloped hammerhead shark, 3.5% of blacknose, 5.6% of blacktip shark, and 2.6% of Atlantic sharpnose shark were measured. Average sizes based on these measurements are found in Table 4.

Protected species interactions

Interactions with protected species (3 individuals) occurred in 3 separate sets for vessels fishing with drift gillnets (Table 5). The species of marine mammal incidentally taken was bottlenose dolphin, *Tursiops truncatus*. One interaction was a mortality while the other fell out of the net before an analysis could be made. The third interaction was with a smalltooth sawfish, *Pristis pectinata*, a species recently added to the Endangered Species List. The sawfish was reported released alive.

References

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Table 1. Total strikenet shark catch and bycatch by species and species disposition in order of decreasing abundance for all observed trips, 2003.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
Carcharhinus limbatus	Blacktip shark	6401	97.5	0.6	1.9
Carcharhinus acronotus	Blacknose shark	343	100.0	0.0	0.0
Caranx hippos	Crevalle jack	215	96.2	3.3	0.5
Sciaenops ocellatus	Red drum	18	0	100.0	0.0
Sphyraena barracuda	Great barracuda	13	92.3	0.0	7.7
Manta birostris	Manta ray	10	0.0	100.0	0.0
Carcharhinus leucas	Bull shark	8	75.0	12.5	12.5
Trachinotus falcatus	Permit	8	50.0	37.5	12.5
Ginglymostoma cirratum	Nurse	1	0.0	100.0	0.0
Carcharhinus brevipinna	Spinner shark	1	100.0	0.0	0.0
Carcharhinus isodon	Finetooth shark	1	100.0	0.0	0.0
Rachycentron canadum	Cobia	1	100.0	0.0	0.0
Sarda sarda	Atlantic bonito	1	0.0	0.0	100.0

Table 2. Total directed shark catch by species and species disposition in order of decreasing abundance for all observed trips, 2003.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
Rhizoprionodon terraenovae	Atlantic sharpnose shark	6917	99.8	0.0	0.2
Carcharhinus acronotus	Blacknose shark	799	100.0	0.0	0.0
Carcharhinus isodon	Finetooth shark	620	100.0	0.0	0.0
Carcharhinus limbatus	Blacktip shark	375	45.0	24.0	31.0
Sphyrna tiburo	Bonnethead	168	100.0	0.0	0.0
Sphyrna lewini	Scalloped hammerhead shark	62	3.2	0.0	96.8
Carcharhinus brevipinna	Spinner shark	20	5.0	0.0	95.0
Sphyrna mokarran	Great hammerhead shark	6	100.0	0.0	0.0
Negaprion brevirostris	Lemon shark	1	0.0	100.0	0.0

Table 3. Total driftnet teleost and ray bycatch caught by species in order of decreasing abundance and species disposition for all observed trips, 2003.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
Euthynnus alletteratus	Little tunny	1169	92.6	0.0	7.4
Scomberomorus cavalla	King mackerel	596	21.5	0.2	78.3
Sphyraena barracuda	Great barracuda	300	100.0	0.0	0.0
Sciaenops ocellatus	Red drum	262	0.0	98.1	1.9
Rachycentron canadum	Cobia	80	70.0	1.3	28.7
Thunnus atlanticus	Blackfin tuna	36	100.0	0.0	0.0
Istiophorus platypterus	Atlantic sailfish	30	0.0	0.0	100.0
Rhinoptera bonasus	Cownose ray	22	0.0	59.1	40.9
Scomberomorus maculatus	Spanish mackerel	11	100.0	0.0	0.0
Echeneididae	Remora	9	0.0	33.4	66.6
Caranx hippos	Crevalle jack	8	0.0	0.0	100.0
Caranx crysos	Blue runner	8	87.5	0.0	12.5
Megalops atlanticus	Tarpon	5	0.0	0.0	100.0
Manta birostris	Manta ray	5	0.0	100.0	0.0
Coryphaena hippurus	Dolphin	5	100.0	0.0	0.0
Lobotes surinamensis	Tripletail	4	100.0	0.0	0.0
Aetobatus narinari	Spotted eagle ray	2	0.0	100.0	0.0
Makaira nigricans	Blue marlin	2	0.0	0.0	100.0
Diodontidae	Balloonfish	2	0.0	0.0	100.0
Acanthocybium solanderi	Wahoo	1	100.0	0.0	0.0
Trachinotus carolinus	Pompano	1	100.0	0.0	0.0
Elagatis bipinnulata	Rainbow runner	1	100.0	0.0	0.0
Pogonias cromis	Black drum	1	0.0	100.0	0.0
Pomatomus saltatrix	Bluefish	1	0.0	0.0	100.0

Table 4. Average size of sharks measured for all observed trips, 2003. N=the number of measured sharks.

Species	N	Size (cm FL)	S.D.	Percentage measured of the catch by species
Blacktip shark	382	133.3	17.8	5.6
Atlantic sharpnose shark	178	78.6	5.7	2.6
Blacknose	40	107.2	7.6	3.5
Spinner shark	20	168.0	10.9	95.2
Scalloped hammerhead shark	8	214.8	21.1	12.9
Great hammerhead shark	3	198.0	52.0	50.0
Bull shark	1	159.0	-	12.5

Table 5. Protected species interactions in the directed shark gillnet fishery for all observed trips, 2003. No interactions occurred during strikenet operations

LANDING DATE	LATITUDE LONGITUDE	SPECIES	DISPOSITION
03/01/03	27˚ 20.03’ N 080˚ 10.37’ W	*Tursiops truncatus*	Discard dead
6/23/03	27˚ 16.76’ N 080˚ 06.66’ W	*Pristis pectinata*	Released alive
6/26/03	27˚ 23.14’ N 080˚ 04.93’ W	*Tursiops truncatus*	Discard-condition unknown

Figure 1. Distribution of observed strike and drift gillnet sets during 2003.