

The Directed Shark Gillnet Fishery:  
Right Whale Season, 2002.

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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, 2001 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 Season (15 Nov-1 Apr) for vessels operating from West Palm Beach, FL to Sebastian Inlet, FL. The objectives of this report are to document protected species bycatch and to estimate catch and bycatch rates in the southeast US coastal directed shark gillnet fishery for the right whale season, 2002.

## Methods

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 ( $\pm 30$  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 (1998) and Carlson (unpublished data).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 is complete, observers randomly measured sharks when the vessel was returning to port. Fork length (FL, measured on a straight line), sex, and maturity state 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*

Strikenet vessels and fishing techniques has been previously described in Carlson (2000). For the right whale season 2002, strikenet vessels carried nets ranging from 273.6-1623.4 m long and 23.7-30.4 m deep. Mesh sizes ranged from 12.1-25.4 cm. Sets averaged 0.1 hrs ( $\pm 0.1$  S.D.) and soak times (time net was first set minus time haulback began) averaged 0.8 hrs ( $\pm 0.4$  S.D.). Haulback averaged 1.5 hrs ( $\pm 0.4$  S.D.). The entire strikenetting process (time net was first set minus time haulback was completed) averaged 2.3 hrs ( $\pm 0.8$  S.D.).

A total of 24 strikenet sets were observed from 1/5/02-3/28/02. However, 61 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. All strikenet fishing activities occurred during daylight hours. Observed strikenet fishing effort occurred between approximately 27° 11'-28° 25' N (Figure 1).

### ***Observed strikenet catches***

Observed catch in the strikenet fishery consisted of 4 species of sharks (99.3% of total number caught) and 3 species of teleosts and rays (0.7% of total number caught) (Table 1). No marine mammals or sea turtles were observed caught. The blacktip shark, *Carcharhinus limbatus*, made up 99.3% of the number of sharks caught. Bycatch included great barracuda, *Sphyraena barracuda*, cownose ray, *Rhinoptera bonasus*, and houndfish, *Tylosurus crocodilus*.

### ***Driftnet fishery***

A total of 41 driftnet sets were observed on 5 vessels from 12/17/01-3/31/02 in two major areas: between approximately 24° 45'-24° 52' N and 27° 15'-27° 49' N (Figure 1). Driftnet vessels carried nets ranging in length from 364.8-2280 m; depths from 7.6-10.6 m and mesh sizes from 12.7-38.1 cm. The most frequently used mesh size was 25.4 cm. With the exception of trips observed northwest of Key West, FL, usually only one set was made per night and the vessel returned to port the following morning. Trips observed northwest of Key West, FL remained at sea for several days. For all observed driftnet sets, set duration averaged 0.4 hrs ( $\pm 0.5$  S.D.). Haulback and processing of the catch averaged 2.9 hrs ( $\pm 1.9$  S.D.). Average soak time for the driftnet (time net was first set minus time haulback began) was 6.9 hrs ( $\pm 3.2$  S.D.).

### ***Observed driftnet catches***

The observed driftnet catch consisted of 10 species of sharks, 26 species of teleosts and rays, and 2 species of sea turtle. Total observed catch composition (percent of numbers caught) were 90.7% sharks, 9.2% teleosts and rays, and 0.05% sea turtles. Three species of sharks made up 86.9% (by number) of the observed shark catch (Table 2). These species were the Atlantic sharpnose shark, *Rhizoprionodon terraenovae*, blacktip shark, and blacknose shark, *Carcharhinus acronotus*. By weight, the shark catch was made up of blacktip shark (42.1%), blacknose (17.6%), and Atlantic sharpnose shark (15.4%). The average size of blacktip sharks harvested was 112.5 cm FL ( $\pm 1.6$  S.D; n=312).

Three species of teleosts and rays made up 56.2% by number of the overall non-shark species. These species were little tunny, *Euthynnus alletteratus*, (29.2%); king mackerel, *Scomberomorus cavalla* (15.2%); and great barracuda, *Sphyraena barracuda* (11.8%) (Table 3).

For incidental driftnet catch species, the highest proportion discarded dead (with observed catch greater than 10 specimens) was Atlantic sailfish, *Istiophorus platypterus* (97.7%), and cobia, *Rachycentron canadum* (25.7%) (Table 3). Remora, Echeneididae (fam.), had the highest discard proportion alive (72.2%).

### ***Average 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 3.1% of the total catch of sharks. By species, 100.0% of thresher shark, 48.0% of great hammerhead shark, 33.3% of tiger shark, 31.5% of scalloped hammerhead shark, 4.3% of blacktip shark, 0.7% of spinner shark, and 0.5% of bonnethead were measured. Average sizes based on these measurements are found in Table 4.

### *Protected resource interactions*

Interactions with protected resources (3 individuals) occurred in 3 separate sets for vessels fishing with drift gillnets. The species of sea turtle incidentally taken included leatherback turtle, *Dermochelys coriacea*, and loggerhead turtle, *Caretta caretta*. No mortalities were reported for any of these interactions (Table 5).

### **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 during the right whale season, 2002.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Carcharhinus limbatus</i>	Blacktip shark	4179	99.8	0.2	0.0
<i>Sphyrna barracuda</i>	Great barracuda	26	84.6	11.6	3.8
<i>Carcharhinus acronotus</i>	Blacknose shark	13	100.0	0.0	0.0
<i>Carcharhinus brevipinna</i>	Spinner shark	13	100.0	0.0	0.0
<i>Rhinoptera bonasus</i>	Cownose ray	1	0.0	100.0	0.0
<i>Sphyrna mokarran</i>	Great hammerhead shark	1	0	0	100.0
<i>Tylosurus crocodilus</i>	Houndfish	1	0	100.0	0.0

Table 2. Total driftnet shark catch by species and species disposition in order of decreasing abundance for all observed trips during the right whale season, 2002.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	1885	97.9	0.5	1.6
<i>Carcharhinus limbatus</i>	Blacktip shark	1777	98.4	0.0	1.6
<i>C. acronotus</i>	Blacknose shark	1531	99.9	0.1	0.0
<i>Sphyrna tiburo</i>	Bonnethead	402	97.5	0.2	2.3
<i>C. brevipinna</i>	Spinner shark	132	100.0	0.0	0.0
<i>C. isodon</i>	Finetooth shark	125	100.0	0.0	0.0
<i>S. mokarran</i>	Great hammerhead shark	75	61.4	0.0	38.6
<i>S. lewini</i>	Scalloped hammerhead shark	38	97.3	0.0	2.7
<i>Galeocerdo cuvieri</i>	Tiger shark	3	66.6	0.0	33.4
<i>Alopias vulpinus</i>	Common thresher shark	1	100.0	0.0	0.0

Table 3. Total driftnet teleost and ray bycatch by species in order of decreasing abundance and species disposition for all observed trips during the right whale season, 2002.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Euthynnus alletteratus</i>	Little tunny	178	96.1	0.0	3.9
<i>Scomberomorus cavalla</i>	King mackerel	93	75.3	0.0	24.7
<i>Sphyraena barracuda</i>	Great barracuda	72	100.0	0.0	0.0
<i>Rachycentron canadum</i>	Cobia	66	68.2	6.1	25.7
<i>Istiophorus platypterus</i>	Atlantic sailfish	43	0.0	2.3	97.7
<i>Caranx hippos</i>	Crevalle jack	41	97.5	2.5	0.0
<i>Sarda sarda</i>	Atlantic bonito	20	100.0	0.0	0.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	16	87.5	0.0	12.5
<i>Echeneididae</i>	Remora	11	0.0	72.7	27.3
<i>Aetobatus narinari</i>	Spotted eagle ray	9	0.0	100.0	0.0
<i>Pomatomus saltatrix</i>	Bluefish	9	44.4	0.0	55.5
<i>Mobula hypostoma</i>	Devil ray	6	0.0	33.3	66.7
<i>Rhinoptera bonasus</i>	Cownose ray	6	33.3	66.6	0.0
<i>Thunnus atlanticus</i>	Blackfin tuna	4	100.0	0.0	0.0
<i>Coryphaena hippurus</i>	Dolphin	3	100.0	0.0	0.0
<i>Lobotes surinamensis</i>	Tripletail	3	100.0	0.0	0.0
<i>Megalops atlanticus</i>	Tarpon	3	0.0	33.3	66.7
<i>Opisthonema oglinum</i>	Atlantic thread herring	3	0.0	33.3	66.7
<i>Selene setapinnis</i>	Atlantic moonfish	3	66.7	0.0	33.3
<i>Acanthocybium solanderi</i>	Wahoo	2	100.0	0.0	0.0
<i>Caranx crysos</i>	Blue runner	2	100.0	0.0	0.0
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	2	0.0	50.0	50.0
<i>Manta birostris</i>	Atlantic manta ray	2	0.0	100.0	0.0
<i>Trachinotus falcatus</i>	Permit	2	100.0	0.0	0.0
Serranidae	Sea basses	2	0.0	0.0	100.0
<i>Bairdiella chrysoura</i>	Silver perch	1	100.0	0.0	0.0
Carangidae	Jacks	1	100.0	0.0	0.0

<i>Mycteroperca microlepis</i>	Gag grouper	1	100.0	0.0	0.0
<i>Tylosurus crocodilus</i>	Houndfish	1	0.0	0.0	100.0
<i>Trachinotus carolinus</i>	Florida pompano	1	0.0	0.0	100.0

Table 4. Average size of sharks measured for all observed trips during the right whale season, 2002.

Species	N	Size (cm FL)	S.D.	Percentage measured of the catch by species
Blacktip shark	258	117.3	27.0	4.3
Great hammerhead shark	36	147.2	48.8	48.0
Scalloped hammerhead shark	12	62.5	3.0	31.5
Spinner shark	2	166.0	15.5	0.7
Bonnethead	2	65.5	12.5	0.5
Common thresher shark	1	213.0	-	100.0
Tiger shark	1	147.0	-	33.3

Table 5. Protected resource interactions in the directed shark gillnet fishery for right whale season, 2002. No interactions occurred during strikenet operations.

LANDING DATE	LATITUDE LONGITUDE	SPECIES	DISPOSITION
01/21/02	27° 18' 40" N 080° 06' 30" W	<i>Dermochelys coriacea</i>	Released alive
02/09/02	27° 17' 41" N 080° 06' 39" W	<i>Caretta caretta</i>	Released alive
02/19/02	27° 21' 16" N 080° 09' 42" W	<i>Dermochelys coriacea</i>	Released alive

Figure 1. Distribution of observed strike and drift gillnet sets during the right whale season, 2002.

